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# Investigation of Sprinkler Requirements in One-or-Two-Family Newly Constructed Homes

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This is to certify that the doctoral study by

Courtney Catrillo

has been found to be complete and satisfactory in all respects,

and that any and all revisions required by

the review committee have been made.

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Walden University

2025

Abstract

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## Abstract

Multiple case studies and available data supported the effectiveness of residential fire sprinklers. Despite this, 48 states have not implemented a requirement for residential sprinklers in newly constructed homes and 46 have eliminated the requirement. The purpose of this study was to examine which states have adopted the recommendation and to what extent. This generic qualitative study is an exploration of the reasons behind the lack of adoption. Data from reports, charts, and tables from publicly available sources, including government and stakeholder websites, were analyzed using expected utility theory to compile a findings table. The results indicated that only Maryland and California officially codified the recommendation. However, New Jersey has recently adopted the requirement for new townhomes, effective January 2024, for homes with permit applications submitted by August 1, 2024. This study contributes to public administration practice by offering a tool that can be used in other states to make informed decisions. This study may promote positive social change through its focus on insurance incentives, alternative water sources, information dissemination during the home-building process, and incentives for homebuyers to drive positive social change.

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# Dedication

This is dedicated to my grandparents, my parents, Elmer and Mary Jackson; my sisters, Kellye Jackson and Thakira Pirrone; and my husband, Carmen Catrillo.

## Acknowledgments

I want to acknowledge Dr. Raj Singh and Dr. Christina Spoons, who have helped me get this far. I would also like to thank my husband, Carmen Catrillo, who saw more in me than I could see and never let me give up.

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Section 1: Introduction to the Problem

## Introduction

The incidence of residential home fires is the cause of most civilian casualties, with "national estimates for 2017 to 2019 [showing] that 77% of all fire deaths and 75% of all fire injuries occurred in residential buildings" (U.S. Fire Administration & National Data Center, 2021, para 1). Between 2016 and 2020, fire departments "responded to an estimated average of 343,100 home structure fires per year. These fires caused an annual average of 2,610 civilian deaths; 11,090 civilian fire injuries; and $7.6 billion in direct property damage (HALL, 2023B, para 1)." According to the National Fire Protection Association [NFPA], "while there have long been data correlating sprinklers with a reduction in death and property loss, recent research also shows a significant impact on injury cost when sprinklers are present (NFPA, 2014a, p2). In 2008, the International Code Council (ICC) required residential fire sprinklers in one- and two-family homes to be added to the 2009 edition of the International Residential Code (IRC; International et al., 2009). Since then, each U.S. state has approached this requirement differently due to policy administrators, building associations, and contractors not agreeing that the added cost is justified.

The current NFPA Standard 13, approved as an American National Standard on September 3rd, 2018, provides the minimum requirements for installing automatic fire sprinkler systems (NFPA, 2019a). The NFPA is an international organization that

recommends industry standards for fire, electrical, and related life safety hazards. Each state has its respective adoption processes for the NFPA recommendations, some of which take many years. The NFPA Standard 13 outlines general requirements for sprinkler installations with low-rise residential codified in 13D (NFPA, 2019b). Adopting these standards provides foundations to guide proper installation, maintenance, and inspection of water-based fire suppression throughout buildings and helps to protect life and property.

Based on the information provided by the Home Fire Coalition Board (2024), a summary of how fire sprinklers work is that multiple plumbing interchangeable parts contain water held back from spraying out of the pendent by a glass bulb or fusible link. Both sprinkler pendants activate independently in the area closest to the fire. If the heat-sensitive liquid inside the glass bulb breaks the glass or the solder in the fusible link melts, it will allow the water to flow. The temperature for the heating elements can range from 125 to 650 degrees. Only the sprinkler pendant activated will cause water flow, mitigating the water damage but attempting to control the fire and allow occupant evacuation. NFPA 13D allows two sprinkler systems to be used in the home. The type of sprinkler system and design is determined if it is a new build or if it is being installed after construction. This is one of the reasons why a licensed professional is required.

There are stand-alone systems and combined systems. Combined or multipurpose means the fire sprinkler piping is combined with the home’s regular plumbing cold water.

Sprinkler pendant selection can also be determined by location, such as a sidewall or closest sprinkler, by design feature, i.e., concealed pendants or manufactured painted. There must be a primary supply of water to provide for the demand should water flow be activated. The source can be municipal supplies, a storage tank, or natural water (well). Depending on the design and the need, a fire pump may also be needed to provide adequate horsepower and gallons per minute to meet the water demand in a fire scenario. For example, if the water source is an underground well, a pump will be needed to compensate for the friction loss and pounds per square inch (PSI) necessary for the water to travel and adequate water supply.

## Organization Background and Problem Statement

Due to the nationwide restrictions regarding the COVID-19 pandemic, I conducted this study on behalf of the New Jersey Department of Community Affairs, Division of Fire Safety [DFS]. Instead of directing client organizations to limit person-to-person interaction during the pandemic, I did this. The DFS is tasked with the evolution and code enforcement of the state Uniform Fire Code, community education, and fire service personnel training and credentialing. New Jersey's Department of Community Affairs [DCA] is the umbrella agency that handles code enforcement and adoption for most trades and public and private sector buildings, i.e., fire, building, plumbing, one and two-family dwellings, commercial buildings, etc. Fire Safety is housed under an agency umbrella that adopts code reference standards and recommendations, such as the National

Fire Protection Association (NFPA), International Building Code, and International Fire Code. The recommendation for residential sprinklers from the reference standard would be in the interest of the DFS.

Despite the collaborative effort of local and national coalitions, government agencies, and fire safety professionals, there still needs to be a nationwide adoption of the recommendation to include fire sprinklers in newly constructed residential homes. Only Maryland, the District of Columbia, and California have been approved to adopt residential sprinklers into a statewide legislature, which requires automatic extinguishing systems (AES) in one- and two-family dwellings. Some states have municipalities that have approved sprinkler mandates, as some have approval under specific criteria. Regardless of the private and public sector initiatives, no blanket recommendation or evidence of their effectiveness exists. There are local, state, and national initiatives supporting the code recommendation. Organizations such as the NFPA and the Home Fire Sprinkler Coalition are producing literature to show how sprinklers aid in the reduction of property loss and protection of life and injury.

## Background of the Problem

I identified existing sprinkler legislation for one- and two-family dwellings across 50 U.S. states, objections to adopting the legislation, and the cost and benefits of such legislation. The policy areas promulgated from the NFPA ruling that I explored included what codes, issues, prices, and benefits regarding sprinklers for one- and two-family

dwellings currently exist in each state and what the current situation in the state of New Jersey, specifically, where legislation is pending. Between 2012 and 2024, the New Home Fire Safety Act has been progressing as a bill through the NJ legislature; however, it has been vetoed twice. It is widely known that Governor Christie vetoed a portion of the New Home Fire Safety Act (A1698), which would have brought New Jersey up to the *minimum* National Building Code (Shane, 2015, para 2)." The justification given by the then governor was the rebuilding required after the Hurricane Sandy disaster. Hurricane Sandy had an unprecedented amount of damage to NJ's infrastructure. It was explained as bringing New Jersey to the minimum code because the NFPA recommendations are the minimum, and states and local municipalities can create stricter laws or changes if needed. Two bills, the Group Home Fire Safety Act Bill S1176, introduced on February 8th of 2016 (NJ Senate, 2016), and the New Townhouse Fire Safety Act, enacted in January of 2024 (Penna, 2024, para 2), have been introduced since the conditional veto of the initially proposed bill. The New Townhouse Fire Safety Act, originally presented in 2018,

