Assessing Residential Cooking Fires in the City of Tampa

Michael M. Gonzalez, Ph.D.

Tampa Fire Rescue, Tampa, Florida
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, idea, expression, or writings of another.

Signed: ________________________________
Abstract

The identified problem for this research was that Tampa Fire Rescue (TFR) has not conducted a residential cooking fire risk assessment study. The purpose of this research was to conduct a residential cooking fire risk assessment for the City of Tampa (COT). Descriptive research methodology was utilized to focus on the research questions: how are residential cooking fires identified, what neighborhoods had the highest frequency of residential cooking fire deaths and/or injuries in the COT from 2005-2010, what are the demographics associated with the population living in COT neighborhoods where residential cooking fire deaths and/or injuries occurred compared to the neighborhoods where no deaths or injuries occurred from 2005-2010, what are the neighborhood characteristics and demographics associated with the population living in other fire department jurisdictions where the highest frequency of residential cooking fires are occurring and what risk reduction strategies are being used by other fire departments to reduce the frequency of residential cooking fires?

A literature review, census data review, personal communications and a questionnaire were used to collect information to answer the research questions. The questionnaire was distributed electronically through the Florida Fire Chief’s Association and to all the participants of the January 2010 Executive Development and the December 2010 Executive Analysis of Community Risk Reduction courses. The results of the COT assessment identified 8 out of 20 neighborhoods suffered a residential cooking fire death and/or injury from 2005-2010. TFR did not collect victim specific demographic data; therefore a comparison with national trends regarding causal factors could not be achieved. Several recommendations were made to include developing partnerships, promoting “smart stove” technology and increasing the data collection variables associated with victims of residential cooking fires so that comparisons with national
data can be achieved and fire prevention programs can be accurately tailored to target at risk populations.
# Table of Contents

Certification Statement.................................................................................................................. 2
Abstract........................................................................................................................................ 3
Table of Contents............................................................................................................................ 5
Introduction...................................................................................................................................... 6
Background and Significance.......................................................................................................... 7
Literature Review............................................................................................................................ 9
Procedures..................................................................................................................................... 32
Results.......................................................................................................................................... 35
Discussion...................................................................................................................................... 45
Recommendations.......................................................................................................................... 51
Reference List................................................................................................................................. 54

## Appendices

Appendix A: Assessing Residential Cooking Fires Questionnaire............................................. 60
Appendix B: Data Collection Checklist for Fire Departments......................................................... 63
Introduction

Throughout the two-week Executive Analysis of Community Risk Reduction (EACRR) course at the National Fire Academy (NFA), one phrase continued to resonate; “If it is predictable then it is preventable” (M. Wallace, personal communication, December 5, 2010). In theory this statement sounds easily achievable; however, in actuality the desired outcome (effective prevention) can only be accomplished if data pertinent to existing risks are accurately collected and routinely analyzed so that applicable prevention strategies can be tailored to address specific causal factors. Tampa Fire Rescue (TFR) has processes in place to collect, store and analyze data associated with the services that are provided. Records pertaining to emergency calls for service are stored electronically in a database and are also sent to the National Fire Incident Reporting System (NFIRS) collection site. The problem is that TFR has not utilized existing fire response data to conduct a residential cooking fire risk assessment study. Unfortunately, this lack of knowledge prevents the organization from developing preventable programs aimed at reducing the frequency and severity of residential cooking fires. The purpose of this research is to conduct a residential cooking fire risk assessment for the City of Tampa (COT).

The descriptive research methodology will be utilized for this project as it is suitable for the “collection of data to answer questions concerning the current status of the subject of the study” (National Fire Academy, 2009a, p. 14). The research questions used as the foundation for this project include: How are residential cooking fires identified? What neighborhoods had the highest frequency of residential cooking fire deaths and/or injuries in the COT from 2005-2010? What are the demographics associated with the population living in COT neighborhoods where residential cooking fire deaths and/or injuries occurred compared to the neighborhoods where no
deaths or injuries occurred from 2005-2010? What are the neighborhood characteristics and demographics associated with the population living in other fire department jurisdictions where the highest frequency of residential cooking fires are occurring? What risk reduction strategies are being used by other fire departments to reduce the frequency of residential cooking fires?

Background and Significance

The COT is “the nation’s 54th largest city” (City of Tampa, 2010a, p. 1), the “third largest city with 334,000 plus residents” in the State of Florida as reported in 2006 (COT, 2010b, p. 156) and is “projected to increase by 13% between 2005 and 2015” (COT, 2006, p. 4). The initial incorporation of the city occurred on December 15, 1855 (COT, 2010b) with many subdivisions starting to be built in 1923 (COT, 2010c). TFR station #6 was built in 1914 and is still in use today. “Between 1990 and 2003 (the city’s last annexation), Tampa’s land area increased by 7% from approximately 108.4 square miles to 116.1 square miles” (COT, 2006, p. 3). Given the variability associated with the age of the residential construction and the demographic diversity associated with large metropolitan communities, TFR is in need of conducting a community fire risk assessment. Residential cooking fires will be the focus of this assessment because it has been identified as the leading cause of fire related deaths and injuries in the COT from 2005-2010 as a result of an EACRR pre-course assignment.

The significance of this research is that TFR has recently experienced two incidents at two different fire stations involving cooking equipment. The first was an unattended cooking fire that damaged a fire station on April 15, 2005 resulting in approximately seven months of reconstruction and thousands of dollars spent on repairs. The second occurred on January 29, 2011 during shift change when a firefighter was attempting to ignite the pilot light on the gas stove resulting in a flash fire. The firefighter suffered burns to the face and arms and was
transported to the hospital for treatment. The injury resulted in the firefighter being placed on off duty status for two shifts and light duty status for three additional shifts. In addition, this researcher had several personal experiences with the devastating aftermath of residential cooking fires. As a former Fire Investigator and Supervisor of the Fire Investigation Division, this researcher investigated the origin and cause of many residential cooking fires from 1993 through 2003, with several resulting in great bodily harm and death to COT residents. The most difficult scenes to investigate were those involving children, who had no control over the fate they suffered as a result of cooking fires.

This project has direct linkage to goals identified by the COT, the U. S. Fire Administration (USFA) and the National Fire Academy’s EACRR course. In 2003 the Mayor of the COT unveiled a strategic plan identifying “six strategic focus areas to transform the City of Tampa into a diverse and progressive city” (COT, 2010d, p. 2). The first focus area Invest in Tampa’s Neighborhoods, identified public safety as one of the highest priorities to “advance the quality of life in Tampa’s diverse neighborhoods” by providing quality fire protection (COT, 2010d, p. 3). The results obtained by this project may provide the platform for TFR to increase the quality of life for their citizens by identifying trends associated with residential cooking fires, thus providing the opportunity to develop proactive measures aimed at educating and equipping at risk populations.

This potential outcome targets the U. S. Fire Administration’s Goal 1: Reduce Risk at the Local Level through Prevention and Mitigation. In this goal, the first operational initiative states “expand initiatives in public fire and safety education through various avenues to reach all segments of the population, particularly high risk groups” (U. S. Fire Administration, 2010a, p. 18). In addition, the project is linked to the EACRR course through the expectation of the
Executive Fire Officer to “help lead the process of identifying and prioritizing community risk” (NFA, 2009b, p. SM 1-17). This will be accomplished by establishing priorities “based on local data and trends” (NFA, 2009b, p. SM 2-23) “on the people affected by those risk” (NFA, 2009b, p. SM 2-3). Through the use of data analysis, TFR can “zero in on the highest risk population” (NFA, 2009b, p. SM 2-23) to identify causal factors that can be targeted through risk reduction strategies.

Literature Review

A review of existing literature was completed to gather information to determine how cooking fires are identified, classified, reported and how the collected information is disseminated throughout the fire service community. Information will also be analyzed to report the frequency, deaths and injuries, causal factors and existing risk reduction strategies associated with residential cooking fires.

Identification of Cooking Fires

Fires are reported in several ways. The most common is through the 911 emergency notification system. The nation’s “911 emergency telephone system was inaugurated” in 1968 (Today in History, 2011, p. 27). Other methods include those reported by law enforcement officers that observe a fire while on patrol by using their department’s internal radio communication system and those that are reported face-to-face by citizens, who make the notification in person to their neighborhood fire station. Once the fire has been extinguished, state and local governing documents mandate that an investigation to identify the fire’s origin and cause is conducted. The State of Florida Fire Code Chapter 69A-61 Rules of the Bureau of Fire and Arson Investigations, Section (3) Conduct of Initial Investigation states,

(a) Any time a fire or explosion has occurred which results in property damage in any
municipality, county, or special district having an organized fire department, any local fire official whose intent is to request the State Fire Marshal to perform an investigation under Section 633.03, F.S., shall make or shall cause to be made an initial investigation of the circumstances surrounding the cause and origin of such fire. Law enforcement officers are permitted to, if any chooses, conduct such initial investigations.

(b) If the fire occurs in a municipality, county, or special district which has no organized fire department or designated arson investigations unit within its law enforcement providers, the municipality, county, or special district is permitted to request the bureau to conduct such initial investigation. (Florida Department of State, 2011, para. 4)

The aforementioned code does not specify the level of training that is required by the individual assigned to conduct the initial origin and cause investigation. A firefighter, fire officer or specially trained fire investigator can perform this function. In the COT, a specially trained fire investigator is dispatched to respond to every working structure fire to fulfill this mandate (Tampa Fire Rescue, 2010). The state rule is adopted locally by the COT Charter in Chapter 11 Fire Prevention and Protection, Section 11-8 Investigation of Fires, which states,

The Fire Marshal and his designated representatives shall investigate the origin, cause, and circumstances of every fire or explosion occurring within the jurisdiction of the city, which is of suspicious nature or which involves loss of life or injury to a person or by which property has been destroyed or damaged or an attempt has been made to destroy property, or cause loss of life or injury. Where it has been determined through such investigation that the fire is of a criminal nature, it shall be the responsibility of the Fire Marshal or his designated representative to conduct further investigation to determine who is criminally responsible, to
develop a case for presentation to the State Attorney, and arrest those for whom probable cause has been established that a criminal act has been committed. (COT, 2009, p. 3)

The science of fire investigations is very complex. The National Fire Protection Association (NFPA) 921, Guide for Fire and Explosion Investigations was developed “to assist in improving the fire investigation process and the quality of information on fires resulting from the investigative process” (National Association of Fire Investigators, 2011, p. 1). The intent of NFPA 921 is to encourage the use of a systematic approach to analyzing each fire scene in the same way to facilitate an efficient and accurate determination of the origin and cause of the fire and/or explosion (National Fire Protection Association, 2008). This systematic approach has sometimes been referred to as conducting a backward investigation. In short, the theory behind this concept is that you start your investigation at the “least damaged area”, which is often the exterior of the structure, and work systematically “toward the most damaged area” (NFPA, 2008, p. 313). Technically the heaviest damaged area should be where the fire burned the longest, thus the area or point where the fire originated. Although this is generally the rule, some exceptions such as ventilation openings and different types of fuel sources may create heavier fire damage away from where the fire actually started.

