

2022

## Fire Safety Education and Increasing Functioning Smoke Detectors in Residential Apartments

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# Walden University

College of Social and Behavioral Sciences

This is to certify that the doctoral study by

Enrique Fernandez Robinson

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Walden University

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Abstract

Fire Safety Education and Increasing Functioning Smoke Detectors in Residential Apartments

by

Enrique Robinson

MS, University of Phoenix, 2018

BA, Trinity Bible College. 2011

Professional Administrative Study Submitted in Partial Fulfillment  
of the Requirements for the Degree of  
Doctor of Public Administration

Walden University

August 2022

## Abstract

The lack of functioning smoke detectors poses significant life safety risks to people in low-income residential communities. In 2019, a fire incident occurred in an urban Maryland community due to the lack of a functioning smoke detector. Although no deaths or injuries resulted, there was significant property damage and resident displacement. The purpose of this study was to assist a local fire department in an urban area of the state of Maryland with developing and implementing a fire safety community outreach program designed to reduce the percentage of residential homes in a low-income community without functioning smoke detectors. A qualitative research methodology consisted of document review and semistructured interviews conducted with five local fire department organization officials and eight local neighborhood residents to identify barriers and challenges to ensuring that residents had functioning smoke alarm detectors. The findings revealed a need to improve the fire department's current community outreach and fire safety education initiatives in the neighborhood using current evidence-based guidance in community assessment and risk reduction. Several recommendations were identified to improve fire safety and prevention in the areas served by this fire department. The findings of this study have potential implications for positive social change by improving fire safety education and potentially preventing additional fire deaths and injuries in low-income residential communities.

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## Dedication

I dedicate this project to the war on poverty in American urban and rural communities. This study represents a small step toward addressing many problems, such as food deserts, lack of affordable housing, redlining in urban cities, and social injustice. The Susquehanna Hose Company in Havre de Grace Maryland is one of the best diverse volunteer fire departments in the country with an ISO Class 1 rating. The firefighters risk their lives daily to protect the community from fire incidents and to serve the citizens of Havre de Grace, in Harford and Cecil County Maryland.

“If you can’t fly then run, if you can’t run then walk, if you can’t walk then crawl, but whatever you do, you have to keep moving forward.” — Martin Luther King Jr.

## Acknowledgments

My life has always been a complicated roller coaster. From living in the city of Detroit to my freshman year in high school with no direction and not knowing the expectations that life is going to bring. I remember my senior year in high school at New Boston Huron in New Boston, Michigan, a teacher told me, “You don’t meet the requirements to even think about going to a college or university. You should just work at a factory.” This was the motivation I needed in my life. I began looking at the big picture and figuring out how I could reach my goals and receive a degree in the highest level of education. Life was a huge roller coaster with ups and downs, roadblocks and failures constantly hitting me in the face. With the help of my Lord and Savior Jesus Christ, I was put in the right direction with the right people. This also gave me the motivation, guidance, and direction I needed to finish this degree.

I would like to give a big thanks to Susquehanna Hose Company (ISO Class 1) Fire Chief Scotty Hurst and President Joe Miller for allowing me to do my research. I would like to give thanks to Blue and Susie Livingston for always believing in me and keeping me in their thoughts and prayers. I would like to thank all the individuals who believed in me, giving me the motivation and strength to achieve my goals. I would like to thank all the individuals from the Susquehanna Hose Company (ISO Class 1) and the residents who participated in the study.

I would like to especially thank my brother, Larry Bowen, who has been there with me through high school, homelessness in Detroit, financially struggling, and being misguided in life. I would like to give a big thanks to Eric Slivoskey and the Slivoskey family for introducing me to higher education. Also, I would like to give a huge thanks to Dr. Julian K. Muhammad for his guidance and wisdom by helping me finish this study. Whoever thought a kid from Detroit who

was considered a statistic at the age of 15 would receive doctorate? Never give up on your hopes and dreams, don't listen to the naysayers, and keep pushing forward. Nothing is impossible.

“Education is the passport to the future, for tomorrow belongs to those who prepare for it today.” — Malcolm X



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## Section 1: Introduction to the Problem

### **Introduction**

The purpose of this study was to assist a local fire department with developing and implementing a fire safety community outreach program designed to reduce the percentage of residential apartments in a low-income community without functioning smoke detectors. This study was essential for ensuring the residential community had appropriate levels of fire prevention and fire detection measures consistent with national, regional, and local fire safety standards. According to Roberts et al. (2004), the lack of working smoke detectors poses significant life safety risks to residents of inner-city or low-income communities and those who live below the poverty level. In addition, research continues to reveal a disproportionately high number of residents in low socioeconomic communities do not have working smoke detectors in their homes or apartments (Miller et al., 2014).

Because fire safety and prevention education are central to improving the percentage of residences with functioning smoke detectors, local fire officials identified a need to improve its community outreach efforts focusing on educating community residents about smoke detectors. In pursuing this objective, community residents were interviewed to help inform the fire department's community outreach efforts and to determine how best to develop and implement its fire safety program focusing smoke detector education. In this study, I applied a qualitative research methodology consisting of document review, semistructured interviews with fire officials to identify barriers and challenges to its ability to increase the number of residential structures with smoke alarm

detectors, and interviews with community residents. The goal of data collection and review was to identify recommendations to improve fire safety and prevention in this low-income residential community, which would have potential implications for positive social change.

The findings of this study informed the local fire department on how best to educate high-risk communities and individuals about the importance of smoke detectors in preventing fires and saving lives. Additionally, the study findings informed local fire prevention and safety policymakers in risk reduction strategies for reducing fires and fire-related deaths associated with the lack of smoke alarm detectors via community outreach programs. Lastly, the study findings cemented the need for greater collaboration among fire departments, building managers and community residents in improving fire prevention and safety through information and resource sharing.

### **Problem Statement**

The local fire department, which provides fire protection services to a low-income residential community, identified a need to improve its community outreach efforts by focusing on fire prevention education to increase the number of residential apartments with functioning smoke detectors. Countless fire incidents occur every year in the United States with significant property damage or destruction and loss of life due to the lack of functioning smoke detectors in residences or structures. The term *functioning* refers to smoke detectors that are not outdated (beyond 10-year lifespan) and have sufficient battery life to function properly.

Certain urban and socioeconomic communities experience a greater lack of functioning smoke detectors. Roberts et al. (2004) identified inner city communities as most at risk for lacking functioning smoke detectors, and as such, these residents are at significant risks for injury and death due to fire and smoke inhalation. Crawford (2004) found that residents living below the poverty level are also at significant risk for fire-related injuries or deaths resulting from the lack of functioning smoke detectors. Miller et al. (2014) revealed a disproportionately high number of residents in low socioeconomic communities without working smoke detectors in their homes or residences.

According to the National Fire Protection Association's (NFPA, 2019) statistics on death by fire, individuals who live below the poverty level are at 15% greater risk for fire fatalities. These same statistics show that African Americans and Hispanics account for 12% and 18%, respectively, of fire-related deaths, and states with higher percentages of African Americans and Native Americans tend to have higher fire death rates (NFPA, 2019).

Functioning smoke detectors in a residence can alert the occupants to the presence of smoke and fire, which can help ensure that individuals evacuate before being exposed to fire and/or smoke. There are two kinds of smoke detectors, photoelectric and ionization, which will detect smoke from a fire in any kind of structure (Soares & Jacobs, 2012). However, for residential homes, photoelectric smoke alarms are recommended because they respond quickly to smoldering fires that start slowly and tend to burn without producing a flame for a long period. Deaths and injuries from residential fires are often the result of smoke inhalation rather than flames, and as such, early detection of

smoke can reduce injury and death by alerting occupants to vacate the residence (David & Johnathan, 2014).