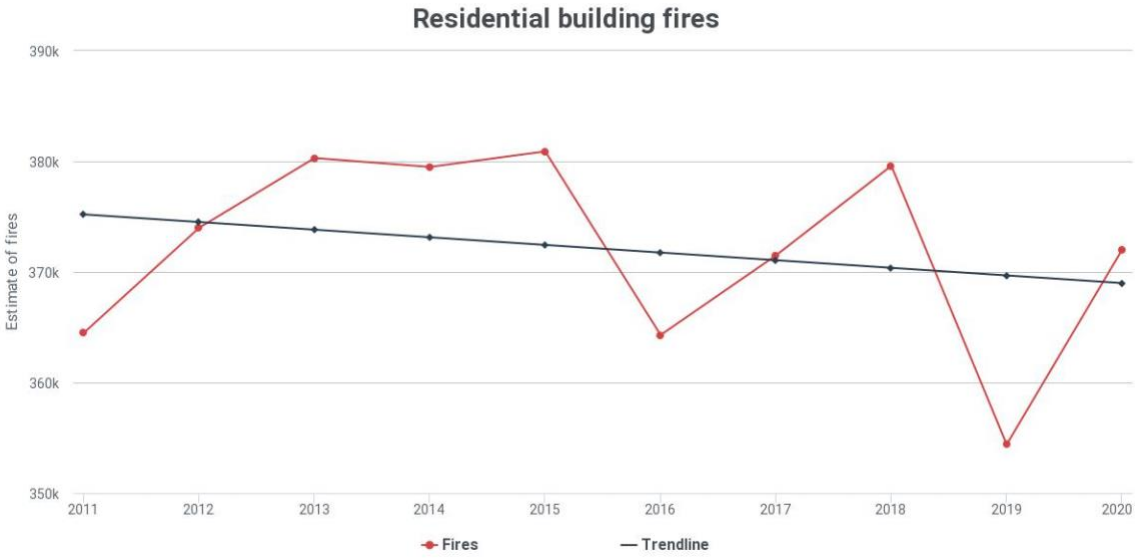
> ..Requires the installation of an automatic fire sprinkler system in new townhouses where a construction permit application has not been declared complete prior to August 1, 2024, the first day of the seventh month following the statute's enactment. This new law establishes exemptions and modifies this requirement so that a development plan with a construction permit application that has not been declared complete prior

> to the first day of the 13th month following the enactment of that statute would be required to be installed with an automatic fire sprinkler system. That new deadline is August 1, 2025 (Penna, 2024, para 2).

The original sprinkler bill proposed was vetoed, and in the normal process of bill enactment, there have been discussions of amending the bill; however, fire sprinklers were required to be enacted only in newly constructed townhomes. This is a positive move; however, more discussion should be about making NJ adopt the complete minimum code.

**Figure 1**

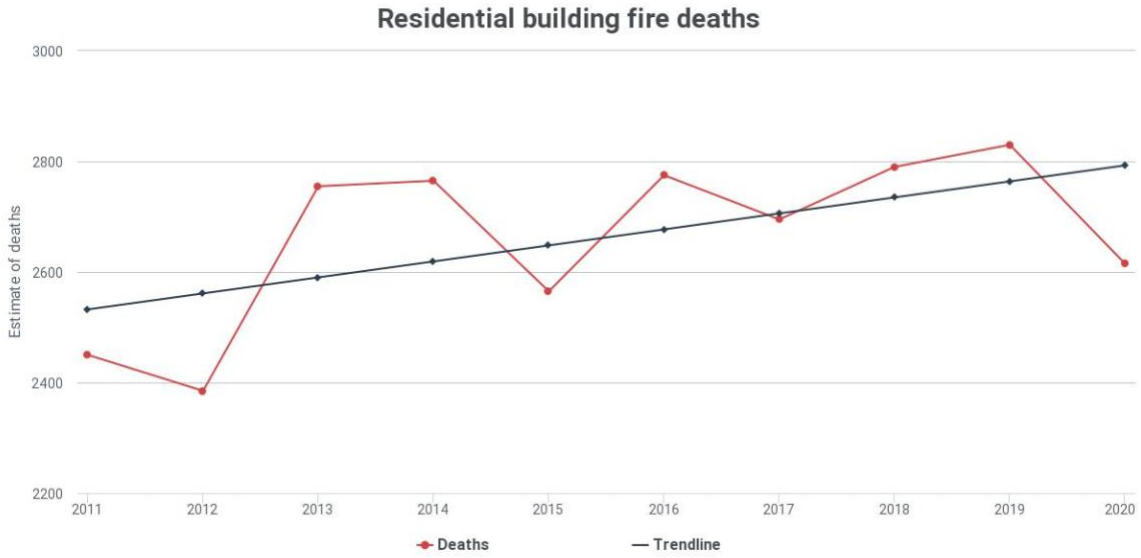
*Residential Building Fires*




*Note.* From the U.S. Fire Administration Residential Fire Estimates, 2021. https://www.usfa.fema.gov/statistics/residential-fires/ Copyright FEMA 2021

**Figure 2**

*Residential Building Fire Deaths*

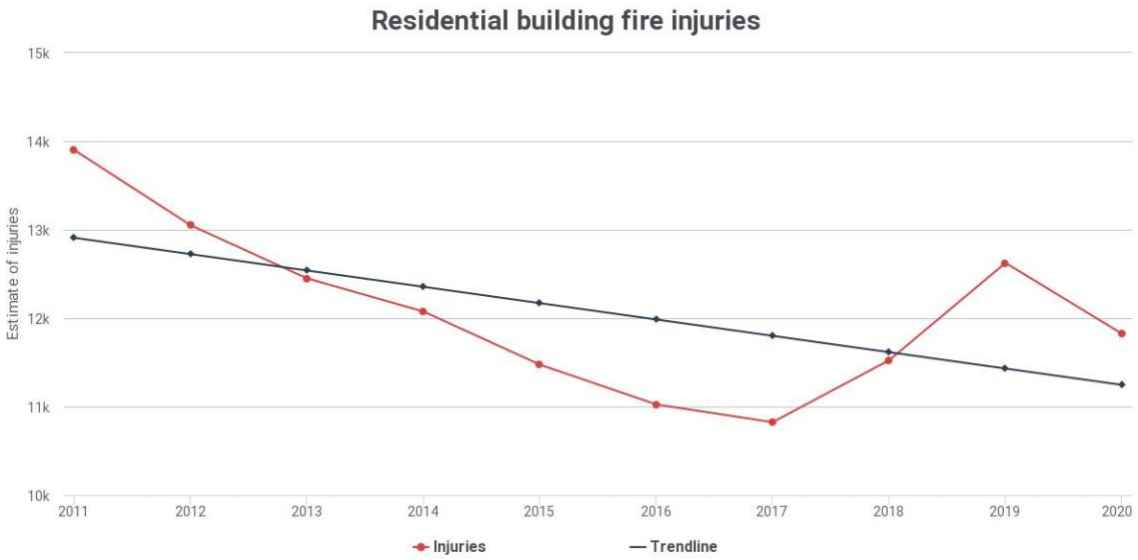



*Note.* From the U.S. Fire Administration Residential Fire Estimates, 2021.