Starting with the exterior of the structure, the person conducting the fire investigation will assess the condition of the window openings, walls directly above the window openings and eaves directly above the window openings to identify the areas that have the heaviest smoke and/or fire damage. This assessment will assist with identifying the possible interior location of the structure with the heaviest fire damage (NFPA, 2008). Once inside the systematic assessment continues by working from the least damaged area to the heaviest. This process is facilitated by observing fire patterns. “Fire patterns are the visible or measurable physical
change” (NFPA, 2008, p. 20) of material, such as furniture, clothing, appliances, wall coverings and structural components. Not all types of materials leave usable fire patterns that can be traced back to the fire’s place of origin. Lightly dense material such as paper items and thin draperies can possibly be heated to the extent of being completely consumed by the fire and/or relocated in the room by the force of the water pressure used to extinguish the fire. More dense materials such as furniture, appliances, wall studs and roof rafters will usually still be in the same location they were prior to the fire and easily traceable; however, their physical appearance may have been altered depending on the amount of heat they were exposed to. For example, once a television has been exposed to heat or fire, its physical appearance may be altered to look like a glob of melted plastic, with some melted glass and wires mixed in. Wood will have different levels of charring. The heavier the charring, the longer the piece of wood was exposed to a heat source.

The fire pattern assessment will continue from room to room until the room with the heaviest damage is identified. This location is referred to as the area of origin (NFPA, 2008). Once in the area of origin, the fire investigator will continue the same systematic analysis to determine the location within the room with the heaviest damage. This location is where the point of origin of the fire will usually be identified. “The point of origin is defined as the exact physical location where the heat source and a fuel come in contact with each other and a fire begins” (NFPA, 2008, p. 310). Once the point of origin is identified the investigation will focus on locating the fire cause. “The fire cause is the circumstances, conditions, or agencies that bring together a fuel, ignition source, and oxidizer (such as air or oxygen) resulting in a fire or a combustion explosion” (NFPA, 2008, p. 20). Determining the fire cause is facilitated by identifying and assessing “all heat-producing devices, appliances, or equipment that could have caused the
ignition” (NFPA, 2008, p. 336). If the source of heat is the result of cooking equipment being used for food preparation, the fire is then identified as a cooking fire.

Classification and Reporting of Residential Cooking Fires

“In 1963 the National Fire Protection Association (NFPA) formed a technical committee to devise a uniform system of fire reporting to encourage fire departments to use a common set of definitions” (National Fire Incident Reporting System, 2008, p. 1-5) to classify fires. As a result, NFPA 901 Standard Classifications for Incident Reporting and Fire Protection Data was created and offered as a guide for use by the fire service industry. Even though many fire departments throughout the nation have adopted various NFPA standards, compliance is not mandatory. Unfortunately, the lack of mandatory compliance may have the potential to prevent fire service professionals from validating the true extent of their community’s and the nation’s destructive impact from fire.

What is available to the fire service community that has adopted NFPA 901 is a voluntary self-reporting system known as the National Fire Incident Reporting System (NFIRS). “The United States Fire Administration (USFA), through the National Fire Data Center (NFDC) plays a significant role in collecting and distributing data concerning the causes of fires and consequences to fire departments and their communities” (NFIRS, n.d., para. 1.) via the data collected from NFIRS. B. Pabody, (personal communication, December 14, 2010) the Chief of the NFDC, reported that “approximately 22,000 out of 30,000 fire departments use NFIRS so the data collected is not exhaustive.” However, J. Kromrey, (personal communication, January 25, 2011) Professor with the Department of Educational Measurement and Research at the University of South Florida explained,
Although 100% participation is not achieved, having a sample that represents 73.3% of the population provides extremely precise estimates of the entire population’s characteristics. For example, a 95% confidence interval for a percentage will be no larger than plus/minus 0.34% (that is, if the sample of 22,000 departments indicates that 50% of household fires are associated with stove-top cooking, we can be 95% confident that the percentage of household fires associated with stove-top cooking in the entire population of 30,000 departments is somewhere between 49.66% and 50.34% -- a very narrow confidence interval).

As pointed out, even though the large sample size increases the validity of the data collected by NFIRS and supports the generalizability of the results to the nation as a whole, potential reliability issues regarding inconsistency of the data being entered may exist. B. Pabody, (personal communication, December 14, 2010) explained that “28% of all fires and 43% of fatal fires reported in NFIRS are classified as unknown.” The lack of an actual fire cause in this many incidents reinforces the fact that the fire problem associated with residential cooking fires may be greater than what is being documented and reported.

NFIRS is an electronic data collection system used by fire departments “to report fires and other incidents to which they respond and to maintain records of these incidents in a uniform manner” (NFIRS, 2008, p. 1-5). Uniformity is achieved by the use of standard codes that are identified in NFPA 901 and outlined in the NFIRS data entry manual. The information collected by NFIRS provides “relevant and accessible data to make more effective decisions, plans and justifications for fire department operations and administration” (NFIRS, n.d., para. 1).

The classifications associated with residential cooking fires are outlined in the NFIRS Chapter 4 Fire Module and Chapter 5 Structure Fire Module. In Chapter 4 under Section D-1 the fire officer completing the fire report will identify the area of fire origin (such as code 24
cooking area, kitchen); D-2 the heat source (such as code 12 radiated or conducted heat from
operating equipment); D-3 the item first ignited (such as code 76 cooking materials); and D-4 the
type of material first ignited (such as code 27 cooking oil). In Chapter 4 under Section E-1 the
officer will identify the cause of ignition (such as code 2 unintentional caused by careless,
reckless or accidental acts); E-2 the factors contributing to the ignition (such as code 53
equipment unattended); and E-3 the human factors contributing to ignition (such as code 1 asleep
or code 2 possibly impaired by alcohol or drugs). In Chapter 4 under Section F-1 the officer will
identify the equipment involved in ignition (such as code 646 range with or without oven or
cooking surface). In Chapter 5 under Section I-1 structure type the officer will identify the type
of occupancy (such as code 1 residential); and I-2 building status (such as code 2 occupied).

Collection and Dissemination of Residential Cooking Fire Statistics

Fire Data Center to gather and analyze information on the magnitude of the Nation's fire
problem” (USFA, 2011, p. 1). To fulfill this obligation, the NFDC established NFIRS to serve
as the data collection point for the nation’s fire service. National fire statistics collected from
NFIRS regarding residential cooking fires is made available by the USFA through various
technical reports. The technical reports can be obtained in an electronic format via the
http://www.usfa.dhs.gov/statistics website or in a hard copy format via a request to the NFA.
The data produced by the USFA is considered the most reliable because the information
collected is provided directly by fire departments that use NFIRS.

Another nationally based fire reporting data source comes from the U. S. Consumer Product
Safety Commission (USCPSC). In contrast to the USFA, the data provided by the USCPSC is
collected by telephone surveys of individuals that experienced non-fire department attended fires
(Greene & Andres, 2009). In addition, the USFA collects its data daily while the USCPSC has only conducted data collection through three surveys (1974, 1984 and 2004-2005). Both sources have advantages regarding the ability to explain the nation’s fire problem. The data from the USFA provides information on the actual incidents that fire departments responded to while the data from the USCPSC provides the ability to assess the totality of the nation’s fire problem by including the amount of fires that are not reported to fire departments.

The residential cooking fire data at the local and state level is made available through the http://www.nfirs.fema.gov website and can be obtained by organizations that enter data into the system. At the local level, each participating fire department has the ability to access records relative to their jurisdiction. To ascertain current or historical data at the state level, the local fire department can make a request to their state representative. Having the availability of accurate information from the national, state and local levels is vital in achieving cross sectional and longitudinal analyses to identify emerging patterns. Cross sectional analysis can be achieved by assessing recently submitted data to assist with benchmarking a community’s fire risk with the state and nation to quickly identify and address current trends. Longitudinal analysis can be achieved by assessing historical data to assist with predicting potential future trends as well as evaluating the effectiveness of fire risk reduction programs.

Residential Cooking Fire Statistics

This section will present information based on the reported number of residential cooking fires and the reported number of deaths and injuries resulting from residential cooking fires in the U. S., State of Florida and the COT.
Residential Cooking Fires

Residential structure fires accounted for the greatest losses in the U.S. (Huang, 2009) representing 78% of all structure fires in 2007 (Karter, 2008). Cooking fires are the leading cause of residential structure fires (Ahrens, 2010; Greene & Andres, 2009; Huang, 2009; Ready America, 2011; USFA, 2010b; USFA, 2005). “In 2002, approximately 30% of reported structure fires first ignited in a kitchen” (USFA, 2004, p. 1). In 2003, there were 118,700 residential structure fires attributed to cooking equipment (Madrzykowski, Hamins & Mehta, 2007; USFA, 2007), which represented the highest rate since 1982 (USFA, 2007). In 2005, our nation’s fire service responded to 146,400 residential structural fires that involved cooking equipment (Hall 2008). Ahrens (2010) reported “one of every 22 occupied households had a cooking fire” (p. 5) totaling an average of 154,700 residential fires, which “accounted for 41% of all reported home fires” (p. 1) from 2004-2008. D. Marron, (personal communication, January 27, 2011) with the NFIRS Support Center explained,

National statistics for 2009 and 2010 were not available at the time of this review because publication of the national data is usually at least two years behind due to the quality assurance measures that occurs at the local and state levels prior to submission and acceptance at the national level.