The low-income residential community, which was the focus of this study, consisted predominantly of two-story row homes. This residential structure contrasts with other cities that have communities with multiple two-family flats housing residential structures. In the study site community, row home structures require functioning smoke detectors for fire safety and prevention because individual residential units are connected to one another. Consequently, when one structure is engulfed with flames and smoke, fire, smoke, and heat radiate to the adjoining structure(s), resulting in multiple structures on fire. Smoke detectors are unequivocally most effective in reducing loss of life and injury and property damage in these cases.

The residential community was comprised of 96% African Americans who live below the poverty level (U.S Census Bureau, 2020). These statistics cement the validity of the need for fire officials to reduce the number of apartments without working smoke alarm detectors in the residential community. As such, the importance of this study is significant for fire departments serving similar communities.

I anticipated that this study would be generalizable to other fire departments facing similar barriers and challenges. The findings of this study underscored the significance that smoke detectors play in improving life safety and fire prevention, especially among high-risk communities. Moreover, community outreach is an important piece of public relations for fire safety and prevention, which has been adopted as best practice in multiple fire safety standards in the United States.



### **Purpose of the Study**

Smoke alarm detectors are critical to fire safety and prevention. Fire departments are inherently charged with ensuring not only that the public is thoroughly educated about the importance of smoke detectors but also that every residence has a functioning smoke detector (Smith et al., 2018). The purpose of this study was to assist fire department officials with developing and implementing a fire safety community outreach program designed to reduce the percentage of residential apartments in the low-income community without functioning smoke detectors. As previously mentioned, researchers have identified inner-city communities as most at risk for lacking functioning smoke detectors, which puts them at significant risks for injury and death (Roberts et al., 2004). The residential community was predominately comprised of African American residents who are low income and, as such, at risk according to research studies. Consequently, this more focused fire prevention and safety outreach and education programs by the local fire department was needed to increase the use of smoke detectors in this residential community.

### **Research Questions**

The research questions guiding this study were:

RQ1: What are the local fire department's current community outreach and fire safety education initiatives in the low-income community, especially initiatives intended to improve the use of functional smoke detectors?

RQ2: What specific evidence-based practices will help the local fire department improve its community outreach and fire safety education initiatives to reduce the

number of residences without functioning smoke alarm detectors in the low-income community?

Numerous studies have been published on fire safety and prevention using smoke detectors. There has been evidence-based research, policy guidance, and best practices published by national fire associations, such as NFPA, that provide strategies regarding how best to implement community fire prevention measures and initiatives. This research also identifies best practices and strategies to help improve the local fire department's ability to increase the percentage of functioning smoke detectors in the residential community.

### **Nature of the Administrative Study**

In this study, I applied qualitative research methods consisting of document review and semistructured interviews with fire officials to identify barriers and challenges to its ability to increase the number of residential apartments with functioning smoke alarm detectors. In addition, I conducted interviews with residents of low-income communities to glean their perceptions of engagement with the local fire department, especially related to its community outreach and fire safety education initiatives to improve the use of smoke detectors among residents. The interviews with local fire department officials and low-income residents were based on hermeneutic phenomenological approaches designed to capture and document the experiences of those involved in the study in inform the development of an effective community outreach program for the local fire department.

The document review consisted of reviewing performance accountability reports, annual budgets, policies, procedures, marketing, academic research, industry compliance standards, fire safety education, fire prevention inspection, home fire safety inspection programs, and documents regarding fire and EMS operations. The goal of document review was to determine how this information informed how fire officials addresses community fire safety education specific to increasing the use of smoke detectors in residential settings. Once this was achieved, the goal was to measure any findings against evidence-based research, industry best practices, and compliance guidance from organizations such as NFPA that provide standards on community outreach and education to improve fire prevention and fire safety, especially the use of smoke detectors in residential settings.

Semistructured interviews, consisting of open-ended questions, were conducted with fire officials, specifically those from the office of the fire chief, office of the Maryland State Fire Marshal, state safety oversight, and local EMS core operations to identify and discuss their perspectives regarding the barriers and challenges associated with the agency's inability to meet any smoke detector and community outreach goals in low-income residential housing (Tasker & Cisneroz, 2019). Semistructured interviews were conducted with low-income residents and primarily consisted of open-ended questions to help glean and inform local fire department understanding of residents' needs as it pertains to fire prevention and smoke detector education, community outreach efforts, and continuous engagement with the fire department (Tasker & Cisneroz, 2019).

I anticipated the study's outcomes would not only inform fire officials development and implementation of its community outreach and fire safety education program but also increase the use of functioning smoke detectors among residents. In addition, I expected the study would be generalizable to residential communities similar to low-income housing throughout the United States as well as the fire departments that serve them.

### **Significance**

This study was significant for several reasons. First, the findings inform fire officials development and implementation of an effective community outreach and fire safety program to improve the use of functioning smoke detectors in residences of low income. According to Baixia (2017), in "recent years, residential building fire has been at a high incidence, and the number of fires, personnel injury, death and other indicators of fire account for a rather high proportion to total fires" (p. 1). This suggests that residents have insufficient awareness of fire safety precautions and measures and, as such, require increased awareness through more effective education and outreach in residential communities in the United States.

Second, in the study I explored and applied best practices in fire safety education and community outreach gleaned from national fire safety organizations such as NFPA as well as state and local government regulations and fire safety accreditation standards. For example, Baixia (2017) suggested that residential property managers, in collaboration with local fire departments, "should carry out rich and colorful fire control propaganda activities close to people's lives" (p. 4). These activities include but are not limited to

“setting up fire publicity windows inside the residential quarter, putting up fire warning signs in the building corridors to create a fire propaganda atmosphere” (Baixia, 2017, p. 4). In this study, I went several steps further by identifying the need to more effectively engage property management to provide fire safety presentations directly to low-income residents.

Third, although the study informed the development and implementation of an effective community outreach and fire safety education program in a low-income community housing, the outcomes could contribute to improving public safety beyond the community. For example, residents may share what they learn about fire safety, especially the importance of functioning smoke detectors, with friends and family members. Fourth, as mentioned previously, the study’s outcomes are generalizable to residential communities throughout the United States and fire departments and other stakeholders that serve them.

### **Summary and Transition**

The purpose of this study was to assist a local fire department with developing and implementing a fire safety community outreach program designed to reduce the percentage of residential apartments in a low-income community without functioning smoke detectors. In this study, I applied qualitative methods consisting of document review and interviews with fire officials and low-income residents to increase the number of residential apartments with smoke alarm detectors. In the next section, I address the study’s conceptual framework and background.

## Section 2: Conceptual Approach and Background

### **Conceptual Framework**

As previously mentioned, the purpose of this study was to assist a local fire department with developing and implementing a fire safety community outreach program designed to reduce the percentage of residential apartments in a low-income community without functioning smoke detectors. As such, a qualitative research design grounded in the theory of constraints (TOC) was applied as the study's conceptual framework. TOC is a methodology founded by Eliyahu M. Goldratt that is ideally used for identifying the most important limiting factors or constraints that inhibit the achievement of a particular goal (Bauer et al, 2019). Once the limiting factors or constraints are identified, a systematic approach is explored for improving that limiting factor or constraint until it no longer inhibits the achievement of that goal or performance measure (Naor et al., 2013). Although TOC has been primarily used in the manufacturing industry to improve process performance, it had considerable utility for this study.