https://www.usfa.fema.gov/statistics/residential-fires/ Copyright FEMA 2021

**Figure 3**

*Residential Building Fire Injuries*

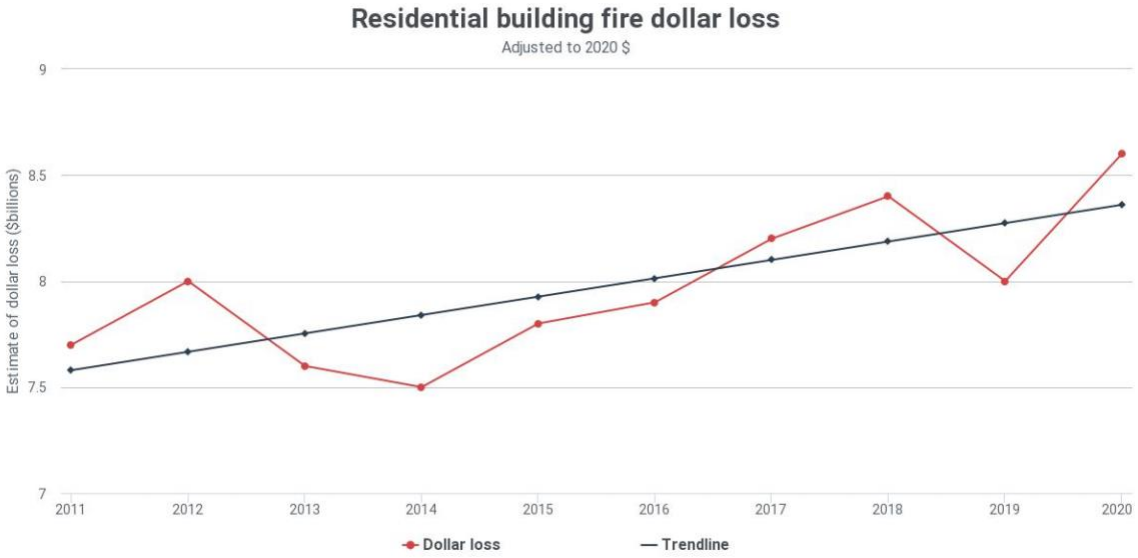



*Note.* From the U.S. Fire Administration Residential Fire Estimates, 2021.

https://www.usfa.fema.gov/statistics/residential-fires/ Copyright FEMA 2021

**Figure 4**

*Residential Building Fire Dollar Loss*




*Note.* From the U.S. Fire Administration Residential Fire Estimates, 2021. https://www.usfa.fema.gov/statistics/residential-fires/ Copyright FEMA 2021.

According to the U.S. Fire Administration, deaths and dollar loss have increased in 10 years, from 2011 to 2021 (2021, para 2). For the year 2020, for every 1000 residential fires in New Jersey, there were .9 deaths and 7.7 injuries. The national average for every 1000 residential fires is six deaths and 21.7 injuries. Even with the casualties trending up nationwide, New Jersey is still below the average. The additional bills being introduced would assist in mitigating fire loss.

## Problem Statement

Contrary to the fact that there are more fire code regulations and the presence of sprinklers in apartments and townhomes,

> ..data suggest that less progress has been made in preventing deaths and injuries associated with reported fires. For overall home fires, the 2022 rate of 7.5 deaths per 1,000 reported home fires was higher than the rate of 7.1 in 1980. The death rate for one- or two-family home fires was 14 percent higher than in 1980, while the rate for apartment fires was 18 percent lower (Hall, 2023a, para 1).

Even though sprinklers are documented to save lives and can decrease or mitigate the severity of property damage, the case of making residential sprinklers mandatory is still being pursued in New Jersey and most states. The public policy problem is that there is science to prove there is a direct effect on loss of life and property in residential fires due to sprinklers, and it is not required in new construction.

The strongest apprehension to adopting the recommendation to require fire suppression in newly constructed residential one- and two-family homes comes from significant construction organizations and real estate developers. According to the National Association of Home Builders (NAHB), the evidence provided by NFPA is not backed by science. Thus, more is needed to prove the cost-effectiveness of residential sprinklers (NAHB, 2021). The NAHB promotes the success rate of smoke detectors and

challenges the argument made by NFPA that newly constructed homes are made of inferior materials geared for faster build times and not grounded in safety. Newly constructed homes are built with engineered wood or lightweight construction materials. However, “from the fire service perspective, engineered wood products are engineered for structural applications and are made by combining wood strands, lumber, veneer or other wood fiber with glue” (Duffy, 2019, para 3). This would add to the argument that they do not have the same strength as older home-building constructions and, thus are weaker.

Consequently, lightweight construction and engineered wood can fail quickly in fires. NFPA Standard 220 is the “Standard on Types of Building Construction, [which] defines the types of buildings based on combustibility and the fire-resistance rating of their structural elements” (Duffy, 2019, para 1). According to Duffy, the five building material types include Type I, fire resistive; Type II, noncombustible; Type III, ordinary; Type IV, heavy timber; and Type V, wood (Duffy, 2019, para 1).

Lightweight construction materials, sometimes engineered wood, are among the leading issues fire safety professionals discuss in preventing line-of-duty deaths and fire dynamics in promoting residential fire sprinklers. According to the Occupational Safety & Health Administration (OSHA, 2015, p. 44), “lightweight components often fail suddenly and catastrophically during fires.” Consequently, “many firefighters have been in collapses attributed to lightweight construction members since the 1970s” (OSHA,

2015, p. 45). Firefighter safety is considered when adopting and revising model code additions.

Each new addition of the International Code Council's code enforcement specifications in building and fire codes expands on the sprinklers' requirements without the adoption by the state of New Jersey. According to the proposed New Home Fire Safety Act, fire suppression installation, which included pumps, piping, valves, and municipal water connection, would have to be completed in the construction phase or before the certificate of occupancy is issued. According to the New Jersey Administrative Code, only licensed fire suppression professionals can design and install fire suppression (N.J.A.C 5:74-1.2, n.d., 2021). Including this phase in the construction extends the time it takes to build and increases cost. New Jersey public administration seeks to bridge the gap between private consumers, the real estate industry, public officials, and safety professionals to determine how to incorporate fire suppression in newly constructed one- and two-family residential builds in the state. More information in this public policy arena is needed.

## Summary of Data Sources and Analysis

In this study, I provided comparative state legislation information about implementing New Jersey's New Home Fire Safety Act. This information was explored, using data synthesis, to ascertain whether fire sprinklers ensure occupants' and firefighters' safety and mitigate property loss. I generated additional information for

policymakers' future decision-making in fire prevention and emergency management. It is possible to determine the effect that provides the most significant expected utility by quantifying the options for enforcing residential sprinklers.

## Definitions

*One-and-two-family dwellings:* A dwelling that has no more than two living units. Each dwelling unit has only one family; up to three people outside that family can live there. This includes rentals.

*Automatic Extinguishing System (AES):* A fire suppression system that activates without the intervention of a person. For this document, we will only be speaking of water-based extinguishing systems. They will also be referenced as fire sprinklers.

*Manufactured Home:* A prefabricated home completed entirely or in pieces at a factory and delivered to its designated location.

*Constituents:* The general populace of a small geographic area has elected a political official to represent their interests.

*Residential:* This will describe a building used for private living, not commercial use. There are different requirements and recommendations for commercial AES, which this document will not cover.

*Bill:* A proposed law is to be presented before a governing body.

*Statute:* Once the bill has passed, it is now a law.

*Code:* A collection of laws about a specific subject matter. In this study, I refer to the Uniform Fire and Building Codes. For the New Jersey case study, the New Jersey Administrative Code will be referred to as the set of laws encompassing the fire and building codes.

*Townhouse:* A single-family dwelling has three or more attached units, each extending from foundation to roof and having a yard or public way on at least two sides (England, 2020).

## Significance

In this study, I have contributed to the fire prevention, building, and construction code enforcement field. The conversation and outcome are now incorporated into emergency management by adding preventative and mitigative factors. By adding research findings to respective code enforcement fields, model codes can be adopted or revised with interest in the safety of residential home occupants and emergency responders. Code adoptions or revisions may further mitigate stakeholder losses. My goal was to continue the conversation in making occupants and firefighters safe in their homes and when responding to them. After the completion of this study, more literature was added to the discussion to provide more insight to policymakers and administrators.