In the State of Florida, residential cooking fires accounted for approximately 30% of all structure fires from 2005-2010 (NFIRS, 2011). The COT reported that residential cooking fires accounted for approximately 37% of all structure fires from 2005-2010 (COT, 2011). Frequencies and percentages for the number of residential cooking fires in the State of Florida and COT from 2005-2010 are presented in Table 1.
Table 1

*Frequencies and Percentages for Residential Cooking Fires in the State of Florida and City of Tampa from 2005-2010*

<table>
<thead>
<tr>
<th>Year</th>
<th>Florida Frequency</th>
<th>Florida Percentage</th>
<th>Tampa Frequency</th>
<th>Tampa Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>3,702</td>
<td>29.09</td>
<td>158</td>
<td>27.48</td>
</tr>
<tr>
<td>2006</td>
<td>3,978</td>
<td>28.88</td>
<td>160</td>
<td>27.07</td>
</tr>
<tr>
<td>2007</td>
<td>3,845</td>
<td>29.57</td>
<td>147</td>
<td>28.38</td>
</tr>
<tr>
<td>2008</td>
<td>4,469</td>
<td>32.54</td>
<td>131</td>
<td>63.59</td>
</tr>
<tr>
<td>2009</td>
<td>4,509</td>
<td>30.76</td>
<td>116</td>
<td>42.49</td>
</tr>
<tr>
<td>2010</td>
<td>4,389</td>
<td>30.65</td>
<td>89</td>
<td>35.18</td>
</tr>
</tbody>
</table>

While these numbers identify a large residential cooking fire risk, the data presented are not truly representative of the totality of the problem. “The U.S. Consumer Product Safety Commission (CPSC) is charged with protecting the public from unreasonable risks of injury or death from thousands of types of consumer products under the agency's jurisdiction” (U. S. Consumer Product Safety Commission, 2011, p. 1). In order to acquire feedback regarding the relationship between consumer products and fire safety, the USCPSC conducts “national telephone probability sample survey of unreported (and non-fire department attended) residential fires” (Greene & Andres, 2009, n.p.). The USCPSC reported that 96.4% of the total number of residential fires went unreported to fire departments in 1984 and 96.6% went unreported in 2004-2005 (Greene & Andres, 2009). In addition, the data is also not representative of the totality of cooking fires. Ahrens (2010) reported that the “CPSC’s 2004-2005 residential fire survey found
that cooking equipment was involved in 4.7 million unreported home fires per year” (p. 5) resulting in “approximately 99% of the cooking fires are never reported to fire departments” (Ahrens, Hall, Comoletti, Gamache & LeBeau, 2007, p. 15).

Deaths and Injuries Associated with Residential Cooking Fires

In addition to accounting for the greatest number of fires in our nation, residential occupancies is also the settings where the most fire deaths and injuries occur (Ahrens, 2010; Ahrens et al., 2007; Huang, 2009). “From 2003 to 2005, an average of 2,740 people died, and 13,090 people were injured because of fires in residences” (USCPSC, 2009, p. 50). In 2007 residential fires caused 2,865 deaths, which accounted for 78% of the total number of fire related deaths and 14,000 injuries (Karter, 2008). In addition to being the most common cause of residential fires, cooking fires are also attributed to the greatest frequency of fire deaths and injuries. “In 2002, approximately 30% of reported structure fires first ignited in a kitchen and accounted for 12% of deaths and 32% of injuries” (USFA, 2004, p. 1). In 2003 cooking equipment fires resulted in 250 fatalities and 3,880 injuries (Madrzykowski et al., 2007). From 2004 to 2005 residential cooking fires resulted in 460 deaths accounting for 17% of home fire deaths and 4,850 injuries accounting for 37% of home fire injuries annually (Ahrens, 2010). Hall (2008) reported that in 2005, residential cooking fires that involved cooking equipment resulted in approximately 480 civilian deaths and 4,690 civilian injures. Statistical data identifying the rate of deaths and injuries resulting from residential cooking fires after 2005 was not available at the time of this review.

While these figures identify a large cooking fire risk associated with deaths and injuries to our nation as a result of this type of fire cause, these numbers are not truly representative of the totality of the deaths and injuries that occur annually for three potential reasons. The first is
associated with the aforementioned USCPSC report that cited 96.4% of the total number of residential fires went unreported in 1984 and 96.6% went unreported in 2004-2005 (Greene & Andres, 2009). In addition, the study also discovered approximately 102,000 cooking fire injuries did not include a fire department response. “This is 21 times the average number of civilian injuries per year in reported fires during 2004-2008” (Ahrens, 2010, p. 5). Catherine Carrubba (personal communication, June 9, 2011) emergency room physician at Tampa General Hospital explained that “emergency room personnel must notify law enforcement when a gun shot victim arrives at a hospital; however, there are no such requirements to notify fire departments or law enforcement when a burn patient arrives, unless child abuse is suspected.”

The second reason is associated with the lack of tracking patient progress once the victim has been transferred from the responding agency to the hospital. For example, K. McCarthy (personal communication, January 26, 2011) with the State of Florida NFIRS explained,

If a person is injured in a fire and later succumbs to the injury and dies in the hospital, a change in NFIRS database does not occur unless the responding agency makes the change.

As such, the reported number of deaths may be higher than what has been reported.

The third reason is associated with the fact that 43% of fatal residential fire incidents reported to the NFIRS do not have sufficient information to classify the cause of the fire, attributing to another possible percentage of residential cooking fire deaths and injuries that is not accounted for (USFA, 2010c). Finally, compounding this issue even further is the potential for reporting errors caused by the fire departments entering the data into the NFIRS.

The State of Florida reported 10 deaths from 2005-2010 and approximately 147 injuries per year during the same time period (NFIRS, 2011). Frequencies and percentages for the reported
number of residential cooking fire deaths and injuries in the State of Florida from 2005-2010 are presented in Table 2.

Table 2

*Frequencies and Percentages for Residential Cooking Fire Deaths and Injuries in the State of Florida from 2005-2010*

<table>
<thead>
<tr>
<th>Year</th>
<th>Deaths</th>
<th>Percentage</th>
<th>Injuries</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>0</td>
<td>0</td>
<td>125</td>
<td>22.08</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>5</td>
<td>7.14</td>
<td>131</td>
<td>22.98</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>0</td>
<td>0</td>
<td>116</td>
<td>22.26</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>1</td>
<td>1.30</td>
<td>144</td>
<td>24.91</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>1</td>
<td>1.33</td>
<td>186</td>
<td>25.34</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>3</td>
<td>4</td>
<td>182</td>
<td>24.69</td>
<td></td>
</tr>
</tbody>
</table>

TFR reported three deaths and 14 injuries resulting from residential cooking fires from 2005-2010 in the COT (COT, 2011). Frequencies and percentages for the reported number of residential cooking fire deaths and injuries in the City of Tampa from 2005-2010 are presented in Table 3.
Table 3

*Frequencies and Percentages for Residential Cooking Fire Deaths and Injuries in the City of Tampa from 2005-2010*

<table>
<thead>
<tr>
<th>Year</th>
<th>Deaths Frequency</th>
<th>Deaths Percentage</th>
<th>Injuries Frequency</th>
<th>Injuries Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>1</td>
<td>16.66</td>
<td>3</td>
<td>33.33</td>
</tr>
<tr>
<td>2006</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>12.50</td>
</tr>
<tr>
<td>2007</td>
<td>2</td>
<td>40</td>
<td>2</td>
<td>40</td>
</tr>
<tr>
<td>2008</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>33.33</td>
</tr>
<tr>
<td>2009</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>11.1</td>
</tr>
<tr>
<td>2010</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>25</td>
</tr>
</tbody>
</table>

An example reinforcing the aforementioned potential for variations in data is illustrated by the fact that the NFIRS data presented in Table 2 for the State of Florida reported no residential cooking fire deaths in 2005 and 2007; however, the records maintained in the COT Fire Marshal’s Office presented in Table 3 identified one fatality in 2005 and two fatalities in 2007.

Causal Factors Associated with Residential Cooking Fires

An analysis of causal factors is an important component of assessment based research in order to identify the existence of potential relationships. “Causal factors must be addressed in order for risk to be reduced” (NFA, 2009b, p. SM 2-7). This section will discuss the correlation between human behavior, gender, age, renters, socioeconomic status and type of cooking equipment used with residential cooking fires.
Human Behavior

The leading causes of residential fires are both directly and indirectly attributable to human behavior and not equipment malfunction (Ahrens et al., 2007; USFA, 1998). This contributing factor is largely attributed to the inability of some individuals to clearly delineate the difference between perceived risk and actual risk resulting in the decision to engage in unsafe behaviors (Gonzalez, 2002). Many preventable injuries and deaths associated with residential cooking fires are directly proportionate to the amount of unnecessary risk individuals expose themselves to. An example of unnecessary risk is when building occupants choose fight over flight when confronted with a fire situation. “In 2004-2008, three of every five (59%) civilians injured in home fires involving cooking equipment were hurt while attempting to fight the fire themselves” (Ahrens, 2010, p. 16).