For example, in identifying the best approaches to developing and implementing an effective community outreach and fire safety program to improve use of smoke detectors in residential communities, barriers to the local fire department's current efforts were identified. The identification of such barriers was derived primarily from participant interviews. Consequently, there was a need not only to identify the barriers but also to understand the reasons for them in order to explore strategies to reduce or eliminate them.

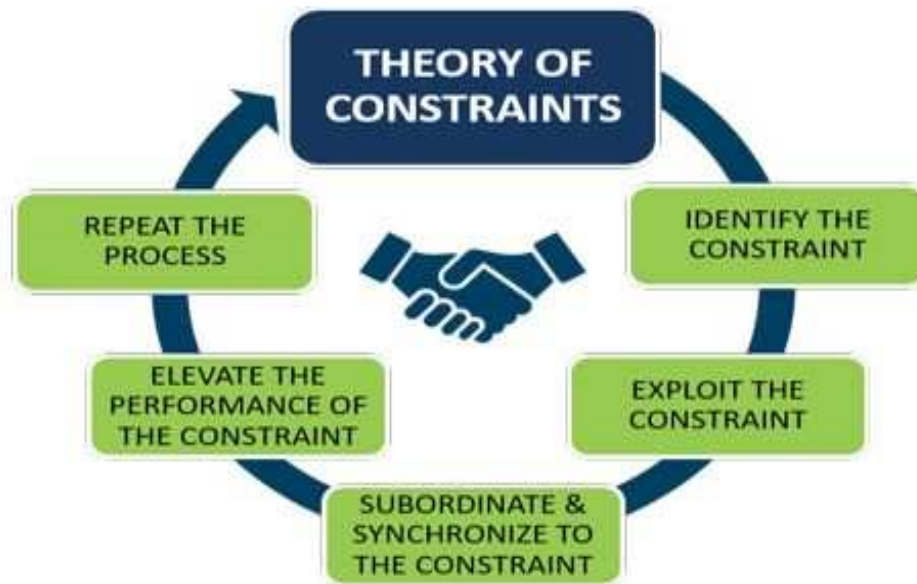
Bauer et al. (2019) applied TOC to "diagnose and improve healthcare systems focusing on the service quality" (p. 1543). Naor et al. (2013) attempted to "establish it as

a formal operations management theory, so it can continue improving practice” (p. 542).

This demonstrates the application of TOC in qualitative studies. Again, the qualitative research design for this study employed document review, semistructured interviews with key fire officials’ decision makers and low-income residents. These data collection methods helped me to identify and understand the relationship between the key variables to gauge inconsistencies in fire department community outreach and fire safety education initiatives. This was logically articulated using TOC (Naor et al., 2013).

### Figure 1

#### *Theory of Constraints*



<https://www.pinterest.com/pin/325174035581598152/>

According to Bauer et al. (2019), “TOC aims to solve unstructured or ill-defined problems and also to identify cause-and-effect relationships that may generate constraints” (p. 1544). In this regard, the TOC process, which consists of five steps, will help inform the study’s outcomes. These steps are as follows: (a) identify the constraint,

(b) exploit the constraint, (c) subordinate and synchronize to the constraint, (d) elevate the performance of the constraint, and (e) repeat the process.

For example, in applying the first step, identifying the constraint, I gleaned barriers and issues related to current community outreach and fire safety education by identifying specific aspects or parts of these efforts that have failed to produce the desired outcomes based on participant interviews. Such aspects included but were not limited to poorly designed community outreach and safety education materials, lack of effective collaboration between fire officials and residential property management, and insufficient interaction between the fire department and residents (Bauer et al., 2019). For the second step, exploit the constraint, I determined how best to use the existing efforts of fire officials to reduce potential constraints, such as those mentioned in Step 1. Step 3, subordinate and synchronize to the constraints, involved identifying parts of fire officials' community outreach efforts that work well and how best to use them to support the constraints (Bauer et al., 2019). Step 4, elevate the performance of the constraint, was simply prioritizing those constraints that cannot be effectively remedied and determining what should be done to reduce or eliminate them. Step 5, repeat the process, involved continuously identifying ways to improve community outreach and fire safety education efforts in low-income communities housing. This was especially important because TOC is an ongoing process that will help fire officials meet its program goals (Bauer et al., 2019).



## Definitions

*Community outreach:* The activity of providing services to any population that might not otherwise have access to those services.

*Fire safety:* A set of practices intended to reduce the destruction caused by fire.

*Identify risk:* The process of determining risks that could potentially prevent a program, enterprise, or investment from achieving its objectives.

*Smoke detectors:* Fire-protection devices that automatically detect and give a warning of the presence of smoke.

*Socioeconomic communities:* Relating to or concerned with the interaction of social and economic factors.

## Relevance to Public Organizations

Public safety is among the most essential responsibilities of government and those public organizations that engage in it. Although all levels of government engage in some form of public safety, the local government is primarily responsible for responding to fire emergencies. As such, the relevance of this study, which was to improve fire safety by increasing the use of functioning smoke detectors in low-income housing, served an important public good.

*Fire safety education* is a broad term that addresses numerous factors that contribute to reducing the risk of fire-related incidents in the home or residential building. These factors include, but are not limited to, the proper use of fire extinguishers, correct disposal of cigarette butts, proper use of electrical outlets, surge protectors and extension cords, and knowledge and management of combustible materials and chemicals

commonly used in the home (Zhuo, 2017). In addition, proper home or building evacuation procedures, especially for children, the elderly, and those with functional challenges and disabilities is of prominent importance in fire safety education (Zhuo, 2017).

As mentioned previously, the lack of functioning smoke detectors in the residence can have far-reaching implications to safety. This fire prevention and safety measure is often considered the minimum protective measure required in structures, but also the most overlooked in the home. The relevance of this study is that it will inform fire departments and other public safety stakeholders of effective evidence-based approaches to educating residents in residential settings of the importance of having functioning smoke detectors in their homes or apartments.

### **Organization Background and Context**

The fire department is responsible for providing fire protection services to the local community, which has a population of approximately 16,000 people and is famous for its waterfront, decoys, and lighthouse. The local fire department has five firehouses that operate five engines, two ladder trucks, and one heavy rescue in addition to other critical resources, such as mini pumpers, boats, and dive and swift water units. It also regularly hosts community events and provides fire safety education to the community. However, there was a need to develop and implement a more robust community outreach program to educate residents about the myriad of fire safety and prevention measures to reduce the risk of fire incidents. Currently, the fire department responds to approximately seven-eight fire apparatus on calls daily.

In meeting this need, fire department officials identified the low-income community as a potential risk for fire incidents that can be effectively mitigated through robust community outreach and fire safety education initiatives. As such, fire department officials explored the development of community outreach initiatives comprised of onsite fire safety education presentations to low-income residents, which was the purpose of the study. Of particular importance was determining how best the local fire department could be more supportive of the community through these initiatives, specifically regarding improving the use of functioning smoke detectors. The local fire department was also interested in fostering greater collaboration with the residential community's property management and community leaders to improve its outreach and fire safety education.