### Significance to Emergency Management

The core components of emergency management are an ever-turning cycle of prevention, mitigation, response, recovery, and preparedness. Pre-disaster, during, or

after a disaster, the argument for residential sprinkler policy adoption is essential to the community, its constituents, and stakeholders. Adopting residential sprinklers would produce higher efficacy in all core components of emergency management. Using the example of a catastrophic residential fire that spreads through a row of townhouses as the disaster in the mitigation phase, having residential sprinklers would keep the fire contained and allow occupants to evacuate the home. In the response phase, if the fire is contained, it aids the fire department's response. In the recovery phase, there will be less property damage and injuries to civilians or firefighters to recover from. It is also resulting in fewer deaths. Installing and maintaining residential fire sprinklers aid in the preparedness efforts for fires and prevention by reducing damage and saving lives.

**Significance to Practice**

The synthesis of information regarding adopting the residential sprinkler adds to the emergency management and fire prevention fields by continuing the discussion of codifying the recommendation or, at minimum, amending it to allow for some increase in protection. The information gained provides a comprehensive look at the current state of residential fire suppression requirements and the arguments for and against them. This may also provide insight into whether implementing New Jersey’s New Home Fire Safety Act benefits the builder, the buyer, and the seller.

## Significance to Social Change

This study promotes positive social change by intertwining fire safety professionals, building associations, legislators, the real estate industry, and homeowners to create an interdisciplinary approach to preventing casualties and property loss due to fire. The overarching goal of all parties is to promote community resilience. By using an interdisciplinary approach to community resilience, there is a better chance of preventing the loss of life and property due to a home fire. Aside from financial reasons, building homes that are reinforced to ensure occupant safety and building protection should be the priority of all stakeholders, resulting in less taxpayer involvement in the event of a loss.

## Research Question

The research question for the study was: When considering 50 state legislations regarding residential fire suppression codification, what are the influencing factors in determining the necessity of requiring the installation of residential fire sprinklers in one- and two-family dwellings?

For my inceptive analysis, I reviewed and published each state's position on residential sprinkler requirements and whether legislation is pending, at a standstill, or complete. I reviewed the objections and support for each state position. For future evaluation of the information, I published the abstract into a comprehensive table supporting quick overview capabilities for policymaker reviews.

## Nature of the Administrative Study

The real estate industry and construction firms are concerned about whether adopting New Jersey's New Home Fire Safety Act will provide the best outcomes in reducing residential deaths and lower residential housing fire losses. However, fire safety professionals support the adoption of the act. By stratifying and analyzing various state legislations in favor of or against, enforcement of New Jersey's residential sprinkler legislation can emanate from a more cohesive data source. This source is a guide and informative documentation moving forward with the option that provides the most significant expected utility. I used a qualitative methodology for policy analysis and content analysis using historical and descriptive research methods, including cross-sectional and archival research. The NFPA provides statistics and literature through its national sprinkler initiative. They also produce the recommended standard life safety codes, including residential sprinklers. Private organizations also have state, regional, and national sprinkler initiatives. The International Fire Code, Building Code, and Residential Codes maintain the standards for construction, installation, and maintenance requirements for sprinklers in residential homes. Each state provides data on its current positions on providing fire sprinklers in residential buildings online or in print.

## Summary and Transition

Section 1 included the background and the nationwide path of adopting the recommended sprinkler requirements. NFPA recommended requiring sprinklers in one

and two-family homes. Research and statistics from the U.S. Fire Administration and fire safety professionals support this. Only two states and one territory have fully adopted this recommendation. The main opposition to this adoption is the argument that the cost would be prohibitive to new home buyers. Section 2 will include a more in-depth look at the conceptual framework used to explore this case.

Section 2: Conceptual Framework and Relevant Literature

## Introduction

Protecting loss of life and property is the fundamental rule in fire prevention. Cooking is one of the most probable causes of residential fires (Suzuki & Manzello, 2021). Automatic extinguishing systems (AES) have been proven to save lives, and fire sprinklers significantly reduce the risk of loss of life and property in a residential fire by 82% (USFA., n.d). Due to the effectiveness of fire sprinklers and to mitigate or prevent the loss, the NFPA created Standard 13D in 1975. This is the standard for installing Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes. This standard recommends installing fire sprinklers in residential buildings for evacuations, rescue operations, and firefighter safety and to help eliminate the conditions that create flashovers (Butry, 2012). The recommendation also aims to keep the residence affordable. In a continuation of increasing fire prevention in residential one-and-two-family dwellings, government agencies and private agencies provide community education, public information, and resources regarding kitchen fire, winter safety, holiday decorating, grilling, and other topics that all create favorable circumstances for fire events. This was done in addition to states adopting or implementing fire alarm and fire suppression legislature. New Jersey adopted the International Fire Code, which endorses the NFPA Standard 13D. However, NJ has yet to adopt 13D.

## Literature Search Strategy

The last 4 years have shed new light on residential fire safety due to the COVID-19 pandemic and the various secondary emergencies. NFPA stated, “The societal effects of the COVID-19 pandemic in recent years are still uncertain, as are their impact on fire incidences, casualties, and injuries. For many, 2022 was a return to pre-COVID-19 practices. For others, their lifestyles remain the same (Hall, 2023a, para 2).” The COVID-19 pandemic caused the enforcement of stay-at-home orders to limit the spread of the first wave of coronavirus disease. According to Murray & Murray(2022, p1),

> …to force social distancing, a primary tool used to stop the spread of infectious diseases, government authorities in the U.S. incrementally restricted social contact starting with prohibiting large gatherings of people, closing schools, and limiting or closing non-essential businesses ultimately culminating in comprehensive, statewide stay-at-home orders (SAHOs) in a large majority of U.S. states.

According to NFPA, “cooking was the leading cause of reported home structure fires and civilian fire injuries and the second leading cause of civilian fire deaths from 2016 to 2020” (Hall, 2023b para 9),” While families are changing their routines to be in the home more often due to stay-at-home orders, fire professionals have reiterated the importance of fire safety. While the statistics are still being tabulated and research is

ongoing, there is concern about whether the number of residential fires correlates with the stay-at-home orders.

Per NFPA, “In 2022, local fire departments responded to an estimated 1.5 million fires in the United States. These fires caused 3,790 civilian fire deaths and 13,250 reported civilian fire injuries. ” (Hall,, 2023a, p. 1). The property damage was estimated at $18. Billion. The same report states that …

> ..The 360,000 home structure fires in 2022 (24 percent of all the fires that year) caused 2,710 civilian fire deaths (72 percent); 9,940 civilian injuries (75 percent), and $10.5 billion in direct property damage (59 percent). On average, a home structure fire was reported every 88 seconds, a home fire death occurred every three hours and fourteen minutes, and a home fire injury occurred every 53 minutes (Hall, 2023a,, para 17).

Per NFPA’s previous 2019 report, which is no longer accessible, the fire department responded to 100,000 more fires where there were 1,290 more civilian deaths and 1,950 less civilian injuries. The fire department response, civilian death, and property damage increased. Once NFPA publishes the 2024 data, if the trend continues, it will add to the argument supporting the adoption of mandatory sprinklers in newly constructed single and multi-family homes nationwide. Even though sprinklers save lives and can decrease the severity of property damage, the case of making residential sprinklers mandatory is still being pursued in New Jersey and most states.