Unattended cooking equipment was the leading contributing factor in home cooking fires (Ahrens, 2010; Madrzykowski et al., 2007; USFA, 2005; USFA, 2004). This preventable act is responsible for “half (48%) of the civilian deaths and 45% of the civilian injuries” (Ahrens, 2010, p. 9). Falling asleep is the leading human factor contributing to unattended cooking fires and is responsible for 41% of home cooking fire deaths (Madrzykowski et al., 2007). This finding is not unexpected as 33% of fatal residential fires occur between midnight and 5 a.m. (USFA, 2010d, p. 2). Individuals simply forgetting about food in the oven or on the stove accounted for 30% of cooking fires (USFA, 2005). Individual social roles such as parenting are another factor that can result in unattended cooking fires. Jennings (1996) reported an increase in the probability of experiencing a cooking fire when adults leave the cooking area unattended to take care of children.
Gender

“In 2004-2008 males accounted for 54% of the home cooking fire deaths and 47% of cooking fire injuries” (Ahrens, 2010, p. 14). This realization could arguably be unpredictable given the amount of time that men are tasked with cooking duties compared to women (Ahrens et al., 2007). A potential cause for males being injured more frequently than females when compared to the lower amount of potential exposure to cooking fires is because males “are much more likely to experience an increased activation of the physiological response” (James, 2011, p. 2) that triggers the fight over flight reaction. Unfortunately the fight “response can be extremely powerful, but it doesn’t always work to our advantage” (Ellis-Christensen, 2011, p. 1), thus the aforementioned citation that 59% of civilian injuries from 2004-2008 were a result of attempting to extinguish a cooking fire (Ahrens, 2010). Another contributing factor resulting in the decision to fight the fire may be “out of a sense of responsibility for the mistake of letting the fire start in the first place” (Chubb, 2003, p. 2).

Age

While individuals between ages 25 and 44 represented the greatest risk of experiencing a residential cooking fire, older adults and very young children were at the greatest risk of dying as a result of cooking fires (Ahrens, 2010; Ahrens et al., 2007). Ahrens et al. (2007) found that 12% of the U. S. population which is 65 years of age or older accounted for 30% of the cooking fire deaths and the 7% of the population which is under five years of age accounted for 9% of the cooking fire deaths. (p. 17)

Even though “older adults at least 65 years of age faced twice the risk of dying in a cooking fire as the population at large” (Ahrens, 2010, p. 14), their overall injury risk was the same as the
general population. The COT is similar to the national average having 12% of the population in the Tampa Bay area over 65 years of age (Stanley, 2010).

When individuals are confronted with a hazardous situation, such as a cooking fire, they must be able to use their senses keenly in order to quickly recognize the danger and react quickly to take action for personal safety and self-preservation. Unfortunately, cognitive and psychomotor processes slow down with age (Kramer & Willis, 2002; Salthouse, 1998; Schaie, 2000). The USFA (1998) found “that elderly persons experience more fires than other age groups due to the decline of their physical or mental capabilities” (p. 21). This deterioration of the cognitive process can be seen in the delayed reaction time it takes for older adults to react to stimuli (Gonzalez, 2002) and may be a contributing factor associated with why older adults are more vulnerable during fires.

“During 2004-2008, an average of 80 (17%) of the home cooking fire fatalities per year were children under five” (Ahrens, 2010, p. 13). Craig Fugate the Director of the Federal Emergency Management Agency supported this unfortunate statistic by explaining that “little kids just can’t get out by themselves” (Sternberg, 2011, p. 2). Young children are vulnerable due to their psychomotor inability to self evacuate or their lack of cognitive development resulting in a decision to seek a hiding place rather than evacuation. Even though cooking fire deaths is high for young children, this population has a very low rate of cooking fire injuries (Ahrens, 2010).

Ahrens et al. (2007) found that people between 25 to 34 years of age face the highest risk of a cooking fire injury, due to the fact that this population is more likely to have young children or other distractions present when they cook. From 2004-2008 “the highest non-fatal cooking fire injury rate was seen among people 15-24” (Ahrens, 2010, p. 14). This trend is likely attributed to not having the distraction often associated with caring for children.
Renters

It is arguably accepted that individuals take better care of their own property compared to the property belonging to others. This is why owner occupied properties are better maintained and seem to have lower fire risks than renter occupied property (Huang, 2009). M. Mariani, (personal communication, February 17, 2011) rental property manager explains that “most property owners use a vetting process to include a detailed rental application and background check when deciding whether or not to choose a particular tenant.” Furthermore, property owners are “more likely to be careful when engaged in cooking” (Huang, 2009, p. 37) and “more likely to invest in fire safety equipment than a renter” (USFA, 1998, p. 23).

Socioeconomic Status

Socioeconomic status is often based on income, occupation, education level, and community status (Learning Point Associates, 2011). Families with low socioeconomic status often lack the personal resources and have limited access to community resources, which places this population at greater risk to suffer a negative impact regarding health and safety (LPA, 2011). Stanley (2010) reported that in the Tampa Bay area, the drop in worker compensation was worst in our most urban counties, with between 12 to 15 percent living in poverty. Unfortunately, this statistic is also representative of the rest of the state and country.

There has been many studies linking low poverty rate to an increase in residential fires (Huang, 2009). Cooking was the leading cause of fires for low-income groups (Huang, 2009). A contributing factor may be that many lower socioeconomic individuals and families live in rental properties that often lack adequate routine maintenance and replacement of cooking equipment (Fahy & Miller, 1989). This problem can be compounded when occupants choose not to participate in routine preventive measures such as removing excess build up of grease in and
around cooking equipment. In addition, “poor people have almost no financial resources needed to invest in fire safety equipment, such as smoke detectors” (Huang, 2009, p. 36).

*Type of Cooking Equipment*

There are several methods predominantly used to heat food and various types of equipment to facilitate cooking. The most common heating methods resulting in the ignition of a fire, in order of their prevalence rate includes frying, boiling, baking and grilling. Ranges are the most common types of equipment used to produce the heat and is attributed to 59% of all cooking fires (USFA, 2005). “Ranges, with or without ovens, were involved in three out of five reported cooking fires and responsible in 89% of the civilian deaths and 77% of the civilian injuries” (Ahrens, 2010, p. 8). The 2004-2005 USCPSC study discovered that frying accounted for 63% of the fires, of which the fire began within the first 15 minutes in 83% of the fires, while 12% ignited within 30 minutes; Boiling accounted for 18% of the fires, of which the fire began within 15 minutes in 6% of the fires, while 63% ignited within 30 minutes; Baking accounted for 10% of the fires, of which the fire began within 15 minutes in 88% of the fires, while 12% ignited within 30 minutes; Grilling accounted for 9% of the fires, of which the fire began within 15 minutes in 76% of the fires, while 24% ignited within 30 minutes (Ahrens, 2010).

*Prevention Strategies for Residential Cooking Fires*

“Cooking fires in 2003 were at the highest point since 1980” (Ahrens et al., 2007, p. 12). Although cooking fire deaths have generally declined from 1980 to 2003 there has been no consistency (Ahrens et al., 2007). Even though the statistics do not readily support cooking fire reductions, it is difficult to pass judgement on the effectiveness of prevention strategies due to the fact that it is impossible to factor in the large number of self-extinguished and unreported fires. In fact an argument may be presented to support the effectiveness of existing prevention
strategies since our nation’s population has steadily increased since 1980 without a proportionate increase in residential cooking fires or deaths and injuries attributed to cooking fires.

Fire service professionals are in the best position to drive fire risk prevention strategies; however, to accomplish this task they must commit to sharing the overwhelming emphasis on response missions with fire prevention initiatives (Lacy & Valentine, 2005). M. Salario (personal communication, February 25, 2011) a former COT Fire Marshal and State of Florida Bureau Chief of Fire Investigations explained,

Fortunately a fire service paradigm shift from being recognized primarily for reactive fire suppression to proactive fire prevention has been occurring, albeit incrementally. The most visible shift has been the integration of the traditional fire department mission statement ‘save lives and protect property’, with the inclusion of fire prevention language, resulting in a more collaborative message such as save lives and protect property by educating our community and developing fire safe attitudes.

In addition, Gielen, McDonald and Piver (2007) found that 86% of fire departments engage in fire safety education. Unfortunately, given the recent decline in our nation’s economy, many departments have been faced with budget cuts. As such, when faced with the reality of cutting emergency response services or fire safety education, the latter will understandably loose out. This is largely attributed to the fact that since fire prevention methods are never 100% effective, emergency response will always be required to mitigate the damage associated with fires (Hall & Cote, 2008). In fact, TFR had to make this difficult decision recently, which resulted in the reduction of one of the two fire life safety educators.

Dr. William Haddon Jr. considered the founding father of injury prevention coined the phrase “risk sequencing” to describe the phases in which accidents and injuries occur. “Risk
sequencing is the chain of events that set the stage for the event to occur and the outcome” (NFA, 2009b, p. SM 3-13). This sequence includes the pre-event, event and post-event. Risk reduction strategies should target the three phases. Obviously, if the event has occurred, the risk reduction strategies did not achieve the desired results, therefore event and post-event strategies should focus on mitigation by controlling the event from escalating. The EACRR course outlined the five E’s (education, enforcement, engineering, economic incentive and emergency response) as a realistic and effective approach to reducing community fire risk (NFA, 2009b).

The National Institute of Standards and Technology (NIST) is a non-regulatory federal agency that promotes innovation and industrial competitiveness in ways that enhance economic security and improve our quality of life (National Institute Standards Technology, 2011). Based on the data collected during a workshop focused on improving residential fire protection, education was determined to be the most effective strategy to address kitchen fires in the short term and engineering enhancements for the long term (Madrzykowski et al., 2007). When developing risk reduction strategies, “it is important to zero in on the highest risk population” (NFA, 2009b, p. SM 2-23). Hall (2005) identified the highest two at risk populations associated with fire incidents were education level and income. Unfortunately, even though the highest risk populations are easy to target, they tend to be the hardest in making an impact with prevention measures (Hall & Cote, 2008). Accordingly, the challenge life safety educators face has less to do with matching the population’s education level with the "right" information than with persuading the learner that the information being received is relevant to their everyday existence.