#### **Role of the DPA Student**

I am a professional fire fighter with six years of experience with a local fire department in an urban area. As such, my role is critical to informing the study's methodology and data collection and analysis. For example, I have been professionally active in fire safety prevention, including residential fire prevention and reduction efforts in urban communities. I also have experience with aerial operations, and mutual aid assignments to in other jurisdictions. My professional certifications include Firefighter 1 and 2 and Fire Officer 1, 2, 3 and 4. In addition, I have a Bachelor of Arts in General Studies and Master of Science in Public Administration.

I believe that my education, training, and experience are essential to informing the data collection and analysis for the study, which includes identifying areas where objectivity and potential bias may compromise or adversely affect the interpretation of

research outcomes and findings. I have thoroughly engaged in the literature and will synthesize information gleaned from document review and participant responses to questions from semi-structured interviews.

As a firefighter for the last seven years in a local fire department, I have also been involved in community outreach programs to improve fire safety, including the use of smoke detectors in high-risk communities. I have good communication skills and a good relationship with people in the community.

### **Summary and Transition**

In exploring the best approaches to developing and implementing an effective community outreach and fire safety program to improve use of smoke detectors in the low-income residential community, I applied the Theory of Constraints conceptual framework to identify the local fire department challenges with current efforts. The organizational background and context cemented the validity of my role as the researcher and my approach to the study. The next section discusses the data collection process and analysis of the study.

### Section 3: Data Collection Process and Analysis

#### **Introduction**

The purpose of this study was to assist a local fire department with developing and implementing a fire safety community outreach program designed to reduce the percentage of residential apartments in a low-income community without functioning smoke detectors. The findings of this study were essential for informing fire department officials about community outreach and fire safety education initiatives to increase the use of functioning smoke detectors in low-income communities. As such, the research designed incorporated a qualitative methodology using document review and semistructured interviews with key research participants. The key participants were fire department officials, residents of the low-income housing, and fire safety experts. In this section, I address practice-focused questions, sources of evidence, archival and operational data, analysis and synthesis, and the conclusion.

#### **Practice-Focused Questions**

This research incorporated a qualitative methods model that consisted of document review and semistructured interviews with key research participants. The research questions guiding this study were:

RQ1: What is the local fire department's current community outreach and fire safety education initiatives in the low-income community, especially initiatives intended to improve the use of functional smoke detectors?

RQ2: What specific evidence-based practices will help the local fire department improve its community outreach and fire safety education initiatives to reduce the

number of residences without functioning smoke alarm detectors in the low-income community?

These questions were important because one of the requirements of the new NFPA 1300: Standard on Community Risk Assessment and Community Risk Reduction Plan Development is to ensure that residents are educated about the importance and use of smoke detectors and that smoke detectors are present and functioning properly in every residence (Smith, 2000). Fire officials has adopted this NFPA standard. According to NFPA (2016), “Smoke alarms provide the basic level of protection in homes (early detection) and have directly prevented tragedies from occurring” (p. 6). This was important consideration for this study, as Ahrens (2019) suggested that “higher state fire death rates are correlated with larger percentages of people who have a disability, live below the poverty line, are smokers and are African American, Native American or Alaskan Native” (p. 36).

### **Sources of Evidence**

The research incorporated a mixed qualitative methods model that consisted of document review and semistructured interviews with key research participants: fire department officials, residents of the low-income residential community, and fire protection and safety experts. According to Chowdhury (2019), “Documentation review can be primary data. These are regarded as primary data because these raw data were not used by any researcher previously” (p. 10).

The document review portion of the qualitative approach consisted of extrapolating and assessing relevant information from key reports, standards, research

articles, video recordings, etc., to inform my understanding of the importance and utility of community outreach and fire safety education in fostering greater awareness and use of functioning smoke detectors in residential settings. The documents included, but were not limited to, reports, policies, procedures, marketing materials, academic research, industry compliance standards, and video training recordings related to smoke detectors as fire safety and prevention measures.

The document review process informed my understanding of how local fire department educates the community of the importance of smoke detectors in fire safety and prevention through its community outreach and education approaches. The goal of the study was to measure these initiatives against evidence-based research, industry best practices, and compliance guidance from national and international fire safety and prevention organizations. This was where the review and synthesis of relevant fire safety regulations, standards, and best practices became prominent in informing the recommendations for the local fire department fire safety education program development initiatives.

### **Semistructured Interviews**

The study participants, which were fire department officials (past and present) and residents of the low-income, were purposefully selected based on their specific involvement and perspectives relevant to the study. Purposeful sampling is routinely used in qualitative research and requires a researcher to select study participants based on the needs of the study (Benoot et al., 2016). Benoot et al. (2016) provided a core argument supporting purposeful sampling, suggesting that it is not meant to be comprehensive in

scope. Therefore, a researcher's interest is not in exploring all potential information relevant to the study, but rather in "examining the complexity of different conceptualizations" of the researcher problem, questions, or subject (Benoot et al, 2016, p. 2).

The use of in-depth interviews in phenomenology allows a researcher to glean more specific perspectives of participant experiences related to the focus of the study than surveys and group observation. According to Webb and Welsh (2019), phenomenology emphasizes:

world as lived by a person, not the world or reality as something separate from the person... Therefore, the lived phenomena is foci of the research and the reality and meaning of this phenomenon is embedded within the conscious experience of an individual and the researcher. (p. 170)

The interview questions, which were open-ended, allowed for greater feedback and sharing of perspectives to glean the experiences and opinions of study participants. As such, especially regarding those actively involved in implementing or informing the implementation of fire prevention measures such as smoke detectors, obtaining their experiences was crucial to identifying barriers to fire officials current fire safety education efforts (Webb & Welsh, 2019).

There were three sets of interview questions developed for participants.

Categories of participants included the following:

- 5 fire department officials from local fire department
- 8 current low-income housing residents



- 2 fire safety experts and practitioners from national and international organizations, including the NFPA, National Association of State Fire Marshals, U.S. Fire Administration, International Association of Fire Chiefs, American Red Cross, International Association of Fire Fighters, National Fire Safety Council, and other relevant national and international organizations

Interviews were conducted until data saturation was reached. Fusch and Ness (2015) described data saturation as “when there is enough information to replicate the study, when the ability to obtain additional new information has been attained, and when further coding is no longer feasible” (p. 1408). Data saturation can be attained from a minimum of six interviews (Fusch & Ness, 2015). This study depended heavily on the depth of the information gleaned from participant interviews, which was the reason for purposeful sampling.

The interview questions were directed toward eliciting feedback from the use of smoke detectors in residential communities and community townhomes in urban communities. A saturation grid was constructed that identified major topics developed from interview questions from all the three categories (vertical) and major themes (comparisons, contrasts, etc.) derived from interview responses (horizontal). I determined the degree to which this information contributed to answering the practice-focused questions and the recommendations for the development of a fire prevention, safety education program, and planning program for local income housing communities.

### **Archival and Operational Data**

Qualitative research has been widely used in social science research since the 1990s (Kansteiner & König, 2020). According to Kansteiner and König (2020) “all provide tools for promoting the overall goal of avoiding the blind spots of a mono-method study, as well as expanding and strengthening the conclusions of a study” (p. 2). There are two major focuses of qualitative methods: exploration and description or testing and prediction (Kansteiner & König, 2020). In this study, I focused on exploration and description, which was intended to yield recommendations for developing and implementing an effective community outreach and fire safety education program to increase the use of smoke detectors in low-income housing communities.