## Conceptual Framework

In this study, I considered death or property loss due to a fire in a one- or two-family home a low-probability, high-consequence risk. Expected utility (EUT) theory limits bias when making public administration policies about safety in nature. For example,

> ..According to EUT, each action is ranked based on its expected utility, which depends on both the consequences and the probabilities of each possible scenario. Therefore, the rational decision-maker regards as optimal, and chooses, the action with the highest expected utility (Cappello, Zonta, & Glišić, 2016, para 5)

EUT uses probability and risk to provide a decision-making model that can limit bias. For example, it is widely known that seat belts save lives; however, only some decide to wear them. There are many reasons why they may choose not to, but some examples might be that they forgot or do not think they will get into an accident. Wearing a seatbelt is also a low-probability, high-consequence risk.

A theory used in comparative analysis studies is grounded theory. Glaser and Strauss, who wrote the seminal research "The Discovery of Grounded Theory: Strategies for Qualitative Research (1967), explained how theory could be generated from data inductively" (Tie et al., 2019, para 3). The data analyses used historical and descriptive research methods, including cross-sectional and archival research. Constructivist grounded theory (Charmaz & Bryant, 2007) specifically allows for the literature and data

surrounding the topic to be gathered and analyzed, and a new theory formulated from the findings. The theory that I generated from this study is in decision-making.

Multiple stakeholders are involved in this public policy issue and have different decision-making tools. This public policy issue is a multidisciplinary concern; all parties involved have provided information and resources for public consumption. As data are collected, a new concept may emanate by synthesizing it. The notion that sprinklers save lives has been discussed; however, from the standpoint of the insurance companies, they are trying to prevent having to pay for losses. The insurance companies would like to mitigate or avert loss as much as possible. Significant building association firms, such as Associated General Contractors (AGC), National Association of Home Builders (NAHB), and Associated Builders and Contractors (ABC), are concerned with the costs of adding licensed contractors, testing and inspection, and installing sprinklers to the new build. NAHB leads with a platform of smoke alarms are sufficient and state that…

> The 2009, 2012 and 2015 editions of the International Residential Code contain a mandate for fire sprinklers in all new one- and two-family dwellings and townhouses. However, ensuring every home in in the United States had at least one working smoke alarm would save around 890 lives each year. This would benefit low-income families and not just those who can afford a new home with fire sprinklers (Ehrlich, 2024, para1).

The recommendations provided will outline the next steps for New Jersey in the adoption process for new legislation.

## Literature Review for Study

According to the National Fire Incident Reporting System fire stats for 2019, there were 3.4 deaths and 14.3 injuries per 1,000 fires in New Jersey; the national average was 6.2 deaths and 25.6 injuries per 1000 fires (FEMA, 2019). According to the same report, 88.9% of the fatalities were caused by residential structure fires (FEMA, 2019). The DFS in New Jersey's fire prevention and education department oversees code enforcement, public education, training and certifications, juvenile fire setters' programs, and statistic gathering. They fall under the Division of Community Affairs (DCA). They are not linked to the fire department; however, all fire service personnel credentialing and training are overseen and maintained by the DFS. Being a public division, they must respond to the communities' inquiries and concerns and provide transparency with their initiatives and funding. The DFS supports implementing mandatory fire sprinklers in two-family homes because it prevents firefighter casualties and injuries to the constituents and their property. Director Mikutsky of the DFS reported that in 2022, of the four fatal fires reported, three of the fires were residential (DCA, 2022, p.4):

> The 2021 data is still coming in, but preliminary findings include 107 total fatal fire victims; of those 107, 20 are from vehicle fires, and 80 are from one-and two-family residential dwellings. That is 74% of fatalities in

> residential buildings. The NFIRS Unit continues to process the incoming data from 2021. Still, current numbers reflect the following: 423 civilian burns, 26 school fires, 107 fatalities (20 years high), 70 residential fatal fires, and 38 school fire reports. (DCA, 2022, p. 4).

Residential fire sprinklers would reduce the percentage of fatalities. If there is a way to eliminate or mitigate a hazard, it should be used for optimal risk management.

**Deliverable To the Client**

The client was provided a table with the status of each state's stance on adopting the recommendation of residential sprinklers, specifically in newly constructed one- and two-family dwellings. This included progression, standstill, or no action. There was an emphasis on New Jersey's New Home Fire Safety Act because it was pending. The objections and support were put together in a table to help public policy administrators comprehensively look at the topic and make future decisions. For each state, the investigation focused on the adoption process of NFPA recommendations, whether legislation has been proposed, whether it was accepted, the opposition or suggested amendments, if any, and whether there is a plan to continue the process. By understanding the status in other states, decision-makers can make more informed policy proposals that will have more support. It is essential for those who work in public policy formation to see what works and what does not.

**Relevance to Public Organizations**

Fire sprinklers give occupants more time to exit the building safely and help contain the fire, reducing firefighter fatalities and injuries. The goal of the fire safety profession is to protect life and property. Sprinklers are an engineered tool to aid in mitigating and preventing loss of life and property. Each state has similar ways of approaching fire safety through fire prevention departments or bureaus; however, every state has come to the residential sprinkler legislature in various courses of action. Nationwide, the Uniform Fire and Uniform Building Codes were adopted as standards for installing and maintaining fire suppression and detection equipment and related guidance.

Despite the well-documented proof that sprinklers are effective, states have implemented anti-sprinkler legislation prohibiting requiring their installations. Tennessee, Minnesota, and Nevada, to name a few, were among the states that NFPA stated had anti-sprinkler legislation. On the contrary, Maryland and California have adopted mandatory residential sprinkler codification along with Washington DC and hundreds of local communities. Maryland prohibits local governments from weakening the sprinkler requirements in their jurisdiction's building codes.

Specifically, New Jersey is adopting the code recommendations. New Jersey has the strictest fire prevention laws; however, the New Home Fire Safety Act has yet to be codified. The Assembly approves Assembly Bill A3974 (New Home Fire Safety Act) per the New Jersey chapter of the National Fire Sprinkler Association (NFSA, 2019, para 9).

## Summary

In Section 2, I discussed the conceptual approach that I used in this research, constructivist grounded theory, and the background of the study. This public policy issue has been ongoing since the NFPA recommended requiring AES in one- and two-family dwellings and manufactured homes. The public and private sectors have yet to agree on how to adopt this recommendation in many states. The deliverable to the client will be a document with the legislature's nationwide status to provide to decision-makers. The relevance to the public organization is the safety of civilians, fire professionals, and the prevention of property loss. The organizational background of the DFS and my role in creating an unbiased reproduction of the findings were also covered. Section 3 will include a discussion of the data collection process and analysis. I will also introduce practice-focused questions, sources of evidence, participants, procedures, protections, consent, and privacy.

Section 3: Data Collection Process and Analysis

## Introduction

In this study, I synthesized the state legislature nationwide regarding mandatory residential sprinklers in new builds. This information was then compared to the status of the state of New Jersey regarding this matter. This information helps public policy administration make informed decisions in the future and move forward with the latest, most accurate information. I conducted a thorough document review of secondary data produced by each state and reference standards. NFPA has already recommended the installation of residential sprinklers in new buildings and major renovations. Therefore, I used it to determine if each state adopted the recommendations.

## Practice-Focused Questions

This document review involved researching each state and determining its status on mandating residential sprinklers in new builds. I investigated the following information:

1. Are residential sprinklers required in newly constructed single and multi-family homes in the residing state? If so, when was this adopted?
2. If this has not been adopted, has this been proposed, and when? What stopped the legislature from moving forward?

3. If the legislature has not been adopted, what public or private industry is creating opposition? (Building Associations, Pipe Fitter Unions, Real Estate, Insurance, etc.)
4. If the legislature has been adopted, to what extent?
5. If the legislature has been adopted, has there been a marked decrease in property loss and civilian or firefighter injury or loss?