Enforcement is another strategy that has success with reducing fire risk. “Some of the greatest advances in fire prevention include the promulgation of laws, rules, codes, standards and regulations to promote the primary prevention of fires” (Department of Health, 2010, p. 1). The
NFPA is “the world’s leading advocate of fire prevention… and disseminates more than 300 consensus codes and standards intended to minimize the possibility and effects of fire” (NFPA, 2011a, p. 1). NFPA 101 Life Safety Code “addresses those construction, protection, and occupancy features necessary to minimize danger to life from the effects of fire, including smoke, heat, and toxic gases created during a fire” (NFPA, 2011b, p. 1). The advantage of the requirements outlines in NFPA 101 is that they “do not require the active participation of individuals to prevent fires” (DOH, 2010, p. 1).


Engineering in the form of “smart stove” technology enhancements for cooking appliances could prevent many cooking fires (Ahrens, 2010). In 2001 the USCPSC commissioned a report on potential technologies that identified a possible reduction of roughly two-thirds of the range and cooktop fires through engineering technology such as timers and motion sensors that would
ensure someone was paying regular attention while cooking (Ahrens, 2010). Unfortunately a decade has passed with no progress being made in support of this type of technology by cooking equipment manufacturers. The need for this safety feature is obviously supported by the fact that the leading ignition factor in cooking fires is unattended equipment (Ahrens, 2010; Madrzykowski et al., 2007; USFA, 2005; USFA, 2004). Another supporting factor for this technology is that most cooking fires started within the first 15 minutes of cooking while nearly all the remaining cooking fires started within 30 minutes (Ahrens, 2010).

One of the more common and prevalent types of engineering technology used to save lives and reduce property damage caused by fire is the automatic smoke alarm. Unlike the “smart stove” technology that is designed to target the pre-event phase of a fire, automatic smoke alarms are primarily used to mitigate the effects after a fire has ignited by quickly notifying the building occupants and/or the local fire department via a monitored alarm service provider. As a result of this engineering technology, 82% of reported home cooking fires did not spread beyond the object of origin and 96% were confined to the room where the fire began (Ahrens, 2010). The 2004-2005 USCPSC survey identified that the fire department was less likely to attend fires started by cooking equipment when an operational automatic smoke alarm was present than most other types of fires (Greene & Andres, 2009).

Many fire departments have used grant funds to purchase and provide automatic smoke alarms at no cost as an economic incentive to their citizens to reduce the number of fire deaths and injuries. P. Dempsey, (personal communication, February 22, 2011) Public Education Officer with TFR reported that “approximately 1,250 automatic smoke alarms is distributed annually in the COT.” Residents can go to their neighborhood fire station to receive a free automatic smoke alarm or replacement battery. If the resident is unable to get to their
neighborhood fire station or are unable to install the automatic smoke alarm or replacement battery, the neighborhood fire station personnel will go to the residence and perform the task for them.

Procedures

Four approaches were used to collect information for this project. The approaches included literature reviews, fire reporting data reviews, census data reviews and the dissemination of a questionnaire. The literature review began at the National Fire Academy’s Learning Resource Center in December 2010 and continued using the Internet and the COT Fire Marshal’s Office. This query discovered several sources that were helpful in answering research question one: How are residential cooking fires identified?

The COT Fire Marshal’s Office and the NFIRS were used to collect fire reporting data to answer research question two: What neighborhoods had the highest frequency of residential cooking fire deaths and/or injuries in the COT from 2005-2010. The COT Fire Marshal’s Office and the NFIRS were used to verify the number of residential cooking fire deaths and/or injuries in the COT from 2005-2010. The COT Fire Marshal’s Office was used to identify the neighborhoods were the deaths and/or injuries occurred.

The American FactFinder link on the www.census.gov website was used to collect census data to answer research question three: What are the demographics associated with the population living in COT neighborhoods where residential cooking fire deaths and/or injuries occurred compared to the neighborhoods where no deaths or injuries occurred from 2005-2010?

The collection of original research was facilitated in the form of developing and disseminating a 13-item self-reported questionnaire (see Appendix A for a copy of the Assessing Residential Cooking Fires Questionnaire). The questionnaire was used to collect data to assist
with answering research questions one: How are residential fires identified? Research question four: What are the neighborhood characteristics and demographics associated with the population living in other fire department jurisdictions where the highest frequency of residential cooking fires are occurring? And, research question five: What risk reduction strategies are being used by other fire departments to reduce the frequency of residential cooking fires? This researcher developed the questionnaire after a review of the Internet did not reveal any relevant data collection instruments. Consideration was given for the potential respondent’s time, therefore the questionnaire was limited to 13 items and utilized a structured format in which the questions included suggested answers that could be quickly marked.

Question one of the 13-item self-reported questionnaire was included to categorize the fire departments based on pay structure (career, volunteer or combination). The information allowed this researcher to determine if a correlation exists between pay structure (question 1) and fire prevention staffing (questions 2 and 3) or public education staffing (questions 4 and 5). A possible correlation was also sought between pay structure (question 1) and whether or not the respondent’s department had conducted a residential cooking fire assessment (question 6) or had engaged in the use of cooking fire risk reduction strategies (question 10).

The purpose of question seven was intended to gather information to assist with answering research question one: How are residential cooking fires identified? Questions eight and nine were intended to solicit information to answer research question four: What are the neighborhood characteristics and demographics associated with the population living in other fire department jurisdictions where the highest frequency of residential cooking fires are occurring? Question 11 was intended to gather information to answer research question five: What risk reduction strategies are being used by other fire departments to reduce the frequency
of residential cooking fires? The purpose of questions 12 and 13 were included to solicit information regarding whether or not the respondents that reported using residential cooking fire risk reduction strategies had evaluated the effectiveness of their programs, and if so, how effective had the programs been. This information was sought to determine if a correlation existed between the type of risk reduction strategy being used (question 11) and its reported effectiveness (question 13).

The questionnaire was distributed using a convenience sampling approach to other fire departments electronically through two routes. The first was through a request made to the Florida Fire Chief’s Associations (FFCA). The FFCA has a web based (e-blast) service that is available to it’s members for information gathering purposes. The e-blast is disseminated to all participating members of the FFCA, which includes representatives from other states. The second route was accomplished by sending the questionnaire to all the participants of the January 2010 Executive Development and the December 2010 EACRR courses. In addition, snowball sampling on a limited basis was achieved as a result of one participant from the January 2010 Executive Development course and one participant from the December 2010 EACRR course forwarding the questionnaire to other fire department associations.

All returned questionnaires were categorized alphabetically by fire department name to verify that no duplicate responses by any one fire department were part of the data analysis. There were no incomplete questionnaires returned. Incomplete questionnaires would not have been used in the data analysis. A checklist was created by this researcher and used to categorize and chart the data collected from each fire department respondent’s questionnaire (see Appendix B for a copy of the Data Collection Checklist for Fire Departments).
Limitations of the Project

Four potential limitations for this project are noted. The first is the absence of an existing questionnaire to collect information from the participants; however, since this process did not measure attitudinal scales, reliability and validity checks were not needed (Gall, Borg, & Gall, 1996). The second is a product of the convenience sampling procedure. The population used for the data collection of this project was limited to those fire departments that were readily available to this researcher based on time constraints. The third is associated with the use of a self-reported questionnaire. Self-reported data may be affected by bias. The fourth is that questionnaires should avoid items “that might elicit reactions of embarrassment” (Ary, Jacobs & Razavieh, 1979, p. 177). As such, it is possible that some individuals opted not to respond as a result of feeling embarrassed about not conducting a risk reduction assessment or not utilizing risk reduction strategies in their communities.

Results

Information collected from the literature review and questionnaire provided answers to research question one: How are residential cooking fires identified? The literature review identified two primary sources to identify information regarding residential cooking fires. One source includes information on fires in which a fire department’s services were not requested and the other source pertains to those that are reported to fire departments. The identification of residential cooking fire data that is not reported to fire departments is generated from national telephone surveys conducted by the USCPSC. The USCPSC has conducted a total of three surveys (1974, 1984 and 2004-2005) that have been used to identify the projected number of residential fires that go unreported (Greene & Andres, 2009). The USCPSC reported that approximately 96% of the total number of residential structure fires are unreported annually.
(Greene & Andres, 2009). The 2004-2005 survey identified “that cooking equipment was involved in 4.7 million unreported home fires per year” (Ahrens, 2010, p. 5) resulting in “approximately 99% of the cooking fires are never reported to fire departments” (Ahrens et al., 2007, p. 15).

The identification of residential cooking fires that are reported to fire departments originates with the notification of a community’s 911 emergency dispatch center, or by personal notification directly to a neighborhood fire station. In Florida, once the fire has been extinguished, state fire codes mandate that the origin and cause of the fire is investigated (Florida Department of State, 2011). The State of Florida allows communities with organized fire departments to perform the fire origin and cause identification with department firefighters, company officers, fire investigators or state fire investigators, while communities with non-organized fire departments shall utilize state fire investigators to satisfy this requirement (Florida Department of State, 2011). TFR is an organized fire department and utilizes department fire investigators to identify the origin and cause of every reported working fire in the COT.

Item seven of the Assessing Residential Cooking Fires Questionnaire (Appendix A) sought to gather information from other fire departments regarding how the origin and cause of fires are identified in the respondent’s jurisdiction. Of the 98 total participants that responded to the questionnaire, 12.2% reported using department company officers, 59.2% reported using department fire investigators, 6.1% reported using state fire investigators, 8.2% reported using both department company officers and department fire investigators and 14.3% reported using both department fire investigators and state fire investigators. All respondents to the questionnaire represented organized fire departments.
The NFPA 921, Guide for Fire and Explosion Investigations was developed to standardize the fire cause identification process (National Association of Fire Investigators, 2011) by utilizing the same systematic approach to analyze all fire scenes (NFPA, 2008). The most common approach is to start the investigation at the least damaged area and work systematically to the most damaged area. In theory, the heaviest damaged area identifies where the fire burned the longest and most probably originated. The origin of the fire is where the fire cause will be located. If cooking equipment with evidence of food or materials used to cook food is identified at the origin of the fire without any other explainable accidental or intentionally placed heat source, the fire is identified as a cooking fire.