The operational data analyzed was derived from participant interviews (fire department officials, low-income residents, and fire safety experts) and relevant documents from the local fire department, including but not limited to any past or current community outreach and fire safety education efforts, statistics on the number of residential fire incidents (including property damage and injuries and deaths attributed to the lack of smoke detectors or functioning smoke detectors), and preventable fire incidents in the residential community. The significance of document review as part of qualitative research was not undervalued (Kroos, 2012). The information gleaned from the aforementioned documents not only informed my understanding of the effectiveness or ineffectiveness of the local fire department current community outreach and fire safety initiatives by measuring them against actual fire incident data, but also provided context

regarding the challenges associated with such efforts, which were identified through the application of the TOC to the study, as described in Section 2.

### **Analysis and Synthesis**

The goal of data analysis for this study was to analyze and synthesize data extrapolated from relevant documents and participant interviews based on the application of phenomenological research as a method of inquiry. This type of inquiry helped me to answer the practice-focused questions that drove the study and development of recommendations for local fire department community outreach and fire safety education program. In addition, the five steps of the Theory of Constraints (TOC) required considerable engagement with stakeholders involved or impacted by the fire department community outreach and fire safety initiatives in the low-income housing community. They provided perspectives that could otherwise be sufficiently captured in documents or literature review, which underscored the importance of primary research (Le Gal & Le Roux, 2019).

According to Creswell (2009), phenomenological research relies heavily on the researcher's ability to identify the essence of human experiences about a phenomenon in question as described by participants (p. 13). This approach can also be referred to as hermeneutic phenomenology because it provides the researcher with the needed flexibility to apply his/her own personal knowledge or theories to data interpretation. However, the challenge with this approach is the subjectivity exercised by the researcher (Suddick et al., 2020). For example, statements made by participants, either allegorical or definitive, regarding their experiences with the phenomena under study are the exclusive

province of the researcher's interpretation, which is why his/her role must be clarified and adjusted, if necessary, to account for potential bias, if any (Suddick et al., 2020).

As such, there are potential challenges with validity and reliability derived from data overload and researcher bias in interpreting participant responses. Notwithstanding, the analysis is intended to create meaning and achieve some sense of understanding gleaned from the data. Therefore, to mitigate or reduce the potential effects of the researcher's bias in interpreting qualitative data, a case-oriented research strategy was applied that treated each participant interviewed for the study as a "separate case". However, this approach was limited to the residents of the low-income residential community that were interviewed, and not fire officials interviewed, or fire safety experts consulted for the study. The study required interviewing 10 residents of with a data collection instrument that consisted of open-ended questions. However, 8 residents participated in the study. This inherently translated each completed interview as a "standalone" case that could be examined and compared to other cases (interviewees).

According to Porta (2008), case-oriented approaches apply a different concept of "understanding" related to "generalizable knowledge of relations among variables (aiming at generalization) ..." (p. 207). As such case-oriented strategies are often applied in qualitative research to "understand or interpret specific cases because of their intrinsic value..." (Porta, 2008, p. 207). The most critical aspect of this part was drafting the extensive descriptions of the low-income residential community interview responses, which were extrapolated from the completed interview transcripts and filtering the content.

Once this was achieved, I extracted important words, phrases, and statements from the filtered content with the intent of formulating key meanings. The goal was to arrange a collection of essential meanings into key themes. It was these themes that guided and informed further analyses of the data, which was triangulated. Triangulation was achieved by cross referencing data and findings gleaned from documents, participant interviews and my (researcher's) interpretation. Validation was achieved through comparative analysis of the case descriptions between fire officials and residents of the low-income residential community interviewed for the study.

## Section 4: Evaluation and Recommendations

### **Introduction**

The local fire department, which provides fire protection services to the low-income residential community selected for the study, identified a need to improve its community outreach efforts in low socioeconomic communities by focusing on fire prevention education to increase the number residences with functioning smoke detectors. As such, the purpose of this study was to assist local fire department officials with developing a fire safety community outreach program designed to reduce the percentage of residential homes in low-income communities without functioning smoke detectors. The findings of this study were essential to informing the local fire department's community outreach and fire safety education initiatives to increase the use of functioning smoke detectors in this low-income residential community.

Recently there has been increasing recognition of the need for more aggressive community education about the life and safety benefits of smoke detectors in preventing and reducing fire incidents. For example, on January 5, 2022, 12 people were killed in a fire at a public housing building in Philadelphia, Pennsylvania. Four smoke detectors in the building did not function properly during the fire incident, which resulted in the deaths of seven children and five adults (Steinbuch & Kessler, 2022). Previous fire incidents of national attention that resulted from the lack of functioning smoke detectors included an incident in Akron, Ohio, in which five people were killed and four were injured in a house fire on October 15, 2021 (McDonnell, 2021), and in Detroit, Michigan

two young children were killed in a house fire on Christmas Day in 2020 (Rahl & Hicks, 2020).

This study was not only timely but also critical to identifying community education and outreach strategies to help convey the importance of functioning smoke detectors in residential settings as an essential life safety measure. The research designed for this study was qualitative and consisted of document review and semistructured interviews with key study participants. The key participants were selected through purposeful sampling and were limited to residents of study site (low-income community) and fire department officials. The research questions guiding this study were:

RQ1: What are the fire departments current community outreach and fire safety education initiatives for low-income residence that lived below the poverty line, especially initiatives intended to improve the use of functional smoke detectors in low-income communities?

RQ2: What specific evidence-based, best practices will help fire officials improve its community outreach and fire safety education initiatives to reduce the number of residences without functioning smoke alarm detectors in poor communities?

The documents reviewed were local and state fire incident reports, marketing materials, academic research studies, and industry compliance standards that helped to inform my understanding of the topic, specifically how fire department officials currently educate the low-income residential community of the importance of functioning smoke detectors. The interviews allowed me to capture specific experiences of participants related to the focus of the study (Webb & Welsh, 2019). The interview questions were

semistructured, open-ended and allowed for greater feedback and the sharing of participants' perspectives (Webb & Welsh, 2019).

The analytical strategy consisted of the development of a data saturation grid that identified the main themes and any subthemes and findings from participants' answers to the interview questions. The categories, main themes, subthemes, and findings were documented in a table to determine the degree to which this information contributes to answering the research questions and to informing recommendations and strategies for developing a prevention and safety education program for low-income residents.

## **Findings and Implications**

### **Document Review**

The document review consisted of reviewing documents, such as performance accountability reports, annual budgets and reports, policies and procedures, marketing materials, academic research, industry compliance standards, fire safety education, fire prevention inspection reports, and other key documents to determine how this information informed how fire officials addresses community fire safety education, including the use of smoke detectors in homes. The goal was to extrapolate any findings from the document review to measure against evidence-based research, industry best practices, and compliance guidance from organizations such as the U.S. Fire Administration, NFPA, and other entities that provide standards on community outreach and education to improve fire prevention and fire safety. Table 1 provides a list of the documents, their descriptions, and extrapolated information that help to inform the study.