This information was used as the section headers for the table created as the deliverable to the client. These questions were the subject matter investigated for each of the 50 states. By doing this, I produced a comprehensive examination of the nationwide stance on adopting the NFPA legislation, compared to each state.

## Role of the Researcher and Client Organization

Throughout my tenure in the fire service, I started as a firefighter and advanced administratively to Fire Official. As a Fire Official at a state college, I learned more about fire sprinklers, specifically in a residential setting. This was acquired through dormitories, university-owned homes, and a newly constructed apartment building. This role developed into Emergency Management, which allowed me to transition to an Emergency Management Consultant. Through this professional experience, I have been able to work with the New Jersey Department of Community Affairs Fire Safety Division in the public and private sectors. I have also worked as a consultant to the City of

Philadelphia's risk management division, FEMA, and the American Red Cross, among other agencies and non-governmental organizations, to evolve in the safety field and see all sides of the state affairs regarding residential sprinklers. I support adopting this recommendation because the reduction in property loss and civilian casualties has been documented, and so has the prevention of firefighting casualties. I will always keep firefighters safe.

As the researcher in this qualitative study, I gathered, analyzed, and displayed all the information to aid future policy administrators in their decision-making. With such a strong background in fire safety, I focused on communicating my findings suppositionally to eliminate confirmation bias. According to McSweeny (2021), bias "undermines the trustworthiness of professional research endeavors, political discourse, policy formulation and implementation, and everyday reasoning" (p. 1064). To show transparency in the findings, all the data found through literature review and archival research were provided in the deliverable. My goal for this study was to deliver a status of the legislature in all states—the effectiveness and evidence that sprinklers save fire personnel civilians and mitigate property loss have been proven. Upon reviewing the literature regarding this issue, no scholarly, peer-reviewed source stated fire sprinklers were not economical—only the research provided by the opposing industries. Academic sourced material has been derived by stakeholders focusing on cost-benefit analysis of modern sprinkler technology comparable to loss to determine if it is economical. I used the constructivist grounded theory to analyze these data to provide unbiased, academic

information. My goal was to deliver the status of each state in this process, focusing on New Jersey. The data provided can be used by stakeholders in making the most equitable decision for their constituent base.

## Methodology

I gathered the evidence for this research through secondary data. I reviewed each state's governmental reports, articles, statistics, and findings. These documents were found online or in reference texts. I did not have to contact the respective state's fire prevention office for the information. A trail of proposed litigation in other states has mirrored New Jersey. Following this trail, I was able to ascertain the information needed to complete the deliverable. This information includes bill proposals, committee meeting minutes, government websites, and reports from the public sector. Some of the government agencies include the U.S. Fire Administration (USFA), Federal Emergency Management Association (FEMA), and National Fire Incident Reporting System (NFIRS) to name a few. Information from the private sector included organizational websites, periodicals, and independent research from the private sector stakeholders. Some of these organizations included the NFPA, National Fire Sprinkler Association, NJ Fire Sprinkler Advisory Board, National Association of Home Builders, Fire Sprinkler Initiative, and American Fire Sprinkler Association. There was a review of corresponding referencing organizations such as NFPA, International Building Code (IBC), International Fire Code (IFC), and Uniform Construction Code (UCC), among

others. These organizations provide the referencing standards for the field. The U.S. Fire Administration provided statistics and resources as well. Each state's fire prevention bureau or equivalent needed to be investigated. Each state has a different setup for disseminating fire safety responsibilities. The insurance and real estate industries are mentioned in the literature but have not been found in scholarly sources. That information will also be added if they provide predominant support or objection to adopting the recommendation.

## Participants

As this is a review of secondary data, there were no direct participants. However, there were multiple stakeholders in this public policy concern. Fire safety professionals, government legislators, insurance agencies, home buyers, and constituents, among others, are stakeholders. Fire safety professionals must protect their constituents, while residents want to feel safe in their homes. Politicians and public policy administrators need accurate, real-time information to implement an effective legislature that provides positive outcomes. Insurance companies want to mitigate claims and punitive damages. Real estate agents can push for a higher asking price due to the increased safety feature and, in turn, increase equity for the home buyer.

## Procedures

An in-depth analysis of the information provided for public use by each state was conducted to ascertain the needed information. The reference standards that provide

recommendations and requirements will be used to determine to what extent the legislature recommendation has been accepted. The predominant objections to adopting the guidance were analyzed to show transparency and prevent bias. This was used to determine the best outcome for all parties involved.

## Instrumentation

For this qualitative study, the instrumentation process for the data collection was document revision and observation. The core of the study was following literature and the path that each state has followed. Following the constructivist grounded theory, I used the document review to develop the data needed to create the deliverable.

## Strategy for Data Analysis

This topic is widely discussed amongst government officials, safety professionals, home builders, insurance companies, and real estate companies, and they have all provided research and literature to support their arguments. I reviewed and synthesized this data to give the context of this study. By reading the already documented findings, research, interviews, and comments of all respective parties, I was able to create an unbiased comparative study of the data.

## Issues of Trustworthiness

There was prolonged engagement, persistent observation, and triangulation to ensure the information gathered and disseminated was credible. The project's duration in

the planning stages was more than a year, and in that phase, there was prolonged engagement with the status of the NFPA residential sprinkler recommendation. This allowed ample time for persistent observation in the study's data collection and analysis phases. Both steps create credibility and allow for the most accurate and timely information. Transferability is provided through the thick description process. The research questions that make the focal points for this study allow for a thick description of each state's status with the adoption of the NFPA recommendation. Triangulation aids in the dependability of the data because the information collected and synthesized can be found from multiple sources, thus making the information more dependable. The chart created as the client's deliverable will act as a reflexive journal to create confirmability. All these processes provide evidence of trustworthiness.

## Ethical Procedures

### Protections

This work was submitted to the IRB for approval per Walden University's requirement because I analyzed publicly released secondary data. The IRB had no issues. Support and objections will be displayed to limit conscious and unconscious bias. This document is not linked to an organization but was written for New Jersey's DFS.

## Strategies for Recruitment

Data analysis was the chief instrument in this study. The recruitment tool followed the data, and the leads provided through the analysis. Once the information was found, it was synthesized to determine whether it is source material, anecdotal, or a subjective editorial. Some of the information on this topic is opinionated, so part of assessing participant data was vetting the sources.

## Consent and Privacy

I followed Walden University's instructions regarding consent and privacy and what was required of me. The research was kept on a private, password-protected computer.

## Client Organization Approval

There was no client organization for this study due to the COVID-19 pandemic restrictions. I wrote this study as if the client were the New Jersey DFS. No approval was sought because there was no direct correlation with the DFS. However, the research supports the mission of the agency, which is:

> to serve as the central focus for the state's fire service community and the general public in all matters relating to fire safety through the development and enforcement of the State Uniform Fire Code, public

education programs, and firefighter training programs (Mikutsky, 2023, para 1).

This study provides a nationwide status update on adopting the NFPA recommendation to require sprinklers to be installed in one- and two-family residential homes during construction. The information can be delivered to the DFS or New Jersey legislators to help move the decision-making process forward.

## Walden IRB Approval

I submitted this study to the Walden University IRB according to the university's guidelines. This ensured the highest standards of ethical conduct and research integrity.

## Summary

In Section 3, I discussed the data collection process and analysis, encompassing document review and synthesis. In section 4, the practice-focused questions will be the sections on the table provided as the deliverable to the client. The sources of evidence were gathered through data mining and internet searches on publicly released information from the public and private sectors. The participants were stakeholders in the public and private sectors. The instrumentation and procedures were observation, data collection, and analysis. Walden University’s IRB submission, consent, and privacy policy were followed as required. The client organization did not need approval because it is written on behalf of the NJ DFS due to the restrictions created by the COVID-19 pandemic.