The USFA supports the NFIRS as a collection point for fire departments to report fire incidents based on several identifiable variables to include occupancy type and fire cause so that trends such as prevalence rates and associated deaths and injuries of residential cooking fires can be identified (NFIRS, n.d.). Having access to relevant data allows fire administrators the ability to implement more effective operational and risk reduction strategies (NFIRS, n.d.). Approximately 73% of the nation’s fire departments participate in this voluntary self-reporting initiative (B. Pabody, personal communication, December 14, 2010). Fire departments that utilize NFIRS can query local and state residential cooking fire data by day, week, month or year via http://www.nfirs.fema.gov. National fire statistics associated with residential cooking fires collected from NFIRS can be identified from various USFA technical reports via http://www.usfa.dhs.gov/statistics.

Information collected from the COT Fire Marshal’s Office and the NFIRS was used to answer research question two: What neighborhoods had the highest frequency of residential cooking fire deaths and/or injuries in the COT from 2005-2010? TFR has 21 fire stations with 20 of them
geographically spread throughout the COT to protect their residents. Fire station number two is located at Tampa International Airport. The personnel and equipment assigned to station number two do not leave the airport property. From 2005-2010 TFR responded to 801 residential cooking fires resulting in three civilian deaths and 14 civilian injuries requiring transport to a medical facility. Of the 20 neighborhood fire stations, the deaths and injuries occurred in the residential neighborhoods that are protected by eight of them. The eight fire stations were numbers 7, 10, 11, 12, 13, 15, 16 and 18. Frequencies for the reported number of residential cooking fire deaths and injuries from 2005-2010 by TFR fire station number are presented in Table 4.
Table 4

*Frequencies for Residential Cooking Fire Deaths and Injuries by TFR Fire Station Number*

<table>
<thead>
<tr>
<th>Station</th>
<th>Deaths</th>
<th>Injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

Internet research from the census bureau was used to answer research question three: What are the demographics associated with the population living in the COT neighborhoods where residential cooking fire deaths and/or injuries occurred compared to the neighborhoods where no deaths or injuries occurred from 2005-2010? TFR protects 334,000 plus residents (COT, 2010b). The demographics of the population are very diverse. The categories used to identify the demographic profile for this research includes children less than 5 years of age, adults 65 years or older, owner occupied property, renter occupied property, persons living with disability, non-English speaking households, families living below poverty level and individuals living below
poverty level. The COT 2010 demographic profile percentage by fire station number that responded to a residential cooking fire death and/or injury from 2005-2010 are presented in Table 5.

Table 5

<table>
<thead>
<tr>
<th>Category</th>
<th>#7</th>
<th>#10</th>
<th>#11</th>
<th>#12</th>
<th>#13</th>
<th>#15</th>
<th>#16</th>
<th>#18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child &lt; 5</td>
<td>5.4</td>
<td>6</td>
<td>7.1</td>
<td>7.3</td>
<td>8.3</td>
<td>6.1</td>
<td>3.9</td>
<td>7.3</td>
</tr>
<tr>
<td>Adult &gt; 65</td>
<td>13.5</td>
<td>16</td>
<td>8.5</td>
<td>9.2</td>
<td>7.3</td>
<td>12</td>
<td>5.5</td>
<td>14.1</td>
</tr>
<tr>
<td>Owner</td>
<td>62.6</td>
<td>53</td>
<td>46.3</td>
<td>43.9</td>
<td>52.6</td>
<td>51</td>
<td>48.9</td>
<td>53.8</td>
</tr>
<tr>
<td>Renter</td>
<td>36.4</td>
<td>47</td>
<td>53.7</td>
<td>56.1</td>
<td>47.4</td>
<td>49</td>
<td>50.1</td>
<td>46.2</td>
</tr>
<tr>
<td>Disabled</td>
<td>26.1</td>
<td>30.6</td>
<td>29</td>
<td>20.4</td>
<td>31.2</td>
<td>11.3</td>
<td>19</td>
<td>28</td>
</tr>
<tr>
<td>Non-English</td>
<td>16.1</td>
<td>4</td>
<td>31</td>
<td>43</td>
<td>21.8</td>
<td>15.1</td>
<td>14.8</td>
<td>11.1</td>
</tr>
<tr>
<td>Family &lt; Poverty</td>
<td>3.6</td>
<td>6.6</td>
<td>4.4</td>
<td>3.7</td>
<td>4.9</td>
<td>1.1</td>
<td>2.6</td>
<td>4.4</td>
</tr>
<tr>
<td>Ind. &lt; Poverty</td>
<td>14.8</td>
<td>5.4</td>
<td>22</td>
<td>18</td>
<td>22.8</td>
<td>9.5</td>
<td>15</td>
<td>20.8</td>
</tr>
</tbody>
</table>

A demographic profile of the population in the neighborhoods in which the fire stations did not respond to a residential cooking fire death or injury from 2005-2010 was also conducted to identify similarities and differences between the two demographic profiles. The COT 2010 demographic profile percentage by fire station number that did not responded to a residential cooking fire death or injury from 2005-2010 are presented in Table 6.
Table 6

*COT 2010 Demographic Profile Percentage by Fire Station Number that did not Respond to a Residential Cooking Fire Death or Injury from 2005-2010*

<table>
<thead>
<tr>
<th>Category</th>
<th>#1</th>
<th>#3</th>
<th>#4</th>
<th>#5</th>
<th>#6</th>
<th>#8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child &lt; 5</td>
<td>1.3</td>
<td>5.2</td>
<td>10</td>
<td>11.2</td>
<td>7.1</td>
<td>5.6</td>
</tr>
<tr>
<td>Adult &gt; 65</td>
<td>24</td>
<td>15.5</td>
<td>21.1</td>
<td>5.1</td>
<td>13.9</td>
<td>16.5</td>
</tr>
<tr>
<td>Owner</td>
<td>37.2</td>
<td>43.2</td>
<td>31.2</td>
<td>44.4</td>
<td>54.2</td>
<td>51.8</td>
</tr>
<tr>
<td>Renter</td>
<td>59.8</td>
<td>56.8</td>
<td>68.8</td>
<td>55.6</td>
<td>45.8</td>
<td>48.2</td>
</tr>
<tr>
<td>Disabled</td>
<td>22.7</td>
<td>20</td>
<td>35.8</td>
<td>27.1</td>
<td>20</td>
<td>26.1</td>
</tr>
<tr>
<td>Non-English</td>
<td>25.8</td>
<td>9.6</td>
<td>31.5</td>
<td>9.1</td>
<td>55.3</td>
<td>21.1</td>
</tr>
<tr>
<td>Family &lt; Poverty</td>
<td>.7</td>
<td>3</td>
<td>7.8</td>
<td>11.3</td>
<td>6</td>
<td>2.4</td>
</tr>
<tr>
<td>Ind. &lt; Poverty</td>
<td>16.1</td>
<td>17.8</td>
<td>51.4</td>
<td>52.5</td>
<td>29.3</td>
<td>14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Category</th>
<th>#9</th>
<th>#14</th>
<th>#17</th>
<th>#19</th>
<th>#20</th>
<th>#21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child &lt; 5</td>
<td>5.5</td>
<td>5.2</td>
<td>5</td>
<td>7.1</td>
<td>8.2</td>
<td>7.9</td>
</tr>
<tr>
<td>Adult &gt; 65</td>
<td>23.3</td>
<td>16.4</td>
<td>14</td>
<td>8</td>
<td>4.2</td>
<td>4.6</td>
</tr>
<tr>
<td>Owner</td>
<td>56</td>
<td>59</td>
<td>56.2</td>
<td>53.3</td>
<td>47.6</td>
<td>48.8</td>
</tr>
<tr>
<td>Renter</td>
<td>44</td>
<td>41</td>
<td>43.8</td>
<td>46.7</td>
<td>52.4</td>
<td>51.2</td>
</tr>
<tr>
<td>Disabled</td>
<td>32</td>
<td>14.5</td>
<td>12.7</td>
<td>24.3</td>
<td>9</td>
<td>7.8</td>
</tr>
<tr>
<td>Non-English</td>
<td>63</td>
<td>14.6</td>
<td>13.6</td>
<td>13.3</td>
<td>12.8</td>
<td>12.5</td>
</tr>
<tr>
<td>Family &lt; Poverty</td>
<td>3.8</td>
<td>.3</td>
<td>0</td>
<td>3.6</td>
<td>1.3</td>
<td>1.1</td>
</tr>
<tr>
<td>Ind. &lt; Poverty</td>
<td>22.2</td>
<td>4.3</td>
<td>3.5</td>
<td>15.1</td>
<td>5.8</td>
<td>3.8</td>
</tr>
</tbody>
</table>
A comparison between the averages of the populations in the two demographic profiles identified in Table 5 and Table 6 did not reveal much variation between the categories children less than 5 years of age, families living below poverty level and individuals living below poverty level. Slight differences less than 3.5% were noted for the categories adults’ 65 years or older, owner occupied property, renter occupied property and persons living with disability. Less than 5% variation was identified for the category non-English speaking households. A comparison of the 2010 demographic profile percentages for the fire stations that did and did not respond to a residential cooking fire death and/or injury from 2005-2010 are presented in Table 7.

Table 7

*Table 7 COT 2010 Demographic Comparison Percentages for Fire Stations that did and did not Respond to a Residential Cooking Fire Death and/or Injury from 2005-2010*

<table>
<thead>
<tr>
<th>Category</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child &lt; 5</td>
<td>6.4</td>
<td>6.6</td>
</tr>
<tr>
<td>Adult &gt; 65</td>
<td>10.8</td>
<td>13.9</td>
</tr>
<tr>
<td>Owner</td>
<td>51.5</td>
<td>48.6</td>
</tr>
<tr>
<td>Renter</td>
<td>48.5</td>
<td>51.4</td>
</tr>
<tr>
<td>Disabled</td>
<td>24.5</td>
<td>21</td>
</tr>
<tr>
<td>Non-English</td>
<td>19.6</td>
<td>24.4</td>
</tr>
<tr>
<td>Family &lt; Poverty</td>
<td>3.9</td>
<td>3.4</td>
</tr>
<tr>
<td>Ind. &lt; Poverty</td>
<td>19.8</td>
<td>19.7</td>
</tr>
</tbody>
</table>
The fourth research question asked what are the neighborhood characteristics and demographics associated with the population living in other fire department jurisdictions where the highest frequency of residential cooking fires are occurring. Original research collected from the Assessing Residential Cooking Fires Questionnaire (Appendix A) provided information to answer this question. Questions eight and nine of the self-reported questionnaire were used to collect data to create a profile of the neighborhood characteristics and population demographics of other communities where the highest frequency of residential cooking fires are occurring. The results of the questionnaire identified lower socioeconomic neighborhoods with a higher percentage of renter-occupied property and older residential construction suffered the greatest frequency of residential cooking fires. The neighborhood characteristics (Table 8) and population demographics (Table 9) of other fire department’s communities where the highest frequency of residential cooking fires occurred are presented in Table 8 and Table 9.