**Table 1***Documents, Descriptions, and Extrapolated Information*

Document/research	Description	Information for study
NFPA 1300: Standard on community risk assessment (CRA) and community risk reduction (CRR) plan development	This document provides insight into the steps required to conduct a CRA and a standardized process for developing, implementing, and evaluating a CRR plan. It also includes a framework for assembling a CRR team, cultivating strategic partnerships, and leveraging data to conduct program activities and ongoing evaluations.	Provides best-practices guidance to local fire department in integrating CRA strategies in its fire safety education program
Community Risk Reduction: Doing More with More	CRR is the all-hazards solution to the all-hazards response that the modern fire service needs to keep pace with a constantly changing social, economic, and political climate.	Provides best-practices guidance to fire officials in integrating CRR strategies in its fire safety education program
U.S. Fire Administration's Public Fire Education Planning: A Five Step Process	This guide uses a five-step planning process for developing and implementing successful fire and life safety public education programs.	Provides best practices for developing and implementing fire safety education pilot program that fire department can use as a guide
Office of the Maryland State Fire Marshal Notice of Incident (NOI)	Notice of Incident details fire at a low-income housing community.	The NOI indicates that the smoke detector in the home did not activate.
'Unbelievable' to wake up to: Mother grieves loss of 2 sons after Christmas Day fire	Two young boys die in a Detroit, Michigan, home fire due to lack of functioning smoke detectors.	The news article documents a recent home fire that resulted in the loss of life and property damage or destruction due to the lack of functioning smoke detectors.
At least 13 people killed — including 7 kids — in Philadelphia row house fire: reports	Thirteen people killed in public housing apartment in Philadelphia, Pennsylvania, due to lack of functioning smoke detectors.	The news article documents a recent home fire that resulted in the loss of life and property damage or destruction due to the lack of functioning smoke detectors.
No working smoke detectors found in Akron home after fire killed 5; cause undetermined	Five killed in Ohio home after smoke detectors failed to work properly.	The news article documents a recent home fire that resulted in the loss of life and property damage or destruction due to the lack of functioning smoke detectors.

### **Semistructured Interviews**

Another data collection method for this study was semistructured interviews. Interview participants consisted of eight residents and five fire officials. The interview instruments consisted of 10 questions for low-income residents and seven questions for fire department officials. The responses were very in-depth and detailed and, as such, presented a need to arrange the questions according to three categories—(a) fire safety, (b) smoke detectors, and (c) fire prevention/safety education—to effectively manage, synthesize, and analyze the information and answer the practice-focused questions. Table 2 documents the categorization of the questions for the low-income resident’s interview instrument. Table 3 documents the categorization of the questions for fire officials.

### **Fire Safety Participant Responses**

The participant responses to the interview questions under the *Fire Safety* category were arranged according to main theme, subtheme (as applicable) and findings. “B” refers to the low-income residential interview questionnaire and “S” refers to the fire department officials questionnaire. The results are indicated in Table 4.

**Table 2***Low-income residents Interview Instrument Question Categorization*

Fire safety	Smoke detectors	Fire prevention/safety education
Has anyone you know in your residential community experienced a fire incident in a home during the last 2 years or prior?	Do you receive any information from your local fire department or building management about smoke detectors? If so, what is the information (i.e., flyers, door hangers, posters in building hallways, etc.)?	Do you feel comfortable in your understanding of fire prevention and fire safety?
If so, what was the incident, and was anyone injured or property damaged? Please explain in detail.	Do you have functioning smoke detectors in your home? If so, how many and where are they located in your residence? Please explain in detail.	How often do you receive fire safety information/educational materials from your local fire department? Do any fire department personnel visit the apartment complex to distribute information or provide educational fire safety seminars, workshops, etc.?
	Do you know how to check the smoke detector to ensure it is working properly? Do you know how to change the battery? Please explain in detail.	If you receive fire safety information/educational materials from your local fire department, what are the topics of the materials? Do you understand the information provided?
	If your local fire department were to create a smoke detector outreach program in your residential community, would you be interested of letting the fire department personnel in your home to either install or check existing smoke detectors to ensure they are working properly? If so, why? If not, why not?	What would you like to see your local fire department do in your local community? Sponsor a community outreach program midsummer Sponsor educational programs for children between 5 to 12 years old Sponsor a July 4 community picnic

**Table 3***Officials Interview Instrument Question Categorization*

Fire safety	Smoke detectors	Fire prevention/safety education
<p>Has your local fire department responded to any fire incidents in your residential community during the last 2 years or prior?</p>	<p>Does the local fire department provide any information to your residential community or building management about smoke detectors? If so, what is the information (i.e., flyers, door hangers, posters in building hallways, etc.)? If not, why not? Is there a need? If so, what is the need?</p>	<p>Has the local fire department ever done community outreach in your local residential? If so, what was it and how long ago, or how often? If not, why not? Please explain in detail.</p>
<p>If so, what was the incident? Was anyone injured or property damaged? Please explain in detail.</p>		
<p>Based on your knowledge of your local community, do you believe there is a need for a fire safety and community outreach program to better educate residents about fire safety and prevention? If so, what topics do you believe should be covered?</p>		
<p>Does the local fire department have a relationship with the building management/property owners of your residential community to provide fire safety educational materials? If so, what is the relationship? If not, do you believe such a relationship should be developed and why? Please explain in detail.</p>	<p>Does local fire department have any future projects that are related to educational programs in your residential community? If so, what are they?</p>	

**Table 4***Fire Safety Participant Thematic Analysis*

Question#	Main Theme(s)	Subtheme(s)	Findings
B1	Yes, there is knowledge of fire incidents in your local community.	N/A	All but one participant had knowledge of a fire incident at residential community during the last 2 years.
B2	There is minimal knowledge of property damage from fire incidents Don't know	N/A	Only three participants knew of property damage from the fire incident. Five participants were unaware
S1	Yes	N/A	All participants recalled the fire incident in their residential community.
S4	Yes, fire safety education is not just needed in the local communities but in the whole community of urban housing. Yes, there is a need for an outreach program in are community especially low-income neighborhood.	Fire prevention changes every year because of technology and communication. People believe that a smoke detector is an accessory and not a need. Fire prevention programs are needed to educate the individuals about the smoke detector by checking the batteries, checking the data, and making sure it's in the right location of the residence. The topics fire prevention, smoke detectors, CPR and First Aid, carbon monoxide poisoning and a CERT program, if possible.	All participants believe there is a need for a fire safety and community outreach program to better educate residents about fire safety and prevention. All participants shared what topics should be covered.
S5	No relationship with building management and property owner.	No consensus on fire officials' relationship with property owner.	Three participants stated that the local fire department has no relationship with property owners. 1 had no knowledge of it. 1 stated the local fire department has a relationship.

### **Analysis of Fire Safety Participant Responses**

The findings revealed the need (from all participants) for fire safety education and community outreach to low-income community residents on a more regular basis. In addition, all participants acknowledged a need for the involvement of residential community property management in fire safety education and community outreach. Participant responses revealed there is little to no relationship between fire department officials and property management and between low-income residents and property management regarding fire safety and prevention education beyond a few flyers posted around the community complex from time to time.

The topics of interest for fire safety education based on responses from the local fire department participants included but were not limited to fire prevention, smoke detectors, CPR and First Aid, carbon monoxide poisoning and a Community Emergency Response Team (CERT). This list provided the basis for informing the development of a more structured fire safety and community outreach program targeting low-income residents.

Prior to COVID-19 restrictions, which began in April 2020, the fire department conducted events in many communities such as open houses (held at the local fire department fire houses), the Boys and Girls Club and Boy Scouts' facilities. Since the COVID-19 restrictions were partially lifted, there is an increased interest among all participants for a more robust fire safety education and community outreach program in the communities in urban and rural areas. This program should include low-income housing property management as an active participant in helping to provide and distribute

the materials and resources to make the program successful. Baixia (2017) suggested that property management is responsible for clarifying fire management responsibilities in residential housing complexes, including regular inspection of fire protection of electricity and gas use, fire-fighting equipment inside the housing units, and guiding residents in fire safety response procedures such as building evacuation. Baixia (2017) findings support my analysis; however, there is a need to include education and training on the use of smoke detectors in low-income communities.