Section 4 will include the investigation results and recommendations based on the results. The recommendations will support the mission of the client organization, the New Jersey Department of Community Affairs, the Fire Safety Division, and safety professionals.

# Section 4: Results and Recommendations

## Introduction

I investigated the adoption of the NFPA code recommendations because home fires are a leading cause of civilian casualties in America. The information from this study can be used in policy creation and decision-making. Despite the evidence that sprinklers reduce loss of life, property, and money, the recommendation has yet to be adopted nationwide.

In this study, I developed comparative state legislation information about implementing New Jersey's New Home Fire Safety Act on behalf of the prospective client, the New Jersey Department of Community Affairs, Fire Safety Division. The original bill requiring residential sprinklers in new buildings, introduced in 2014, was vetoed by then-Governor Chris Christie. The New Home Fire Safety Act was introduced and amended into the Group Home Fire Safety Act and the Townhome Fire Safety Act to support changes to the NJ Uniform Construction Code, Senate Bill 180. Senate Bill 180 explicitly establishes fire safety and protocols for specific light frame residential construction and requires placards identifying primary structural systems of buildings. The New Home Fire Safety Act and all subsequent bills introduced had not been signed into law until January 2024. That is when the law requires sprinklers in new townhouses that had not applied for a construction permit.

In the years following the COVID-19 pandemic, there has been a substantial push for resources supporting residential sprinkler adoption. NFPA endorses the Home Fire Sprinkler Coalition (HFSC) as the information source for the sprinkler initiative. HFSC provides resources on how sprinklers work efficiently and why they should be utilized. They also inform building officials, real estate agencies, insurance companies, homebuilders, fire services, and home buyers. The website provides technical reports, quick fact sheets, videos, brochures, and industry-specific incentives. Some incentives include local building and fire code officials working together to build fire-safe homes that also aid in other building issues. For example, a fire sprinkler could be installed in an area that had an issue with fire department response times due to distance and access to an adequate water supply. This was named a Mini Max code by the Home Fire Coalition Board. An example of this is

> In N. Andover, Massachusetts more than 2,000 homes have been built under local planning board fire sprinkler installation requirements. The fire department has documented life saves as a result of fire sprinklers in these homes (Home Fire Coalition Board, 2024).

Besides cost reduction incentives, another option is increasing the spacing between hydrants in housing developments with sprinkled new homes. This would be beneficial because it would allow for narrower road designs and more homes to be placed in the subdivision. An example of a positive case would be

> The City of Altamonte Springs, FL, promotes compact sustainable development within four urban areas: East Town Center, West Town Center, Gateway Center and Regional Business Center. Fire sprinklers are required in all new single-family homes within these centers and for new homes greater than 3,500 sq. ft. outside them. 80%- 125% of Sprinkler System Cost is recovered. Incentives include discounted fees (building permit and water connection fees at 40%, fire impact fee at 25%); hydrant spacing may be increased to 800 ft.; road widths are permitted to be narrowed; and denser development is allowed (within the Centers) (Home Fire Sprinkler Coalition, 2024).

One unexpected incentive for sprinkled homes is community design and an increasing number of homes built in the community. As aforementioned, increasing hydrant spacing aids in housing development design by increasing the number of builds and giving more leeway to road design. This type of incentive is called a trade-up.

> Camas has negotiated trade ups or incentives that have resulted in more the 2,000 homes protected with home fire sprinklers. The most common incentives included: fewer hydrants, narrower streets, single-point subdivision access, longer dead-end roads, smaller cul-de-sacs, steeper slopes, and gated communities (Home Fire Sprinkler Coalition, 2024).

By allowing these trade-ups, some of the costs of the sprinkler installation are covered. These trade-ups provide a dedicated water source to the homes and address concerns of proximity to a fire station.

## Data Collection

I conducted this study online through data mining. I began this study during the COVID-19 pandemic. I used data mining to acquire information because everything in the public sector and government was on hold or emergency status only. Because of this, the information was gathered by examining each state's fire prevention code, which was provided publicly online. Some information was also found through studies done by NFPA, state Fire Sprinkler Initiative websites, or State Fire Prevention websites. After seeing the data, the other sources were used to triangulate the information. Information on the code adoption status was gathered from all 50 states and Washington, D.C. I examined the data for over a year. Specific details on the code adoption process were researched, and when found, they were added to a master table that I developed. Only some of the information publicly provided showed the answer to all the sections of the table.

The International Residential Code recommended in 2009 that fire sprinkler systems be required in townhomes and one- and two-family homes. The NFPA created an initiative to provide supporting information and research to support the adoption of this

model code recommendation. Each state has a different code adoption process, but most states have removed this requirement nationwide.

In my document review, I identified each state's status on adopting residential sprinklers as mandatory in new builds. I addressed the following questions:

1. Are residential sprinklers required in newly constructed single and multi-family homes in the residing state? If so, when was this adopted?
2. If the legislature has been adopted, to what extent?

Three of the original questions in the proposal were removed due to the inability to find the data. This information was used to create a table of the findings for the client. These questions were the subject matter investigated for each of the 50 states. This allowed for a comprehensive look at the nationwide stance on adopting the NFPA legislation, compared to each state.

## Data Analysis

The most up-to-date information was found up to 2019. Due to the COVID-19 pandemic, the code adoption process was halted nationwide. Sprinkler bill recommendations proposed in New Jersey have been defeated or requested to be amended since 2019. This was found through local news articles and simple searches that showed the topic being discussed publicly again. These articles were not scholarly sources, so they were not referenced. However, code adoption codification has yet to be found since 2019. Now that state and local governments are fully operational, legislation

can continue to address this mandate. Positive social change can be furnished by adding more to the literature regarding residential sprinklers in one and two-family dwellings and making the community safer for home occupants and emergency responders. Private-sector sprinkler initiatives have already added more websites and movements to support the codification.

## Findings

A synthesis of each state code adoption status provided insight into this model code recommendation's movement. Of all 50 states and Washington DC, 46 removed the requirement from their fire prevention code, while forty-two removed the townhome requirement (NAHB, 2019 p 1). Twenty states have given municipalities the authority to adopt the recommendation (NAHB, 2019) p 1). Two states have fully codified the requirement, while two states amended the condition to be determined by the size or height of the dwelling (NAHB, 2019, p 1). Four states made it mandatory that in the building phase, builders must give the buyer the option to install residential fire sprinklers.

There are three ways to stop the requirement from being codified: through a state residential code, legislation, or state code adoption process. Twenty-two states defeated the requirement recommendation through code adoption, 22 defeated the proposal through legislation, and four did not adopt a state code (NAHB, 2019, p 1). Most states

have removed the recommendation from their code adoption. However, the number of states or territories amending the recommendation for townhomes is increasing.

Initiatives to promote the importance of residential sprinklers nationwide have drastically increased since 2019, and more information is now accessible digitally. As early as 2003, Congress introduced the Fire Sprinkler Act of 2003 to work on initiatives that would benefit homeowners by promoting the installation of AES. The proposed act,

> creates a tax incentive for property owners to retrofit existing buildings with automatic sprinkler systems. Specifically, the bill would amend the Internal Revenue Code to include automated fire sprinkler system retrofits as a section 179 property. This would allow small and medium-sized businesses to deduct up to $125,000 of the cost of retrofitting a building with an automatic sprinkler system. Additionally, the bill would classify automated fire sprinkler system retrofits in high-rise buildings as a 15-year property for purposes of depreciation. Currently, the depreciation schedule for a fire sprinkler retrofit is 39-years in a commercial building and 27 ½- years in a residential building (CFSI News, 2015, para 2).