Table 8

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Socio</td>
<td>69.4</td>
</tr>
<tr>
<td>Upper Socio</td>
<td>16.3</td>
</tr>
<tr>
<td>Low Rental</td>
<td>6.1</td>
</tr>
<tr>
<td>High Rental</td>
<td>55.1</td>
</tr>
<tr>
<td>Old Homes</td>
<td>38.8</td>
</tr>
<tr>
<td>New Homes</td>
<td>12.2</td>
</tr>
</tbody>
</table>
Table 9

*Other Fire Department’s Population Demographic Profile With the Highest Frequency of Residential Cooking Fires*

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-30 Years Old</td>
<td>30.6</td>
</tr>
<tr>
<td>31-45 years Old</td>
<td>28.6</td>
</tr>
<tr>
<td>45-64 Years Old</td>
<td>14.3</td>
</tr>
<tr>
<td>Over 65 Years Old</td>
<td>32.7</td>
</tr>
<tr>
<td>Disabled</td>
<td>2</td>
</tr>
<tr>
<td>Non-English</td>
<td>14.3</td>
</tr>
<tr>
<td>Family &lt; Poverty</td>
<td>28.6</td>
</tr>
<tr>
<td>Ind. &lt; Poverty</td>
<td>14.3</td>
</tr>
</tbody>
</table>

The fifth research question asked what risk reduction strategies are being used by other fire departments to reduce the frequency of residential cooking fires. Question 10 of the questionnaire (Appendix A) was used to identify how many fire departments used some type of risk reduction strategy to reduce the number of residential cooking fires in their jurisdiction. Of the 98 total participants that responded to the questionnaire, 59.2% of the participants responded yes to using one or more cooking fire risk reduction strategy. Question 11 was used to identify the type of risk reduction strategies that were being used most frequently by other fire departments; 34.5% reported using enforcement, 62.1% reported using engineering, 86.2% reported using education and 62.1% reported using an economic incentive. Question 12 was used to identify whether or not an assessment of the risk reduction strategies that were being
used by other fire departments had been conducted; 62.1% of the respondents reported that no assessment had been performed. Question 13 was used to identify the effectiveness of the risk reduction strategies for the 37.9% of fire departments that reported using them; 17.3% reported very effective, 82.7% reported somewhat effective and 0% reported not effective.

Questions one, two through six and 10 of the questionnaire (Appendix A) were used to collect data to determine if a correlation exists between pay structure (question 1) and fire prevention staffing (questions 2 and 3), public education staffing (questions 4 and 5) and whether or not the department had conducted a residential cooking fire assessment (question 6) or had engaged in the use of cooking fire risk reduction strategies (question 10). The participants that responded to the questionnaire represented 67.3% career departments, 30.6% combination departments and 2% volunteer departments. The results of the data analysis did not identify any correlation between pay structure and the other aforementioned variables.

The data collected from questions two through six identified; 87.8% of the participants responded yes to having a designated fire prevention division with 95.3% of those reported staffing the division with full-time personnel; 71.4% reported yes to having a public education division with 57.1% of those reported staffing the division with full-time personnel; 71.4% of the participants responded that no residential cooking fire assessment had been conducted for their community.

Discussion

The result of this research provides information that can assist TFR with developing risk reduction strategies targeting residential cooking fires. Focusing on residential cooking fires for the basis of this research project is reinforced by the fact that cooking fires are the leading cause of residential structure fires nationally (Ahrens, 2010; Greene & Andres, 2009; Huang, 2009;
USFA, 2010b; USFA, 2005). In the State of Florida and the COT, residential cooking fires were also the leading cause of residential structure fires and accounted for 30.25% of all fires (NFIRS, 2011) and 37.37% respectively from 2005-2010 (COT, 2011). In addition, from 2004 to 2005 residential cooking fires resulted in 17% of home fire deaths and 37% of home fire injuries annually for the nation (Ahrens, 2010). In the COT residential cooking fires were the leading cause of fire deaths and injuries from 2005-2010, resulting in 40% of all fire deaths in 2007 and 33.33% of all fire injuries in 2008 (COT, 2011). This trend clearly reinforces the need for TFR to focus more resources towards cooking fire risk reduction strategies in the COT.

Even though the aforementioned data clearly illustrates an unacceptable pattern associated with cooking fires, the research identified that the true extent of the problem may not be known since approximately 96% of the total number of residential structure fires are unreported annually (Greene & Andres, 2009). The USCSPC reported via the 2004-2005 survey that 4.7 million unreported fires involve cooking equipment (Ahrens, 2010) resulting in approximately 99% of all the cooking fires that occur (Ahrens et al., 2007). Unfortunately, the high amount of unreported fires contributes to the uncertainty regarding the true effectiveness of a community’s current risk reduction strategies. Arguably, an inference could possibly be made in support of the effectiveness of current risk reduction strategies as a result of the extremely large percentage of fires that are discovered and extinguished by building occupants due to engineering advancements such as automatic smoke alarms. This inference is supported by the 2004-2005 USCPSC survey, which supported the assumption that fire departments were less likely to attend fires when an operational smoke alarm was present (Greene & Andres, 2009). The organizational implication regarding the uncertainty of the true amount of unreported residential cooking fires and the associated data regarding how the fires are being discovered and
extinguished, prevents TFR from accurately identifying the effectiveness of current strategies that may be working.

The use of statistical analysis to target areas of fire risk vulnerability is dependent on the reliability of the data that is collected. By adhering to NFPA 921 Guide for Fire and Explosion Investigations, fire investigators can increase their accuracy of fire cause identification by using a systematic approach to analyzing each fire scene (NFPA, 2008). In addition to utilizing NFPA 921, fire cause identification may also be increased through the use of fire investigators that specialize in fire origin and cause determination. The strategy adopted by TFR regarding the use of department fire investigators, whose sole responsibility is investigating fires, is consistent with the approach used by 59.2% of the fire departments that responded to the Assessing Residential Cooking Fires Questionnaire (Appendix A). This finding implies that TFR should continue the operational use of department fire investigators.

The study clearly identified the COT neighborhoods where residential cooking fires deaths and/or injuries had occurred from 2005-2010. Of the 20 neighborhood fire stations, only eight neighborhoods were impacted by a residential cooking fire death and/or injury from 2005-2010 (COT, 2011). Of those, fire station 11 responded to four injuries, station 18 responded to three injuries, stations 12, 13 and 16 responded to one fatality and one injury, station 10 responded to two injuries and stations 7 and 15 responded to one injury (COT, 2011). The implication of having access to this information allows TFR to accurately identify at risk neighborhoods. As a result, risk reduction strategies to include enforcement, engineering, education and economic incentives can be increased in these eight neighborhoods. If resources become limited, the efforts should start with station 11 and 18s neighborhoods, then proceed to station 12, 13 and 16, then station 10 and then station 7 and 15.
The research identified that TFR does not collect certain types of residential cooking fire data (i.e. human behavior at the time of the fire, type of cooking equipment being used and personal demographic information on residents of cooking fires) that can be compared with national data. For example, the research identified that the leading causes of residential fires are attributed to human behavior (Ahrens et al., 2007; USFA, 1998), such as falling asleep, forgetting about food being cooked (USFA, 2005) and/or leaving the cooking area unattended to take care of children. Unfortunately, TFR does not collect this type of data; therefore an analysis comparing the affected COT populations with the nation regarding the dependent variable human behavior could not be facilitated. The research also identified that ranges “were involved in three out of five reported cooking fires and responsible in 89% of the civilian deaths and 77% of the civilian injuries” (Ahrens, 2010, p. 8). Again, due to a lack of available data, the type of cooking equipment that was being used is another causal factor that TFR could not use to compare with national data.

In addition, the research identified that adults “65 years of age or older accounted for 30% of the cooking fire deaths” (Ahrens et al., 2007, p. 17) and “faced twice the risk of dying in a cooking fire as the population at large” (Ahrens, 2010, p. 14); owner occupied properties are better maintained and seem to have lower fire risks than renter occupied property (Huang, 2009), property owners are “more likely to be careful when engaged in cooking” (Huang, 2009, p. 37) and “more likely to invest in fire safety equipment than a renter” (USFA, 1998, p. 23); cooking was the leading cause of fires for low-income groups (Huang, 2009) largely because “poor people have almost no financial resources needed to invest in fire safety equipment, such as smoke detectors” (Huang, 2009, p. 36). The implication regarding the inability to empirically
assess these casual factors on a local level makes it difficult to identify at risk groups and tailor risk reduction strategies.

In the absence of being able to compare the actual casual factors associated with the victims of residential cooking fires in the COT with the nation, this researcher used available census data to look at the overall neighborhood population demographics by fire station number, so that possible inferences associated with nationally recognized causal factors could be made. This assessment was accomplished by sorting the COT population into two groups; the fire station neighborhoods that suffered a residential cooking fire death and/or injury between 2005-2010 and the fire station neighborhoods that did not. The analysis identified only slight differences among the populations in the two groups for the variables 65 years or older, owner occupied property versus renter occupied property, persons living with a disability and non-English speaking households. The implication of these findings reinforces the need for TFR to collect additional demographic information on the actual victims that experience a residential cooking fire so that valid at risk groups can be clearly identified.