### **Smoke Detectors Participant Responses**

The participant responses to the interview questions under the *Smoke Detector* category were arranged according to main theme, subtheme (as applicable) and findings. “B” refers to the low-income residence interview questionnaire and “S” refers to the fire department officials questionnaire. The results are indicated in Table 5.

**Table 5***Smoke Detectors Participant Thematic Analysis*

Question#	Main themes	Subthemes	Findings
B6	Yes, I received information about smoke detectors No, I never received information about smoke detectors I don't know of any information about smoke detectors	N/A	Five participants did not receive information from the local fire department (city) Three participants received information from the local fire department (city) No participants recall receiving any information from building management. Those that did receive or notice fire safety information; it was in the form of flyers and located in the hallways.
B7	Yes, I have functioning smoke detectors in my home.	N/A	All participants confirmed having smoke detectors in their apartments. All participants confirmed that smoke detectors are located in bedrooms, living room and hallways near the kitchen.
B8	Yes, I know how to check the smoke detector to ensure it is working properly. Yes, I know how to change the battery.	N/A	Six participants know how to check the smoke detectors to ensure it is working properly and change the battery. One participant did not know. One participant had a family member who knows and does it.
B9	Yes, participants would be interested in the local fire department smoke detector outreach program for low-income communities.	N/A	Seven participants stated they would be interested in the local fire department conducting a smoke detector outreach program in low-income neighborhood because it would keep people safe. One participant stated he would not be interested but gave no reason.
S6	Yes, the fire department does try to provide fire prevention education and outreach No, the fire department does try to provide fire prevention education and outreach I do not know if the fire department provides prevention education and outreach	N/A	There was no consensus on this question. Two confirmed "yes". Two confirmed "no". One didn't know



### **Analysis of Smoke Detectors Participant Responses**

The participant responses to the questions specific to smoke detectors revealed the need for greater community outreach and education about smoke detectors for low-income residents in urban areas. For example, all residents interviewed could not recall receiving any information about the proper operation of smoke detectors from fire officials or property management. Notwithstanding, all but one resident knew how to check and change the battery of a smoke detector. Those that indicated they knew how to check the smoke detector and change the battery did share with me where they neither acquired this knowledge nor was this information verified during the study.

Similarly, there was no consensus among the fire department participants regarding any known or recent fire prevention and community outreach efforts by the fire department. All of those interviewed were members of the local fire department prior to COVID-19 restrictions; consequently, it can be inferred that any community outreach efforts to low-income communities were either inconsistent or provided infrequently. These findings cement the need for more concentrated fire prevention outreach efforts that provide written instructions, including images that demonstrate how to check the operation of smoke detectors and change the batteries.

According to a study by Gielen et al. (2014) door-to-door canvassing and in-home installation of smoke alarms yield the most effective results for increasing the number of homes protected. Moreover, the study revealed that “the most intensive smoke alarm programs, those with a combination of education, low cost or free equipment and direct installations, and those programs that installed lithium battery alarms reported the highest

rates of coverage” (Gielen et al., 2014). The study also reported a prevalence of functional smoke alarms between 79% - 92% at 12 months after installation or battery change, and 64%-82% at 3-4 years after installation or battery change (Gielen et al., 2014).

According to the Office of the State Fire Marshal, which is an agency of the Maryland Department of State Police, the fire occurred in an urban low income housing community. The origin of the fire was the 2nd floor, rear bedroom and was caused by a juvenile playing a lighter (Office of the State Fire Marshal, 2019). More importantly, the residence did not have a functioning smoke detector, and as a result, sustained significant damage and caused damage to the residence next door. All occupants of both homes were displaced (Office of the State Fire Marshal, 2019).

The participant responses indicated that most (low-income residents) knew of the fire incident, and some of the details; however, how it occurred was unknown to all residents interviewed. The residents also were not aware that the smoke detector in the home did not function. As such, a regular and consistent program that includes fire prevention n safety education, coupled with a demonstration on the use of smoke detectors will improve life safety outcomes and the perseveration of property in the local housing community.

### **Fire Prevention/Safety Education Participant Responses**

The participant responses to the interview questions under the *Fire Prevention/Safety Education* category were arranged according to main theme, subtheme and findings or general meaning of themes. “B” refers to the low-income residence

interview questionnaire and “S” refers to the fire Officials questionnaire. The results are indicated in Table 6.

**Table 6***Fire Prevention/Safety Education Participant Thematic Analysis*

Question#	Main Theme(s)	Subtheme(s)	Findings
B3	Yes, I feel comfortable in my understanding of fire prevention and fire safety.	N/A	All participants except 1 felt comfortable in their understanding of fire prevention and fire safety.
B4	No, due to COVID-19 the fire department has not distributed fire safety information/educational materials or conducted seminars, workshops, etc.	N/A	All participants confirmed the fire department has not distributed fire safety information/educational materials or conducted seminars, workshops, etc. due to COVID-19.
B5	No, I do not receive fire safety information/educational materials from the local fire department. Yes, I receive fire safety information/educational materials but from the public school system.	N/A	6 participants do not receive fire safety information/educational materials from the local fire department. 2 participants receive fire safety information/educational materials from the public school system.
B10	Teaching kids fire safety Conduct community outreach Support community	N/A	All participants except 1 want to the local fire department to provide education Teaching kids fire safety Conduct community outreach Support community
S2	Yes, at least once a year.	N/A	All participants confirmed that local fire department conducts community outreach in the community for low-income housing at least once a year.
S7	No, not that I am aware of any future projects related to educational programs in poor communities.	N/A	All participants were unaware of any future projects related to educational programs in low-income communities.

### **Analysis of Fire Prevention/Safety Education Participant Responses**

The participant responses from low-income residence revealed the need for greater fire safety and prevention education in communities housing in order to improve residents comfort level with fire safety measures. The responses indicated that very few participants (2) ever received fire safety education materials directly from local fire department officials and property management for residence, with 2 receiving fire safety information from the school system. Consequently, participant responses indicated considerable interest in fire department providing fire safety education to their children, conducting community outreach on fire prevention, and supporting community where needed to improve life safety.

The local fire department participants expressed similar interests, especially the need for more frequent fire safety prevention and community outreach efforts in low-income housing beyond the annual outreach and scheduled and episodic events that used to occur. As previously mentioned, prior to COVID-19 restrictions, the local fire department held events in many communities and urban areas. The community outreach events were held at fire houses (open house), the Boys and Girls Club and Boy Scouts' facilities.

Currently there are no plans or efforts to engage low-income residents in fire prevention and community outreach, and the community at large. As such, this study was timely inasmuch as it provided context and justification for the development and implementation of a regular, consistent fire prevention and community outreach program for the low-income residential community and the larger communities. For example, a

study by Baixia (2017) found the lack of fire safety education and widespread awareness of the importance of fire safety places community residents at greater risks for fire incidents. The study also found that “people do not attach importance to or do not have the opportunity to learn fire safety knowledge” (Baixia, 2017, p. 2), coupled with the lack of knowledge of how to use fire-fighting equipment (fire extinguishers, pull the fire alarm, etc.) nor how to escape during a fire.

### **Practice-Focused Questions**

The findings from this study answered the practice-focused questions as indicated below.

What are the local fire department current community outreach and fire safety education initiatives in the local community, especially initiatives intended to improve the use of functioning smoke detectors in low-income areas?