The bill is still in the introduction phase, as it was in 2015. At the local level, many similar incentive programs exist for business owners but none for residential property owners. At the congressional level, no new bills were found.

No scholarly arguments were found to counter the arguments against adopting residential sprinklers in one- and two-family homes. According to the

National Association of Home Builders, the NFPA embellishes the effectiveness of sprinklers. Fires happen in older homes, making residential sprinklers in rebuilds unnecessary. There was no information backing either of these claims. However, the largest counterargument is that installing the sprinklers costs too much and will raise the price of the house. This argument also proved meritless in finding scholarly sources to back this conjecture.

**Deliverables and Recommendations**

For New Jersey to pass bills requiring sprinklers in newly constructed residential homes, the cost of the building will have to be addressed. One way to do this would be to propose bills to change the requirements of licensed contractors required to work on fire sprinkler installation, maintenance, and design. NJ requires specific credentials to install fire suppression, which adds to the cost of the building. Industry-required materials are also necessary and add to the price of the building. For example, companies like FM Global and Underwriters Laboratory equipment are required for some mechanical parts in a fire suppression system; New Jersey can produce industry-standard elements that may also cut the build costs. Supply and demand create price increases on components that could be regulated if comparable components were at a lower cost per unit. For example, CPVC piping can be used for light construction single and multi-family residential instead of industry-standard iron piping.

The Home Fire Sprinkler Coalition, which can be accessed publicly and through a link on the NFPA website, explains multiple recommendations to battle the counterargument of cost. Building associations argue that the mandate would make new buildings too expensive and make home buying oppressive. While a cost-benefit analysis would be recommended, how do you quantify loss of life? One option provided was fire sprinkler trade-ups for builders. In the construction preplanning phase, incentives in the trade-up option might include street width reduction, longer dead-end streets, tee turnarounds permitted, increased street grades and building setbacks, additional units allowed recalculation of the necessity of expanded water supply demand, adjusting hydrant spacing for less demand, subdivision single access point, gated communities, and reducing the number of basements with windows. The incentives allow builders to reduce construction costs if sprinklers are permitted in the subdivision. Some states have already adopted making it mandatory for the builders to offer the option to the home buyer and provide an incentive if they choose to install the sprinklers—for example, a property tax rebate or a reduction in the home insurance rate. The incentives mentioned by the Home Fire Sprinkler Coalition would be added to this amendment option. Sprinklers have proven effective, so policy changes should create an environment where residential sprinklers can be more widely adopted nationwide.

## Evidence of Trustworthiness

I used prolonged engagement, persistent observation, triangulation, and reflexive researcher notes and documentation to provide credibility, transferability, dependability, and confirmability. The information gathered and disseminated is credible through periodic but timely checks of the statuses of each state's stance on the NFPA recommendation. The same can be said about persistent observation. The lengthy phases of this study provided time to observe if the information collected changed consistently. Transferability, supplied through the thick description process, was guided by the research questions and information-gathering process. The research questions that I used to create the focal points for this study resulted in a thick description of each state's status with the adoption of the NFPA recommendation. Triangulation of the data collected through the processes mentioned above-provided dependability in the data. The data collected were then put into the final chart, a collection of my notes and synthesis, thus creating confirmability.

## Strengths and Limitations

During the onset of the study, data mining was arduous. The information desired needed to be more readily available to laypersons. Each state has a different way of displaying their respective fire codes. The current code adoption status is available for each state. There are websites with current literature and datasets created by the NFPA, states, sprinkler organizations, and home builder associations comparing the code

adoption process. The information provided code adoptions made with amendments, total dismissals, and some of the deciding factors for the determination. This was not easily accessible nationwide. The limitations of this project revolved around the lack of movement during the pandemic and the lack of publicly sourced material. More information was needed per state regarding the opposition to the code adoption.

This topic will need further investigation to proceed. A state-by-state cost analysis of an installation in a newly constructed home would be recommended for future projects. A separate document should show the breakdown of the house's cost, with the sprinkler installation factored into the mortgage. Public policy administrators must introduce bills to aid the homebuyer and decrease extra expenses. Even though there has been little movement in the adoption process, more documentation should be readily available regarding where all the states are in the codification process.

## Summary

By the conclusion of this investigation, the New Home Fire Safety Act in New Jersey was approved; on January 16th, 2024, New Jersey Governor Murphy signed Senate Bill 281. This bill would enforce that townhouses that have not passed the application status for a construction permit within the 1st day of the 7th month following the bill’s enactment must be fitted with automatic fire sprinkler systems. This would also require the Department of Community Affairs (DCA) to create standards regarding the construction and design of the suppression systems within five months of bill enactment.

Section 5 will show how the information will be given to the client organization and disseminated publicly in the safety field.

## Section 5: Dissemination Plan and Conclusion

This study will be disseminated through the Walden University Library, where it can be publicly accessed. This work was created on behalf of the New Jersey DFS for fire safety professionals and public policy administrators. This was done to examine the code adoption status nationwide comprehensively and aid in future policy creation. The information gathered and summarized adds to public policy because this safety initiative affects all constituents' safety and protects the lives of fire service professionals. The potential impact for positive social change is generated from trying to find cost-effective ways to create safe residential dwellings and maintain the health and life of constituents and emergency personnel.

Future projects would produce more scholarly material regarding the opposition's argument that requiring residential sprinklers is too expensive.

### Summary

Finding publicly accessible data to answer the research questions was hard to achieve. After compiling the data, it became clear that nationwide, the recommendation for residential sprinklers in one- and two-family residential dwellings was removed during the code adoption process. There is no counterargument to the effectiveness of residential sprinklers, but the cost-benefit analysis concerns builders, new or potential homeowners, and the legislature. There are initiatives on all sides of this discussion due to the financial impact that is believed to be if approved into law at the state level. It is

essential to continue looking into this public policy issue to bridge the gap between economic concerns and safety. Moving forward, more investigations will be conducted to investigate cost reduction and potential incentives for the homebuyer or building association.

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Appendix A

| **State or Territory** | **Removed Requirement** | **Requirement not removed** |
|---|---|---|
| Alabama | Removed | |
| Alaska | Removed | |
| Arizona | Removed | |
| Arkansas | Removed | |
| California | | Approved |
| Colorado | Removed | |
| Connecticut | Removed | |
| Delaware | Removed | |
| Florida | Removed | |
| Georgia | Removed | |
| Hawaii | Removed | |
| Idaho | Removed | |
| Illinois | Removed | |

| | | |
|---|---|---|
| Indiana | Removed | |
| Iowa | Removed | |
| Kansas | Removed | |
| Kentucky | Removed | |
| Louisiana | Removed | |
| Maine | Removed | |
| Maryland | | Approved |
| Massachusetts | | Approved |
| Michigan | Removed | |
| Minnesota | Removed | |
| Mississippi | Removed | |
| Missouri | Removed | |
| Montana | Removed | |
| Nebraska | Removed | |
| Nevada | Removed | |

| | | |
|---|---|---|
| New Hampshire | Removed | |
| New Jersey | Removed | |
| New Mexico | Removed | |
| New York | | Approved |
| North Carolina | Removed | |
| North Dakota | Removed | |
| Ohio | Removed | |
| Oklahoma | Removed | |
| Oregon | Removed | |
| Pennsylvania | Removed | |
| Rhode Island | Removed | |
| South Carolina | Removed | |
| South Dakota | Removed | |
| Tennessee | Removed | |
| Texas | Removed | |

| | | |
|---|---|---|
| Utah | Removed | |
| Vermont | Removed | |
| Virginia | Removed | |
| Washington DC | Removed | |
| West Virginia | Removed | |
| Wisconsin | Removed | |
| Wyoming | Removed | |
| **Total** | **46** | **4** |