As a result of the participation of the self reported Assessing Residential Cooking Fires Questionnaire (Appendix A), this researcher identified that other fire departments attribute the majority of their residential cooking fires to adults over 65 years of age or older, renters and lower socioeconomic status. These findings coincide with the reported national trends. The implication of these results reinforce the ability to infer that TFR should target the populations with these demographic variables until future data can be collected and analyzed to justify a different direction in risk reduction strategy.

Fire service professionals are in the best position to drive fire risk prevention strategies (Lacy & Valentine, 2005). The EACRR course outlined the five E’s (education, enforcement,
engineering, economic incentive and emergency response) as a realistic and effective approach to reducing community fire risk (NFA, 2009b). Of these approaches, education was determined to be the most effective strategy to address kitchen fires in the short term and engineering enhancements for the long term (Madrzykowski et al., 2007). Gielen, McDonald and Piver (2007) found that 86% of fire departments engage in fire safety education. This finding is consistent with the strategies that are being used by other fire departments that responded to the self reported Assessing Residential Cooking Fires Questionnaire (Appendix A), in which 86.2% reported using education and 62.1% reported using engineering and economic incentive.

Engineering and economic incentive can be commingled into one strategy since most departments provide automatic smoke alarms (engineering) to their citizens for free (economic incentive). Automatic smoke alarms are so effective, 82% of reported home cooking fires did not spread beyond the object of origin and 96% were confined to the room where the fire began (Ahrens, 2010). This finding implies that TFR should continue the operational use of education, engineering and economic incentive, in the form of providing free automatic smoke alarms to residents as the primary strategy to reduce the risk of fire in the COT.

The strategy that was reported as being used the least was enforcement, with only 34.5% of the respondents selecting this option. A possible contributing factor to the low use of enforcement as a strategy to reduce residential cooking fires may be attributed to the fact that local jurisdictions have no legal enforcement authority since the NFPA Life Safety Code does not apply to one-family and two-family dwellings (NFPA, 2011a). Without legal authority, fire service personnel are unable to lawfully enter these types of residential dwellings to inspect fire prevention devices without consent of the owner or renter of the property.
In addition to more traditional engineering devices, the research identified other forms, such as “smart stove” technology enhancements for cooking appliances that could prevent many cooking fires (Ahrens, 2010). In fact, a possible reduction of roughly two-thirds of the range fires could be prevented by the use of timers and/or motion sensors that would ensure someone was paying regular attention while cooking (Ahrens, 2010). The integration of “smart stove” technology is obviously supported by the fact that the leading ignition factor in cooking fires is unattended equipment (Ahrens, 2010; Madrzykowski et al., 2007; USFA, 2005; USFA, 2004) and that ranges “were involved in three out of five reported cooking fires and responsible in 89% of the civilian deaths and 77% of the civilian injuries” (Ahrens, 2010, p. 8). The potential positive impact that “smart stove” technology can have at reducing fires implies the need for TFR administrators to drive a campaign to raise awareness and funding for this type of technology to be used by those that can afford it and provided to those that cannot.

Recommendations

Based on the literature review and results gathered from the original research, the following recommendations are being presented for consideration.

1. TFR should work collaboratively with the COT code enforcement division and the building permit department in order to identify residential structure fires that go unreported so that a more accurate understanding of the totality of residential cooking fires in the COT can be determined.

2. TFR should follow up with local hospitals after one week of a burn patient being transported to check on the status of the patient in order to maintain accurate data regarding cooking fire injuries that unfortunately result in fatalities after the victim was transferred to a hospital.
3. TFR should increase public education outreach, to include enforcement, engineering, education and economic incentive strategies in the eight neighborhoods that suffered a residential cooking fire death and/or injury from 2005-2010, while continuing at the current level in the remaining neighborhoods.

4. TFR should increase the data collection information for residential cooking fires to include human behavior such as, falling asleep while food was being cooked, forgetting about food that was being cooked, leaving the cooking area to care for children and the type of cooking equipment involved in the fire so that comparisons can be made between the COT and the nation. This data will also allow TFR to tailor risk reduction strategies to target documented causal factors.

5. TFR should increase the data collection information for residential cooking fires to include individual demographic profiles such as age, gender, occupant status (owner or renter), disability by category (hearing impaired, vision impaired, cognitive impairment and/or physical impairment), non-English speaking and income level so that comparisons can be made between the COT and the nation. This data will also allow TFR to tailor risk reduction strategies to target documented causal factors.

6. TFR should develop programs and literature that target the populations that were identified in the literature review to be at the greatest risk of experiencing a residential cooking fire. These populations include individuals 65 years of age and older, renters, persons living with a disability, non-English speaking and lower socioeconomic status individuals and families.

7. TFR should support “smart stove” technology awareness and seek grant opportunities to purchase this technology and provide it to at risk groups that cannot afford it.
8. TFR should conduct a fire risk assessment every two years to identify emerging trends, target at risk groups and track the effectiveness of current fire risk reduction strategies.
References


Emmitsberg, MD: United States Fire Administration.


Emmitsberg, MD: United States Fire Administration.


Emmitsberg, MD: United States Fire Administration.

Appendix A

Greetings,

By way of introduction, my name is Michael Gonzalez and I am the Special Operations Chief with Tampa Fire Rescue. I would like to request your assistance with gathering information pertaining to a community risk reduction assessment project titled *Assessing Residential Cooking Fires*, that I am working on as part of the requirement for the Executive Fire Officer Program.

Please complete the questionnaire and return it via email to michael.gonzalez@tampagov.net or by fax to 813-274-7026.

I want to thank you in advance for your assistance in this matter.

**Assessing Residential Cooking Fires Questionnaire**

1. How are the personnel structured in your department/organization?
   - Career/All Paid
   - Volunteer
   - Combination Career/Volunteer

2. Does your department/organization have a designated fire prevention division?
   - Yes
   - No
   - Not Sure

3. If you answered yes to item 2, how is your fire prevention division staffed?
   - Full-Time
   - Part-Time
   - Not Sure

4. Does your department/organization have a designated public education program?
   - Yes
   - No
   - Not Sure

5. If you answered yes to item 4, how is your public education program staffed?
   - Full-Time
   - Part-Time
   - Not Sure
6. Has your department/organization conducted a residential cooking fire assessment of your community?

- Yes
- No
- Not Sure

7. Who investigates the origin and cause of fires in your jurisdiction?

- Department Company Officers
- Department Fire Investigators
- State Fire Investigators

8. Based on your experience, what are the neighborhood characteristics in your jurisdiction that has the highest prevalence of residential cooking fires?

(Please check all that apply)

- Lower socioeconomic neighborhoods
- Higher socioeconomic neighborhoods
- Low renter occupants
- High renter occupants
- Neighborhoods with predominantly newer residential construction
- Neighborhoods with predominantly older residential construction

9. Based on your experience, what are the causal factors associated with the populations in your jurisdiction that experiences the highest prevalence of residential cooking fires?

(Please check all that apply)

- 18-30 years old
- 31-45 years old
- 45-64 years old
- 65-years or older
- Disabled individual (physical/mental) living in the household
- Non-English speaking individuals living in the household
- Individuals earning below the poverty level living in the household
- Families earning below the poverty level living in the household

10. Does your department/organization use any risk reduction strategies to reduce the number of residential cooking fires in your jurisdiction?

- Yes
- No
- Not Sure
11. If you answered yes to item 10, what is the focus area of the risk reduction strategy? (Please check all that apply)

- Enforcement: Home safety surveys/inspections
- Engineering: Promote smoke alarms, residential sprinkler systems, smart stoves
- Education: Public speaking outreach, pass out literature at public events
- Economic Incentives: Provide free smoke alarms and/or replacement batteries

12. If you answered yes to item 10, has your department/organization evaluated the effectiveness of the risk reduction strategy?

- Yes
- No
- Not Sure

13. If you answered yes to item 12, how would you rate the effectiveness of the risk reduction strategy?

- Very Effective
- Somewhat Effective
- Not Effective
Data Collection Checklist for Fire Departments

<table>
<thead>
<tr>
<th>Fire Department Structure</th>
<th>Career</th>
<th>Volunteer</th>
<th>Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire Prevention Division</td>
<td>Yes</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Fire Prevention Staffing</td>
<td>Full-Time</td>
<td>Part-Time</td>
<td>Not Sure</td>
</tr>
<tr>
<td>Public Education Division</td>
<td>Yes</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Public Education Staffing</td>
<td>Full-Time</td>
<td>Part-Time</td>
<td>Not Sure</td>
</tr>
<tr>
<td>Conducted Cooking Fire Assessment</td>
<td>Yes</td>
<td>No</td>
<td>Not Sure</td>
</tr>
<tr>
<td>Fire Origin and Cause</td>
<td>Department Company Officer</td>
<td>Department Fire Investigator</td>
<td>State Fire Investigator</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------------</td>
<td>-----------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Neighborhood Characteristics</td>
<td>Lower Socio</td>
<td>Higher Socio</td>
<td>Low Renters</td>
</tr>
<tr>
<td>Population Demographics</td>
<td>18-30 Years Old</td>
<td>31-45 years Old</td>
<td>45-64 Years Old</td>
</tr>
<tr>
<td>Population Demographics</td>
<td>Disabled</td>
<td>Non-English Speaking</td>
<td>Individual below Poverty</td>
</tr>
<tr>
<td>Use Risk Reduction Strategies</td>
<td>Yes</td>
<td>No</td>
<td>Not Sure</td>
</tr>
<tr>
<td>Type of Risk Reduction Strategy</td>
<td>Enforcement</td>
<td>Engineering</td>
<td>Education</td>
</tr>
<tr>
<td>Risk Reduction Strategy Evaluation</td>
<td>Yes</td>
<td>No</td>
<td>Not Sure</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-------</td>
<td>--------</td>
<td>----------</td>
</tr>
<tr>
<td>Risk Reduction Strategy Effectiveness</td>
<td>Very Effective</td>
<td>Somewhat Effective</td>
<td>Not Effective</td>
</tr>
</tbody>
</table>