Based on the study’s findings there is a need to improve the local fire department current community outreach and fire safety education initiatives in the local urban communities that experience poverty, especially initiatives intended to improve the use of functioning smoke detectors by residents.

What specific evidence-based, best practices will help the local fire department improve its community outreach and fire safety education initiatives to reduce the number of residences without functioning smoke alarm detectors in the low-income housing community?

As indicated by participant responses, currently there are not any community outreach and fire safety education initiatives targeting low-income housing that

specifically focus on reducing the number of residences without functioning smoke alarm detectors. The evidence-based best practices most applicable to this finding were identified from peer review research by Baixia (2017) and Gielen et al. (2014), as previously described. This research closely aligned with the findings from participant interviews and key documents.

### **Recommendations**

The recommendations were comprised from participant interviews, document review and peer-review research, coupled with best-practices from the U. S. Fire Administration, specifically its *Public Fire Education Planning: A Five Step Process*, which has also been adopted by the NFPA. This planning process offers a systematic approach to designing, implementing, and evaluating community fire safety education programs. The focus of the study was on addressing low-income housing community most challenging fire safety issues, which includes the lack of functioning smoke detectors. The five-step process provides best practice guidance most appropriate for developing a fire safety education and outreach pilot program for this community.

**Table 7***Recommendations*

Recommendation	Explanation	Implementation	Advantages	Limitations
The study underscored the need for greater cooperation and collaboration between the fire department and property management and homeowners.	It is challenging for local fire departments to provide effective community outreach and education without the assistance of, and participation and support of owners and managers of residential communities (Baixia, 2017). The findings from interviews conducted with both residents and fire officials revealed an absence of collaboration and cooperation between the fire department and property management and homeowners to the extent that most residents felt uncomfortable with their level of knowledge regarding fire safety and prevention.	The fire department could initiate a more formal, collaborative working relationship with property management and homeowners for developing a regular, consistent fire safety education program targeting residents with specific topics of interest. For example, activities and events about fire safety can be held quarterly that educate residents about smoke detectors, building evacuation, use of surge protectors and other important topics. Fire safety materials about these topics can be distributed directly by property management or directly to homeowners by fire department and made available to residents in the rental or property office.	Regular and consistent community outreach by the local fire department and property management and the delivery of important fire safety and education to enhance life safety and confidence in residents' knowledge regarding fire safety and prevention.	It may require the commitment of scarce resources and subject to competing priorities of the fire department, property management and homeowners.
The study yielded information about specific topics of interest to participants to include in any fire safety and community outreach program in low income housing. These topics should be included in the fire department fire safety and education program.	The list of topics, coupled with research gleaned from Baixia (2017) and Gielen et al. (2014), informed on how best to educate high-risk communities and individuals about the importance of smoke detectors and other topics in fire prevention.	The fire department can use the U. S. Fire Administration's Public Fire Education Planning: A Five Step Process to guide and implement a community fire safety education program targeting low-income housing, supported by the findings derived from this study.	The Public Fire Education Planning: A Five Step Process, coupled with findings derived from this study consists of best practices recognized by the fire safety industry and organizations such as NFPA. This will ensure that low-income housing is provided with the most effective fire safety and prevention education program.	The Public Fire Education Planning: A Five Step Process is time consuming and requires a commitment of resources that may be unavailable under COVID-19 pandemic restrictions.



### **Strength and Limitations of the Project**

There were several strengths of this study. First, the document review process helped to identify key evidence-based guidance to assist fire officials in developing its fire safety education program, including the pilot, targeting the low-income communities. Second, the recent fire incidents that result in loss of life, injury and property damage and/or destruction due to the lack of functioning smoke detectors underscored the study's importance and contribution to fire safety and prevention. Third, the semi structured interviews with low-income residents and fire officials provided a rich perspective of the need for effective, consistent fire safety education in that community as well as the importance of collaboration between property management and fire department in delivering it.

There were 2 main limitations of the study. The first was the small sample size of low-income residents interviewed. I reached out to 20 residents to participate in the study; however, only 8 committed and completed the interviews, which were conducted onsite either at the fire station or in participants' homes. There were technological challenges that prevented the interviews from being conducted remotely such as computer or mobile device in accessibility. In addition, all of those interviewed felt uncomfortable using Teams and Zoom telecommunications technologies.

The second main limitation was the lack of official documentation about the local fire department fire prevention efforts. Although there was statistical information on monthly runs (calls), apparatus engagement, and the top ten responders for the year, this information did not specifically inform the study. However, the incident reports from the

State of Maryland Office of the Fire Marshal provided information on the fire incidents in an urban community, one of which documented the lack of a functioning smoke detector.

## Section 5: Dissemination Plan

Fire officials cooperated with me during this study and participated in semistructured interviews to help inform my study. I plan to meet with the fire chief after the study is finalized to share my findings and recommendations about improving the local fire department fire safety education and outreach initiative through the development of a fire safety education pilot program. I anticipate that subsequent meetings will occur with the local fire department leadership team to review the findings and determine how best to proceed with implementing my recommendations. I hope to play a central and dynamic role in this process, probably serving as the lead for these efforts.

I plan to distribute copies of my study to the NFPA, Maryland State Office of the Fire Marshal, U.S. Fire Administration, International Association of Fire Chiefs, American Red Cross, Association of Fire Fighters, National Fire Safety Council, and other relevant national and international organizations. I anticipate this study will be generalizable to other local fire departments throughout the United States facing similar barriers and challenges identified in the study. The link to this study in ProQuest will be provided to local fire departments and state and federal organizations and agencies involved in the fire safety industry. I also plan to identify regional and national conferences to attend where there are opportunities to present and share my research with participants.

As previously mentioned, this study underscored the significance that smoke detectors play in improving life safety and fire prevention, especially among high-risk

communities. Moreover, the findings highlighted the importance of community outreach and collaboration with all stakeholders in coordinating fire safety and prevention education targeting residential communities. Therefore, local governments and housing and residential associations may also be interested in the study as well. I will explore ways and opportunities to provide them with it.

### **Conclusion**

As previously mentioned, this study comes on the heels of increasing awareness for more aggressive fire safety inspections and community education and engagement about the life-safety benefits of smoke detectors in preventing and reducing fire incidents. The recent highly publicized fire incidents that resulted in the deaths of 13 people at a public housing building in Philadelphia, Pennsylvania (Steinbuch & Kessler, 2022) and the deaths of two boys in Detroit, Michigan (Brewer, 2020) underscore the need for fire prevention and safety education in residential housing communities.

The social change implications of this study are considerable. First, the study underscores the need for greater cooperation and collaboration between the local fire department and property or building management of residential communities. The findings indicate the challenges for local fire departments to provide effective community outreach and education without the assistance, participation, and support of property owners and managers of residential communities and homeowners (Baixia, 2017). The findings from interviews conducted with both residents and fire officials revealed an absence of collaboration and cooperation between the local fire department and property

management, to the extent that most residents felt uncomfortable with their level of knowledge regarding fire prevention and safety.

The study yielded information about specific topics of interest to participants to include in any fire safety and community outreach program in low income communities. This content information, coupled with research gleaned from Baixia (2017) and Gielen et al. (2014), provide information on how best to educate high-risk communities about the importance of smoke detectors in fire prevention. Third, the study findings provide risk reduction strategies for reducing fires associated with the lack of smoke alarm detectors and fire safety education through best practices in community outreach programs.

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