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Chief Officers' Perspectives of Traffic Incident Management Standards Following a Line-of-Duty Fatality

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Abstract

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MPhil, Walden University, 2020

MS, Columbia Southern University, 2014

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Policy and Public Administration – Emergency Management

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Abstract

According to the United States Fire Administration, an average of five firefighters are killed annually at scenes of roadway incidents. The purpose of this study was to explore chief fire officers' perceptions of incident management policies and standards for the prevention of firefighter line-of-duty deaths resulting from secondary collisions. Their perceptions may contribute to the efficacy and appropriateness of incident management policies and standards and may also lead to recommendations to improve compliance. The research question was to understand what chief fire officers' perceptions of incident management policies and standards for preventing firefighter line-of-duty-deaths from secondary collisions. The theoretical framework used for this study was the punctuated equilibrium theory. This study utilized a qualitative methodology with a multisite case study approach. Triangulation was achieved by combining in-depth interviews, literature review, and artifact and document reviews. Five chief fire officers in the State of Louisiana were interviewed. Participants were identified using both purposeful and snowball sampling techniques. Data were analyzed through NVivo with three resulting themes identified. Most participants noted that fire departments did have safety policies and standards in place. However, most participants opined that new policies were needed. Finally, most participants thought that the National Fire Protection Association was the basis for policies and standards. Future research may include the full spectrum of public service organizations actively involved in reviewing roadway incidents and approaches for adequate management of such incidents. The study recognized that there is a need for more training and policy improvements that may lead to positive social change.

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Dedication

This work is dedicated to all first responders who lost their lives during emergency roadway incident response. Your dedication, service, and sacrifice will never be forgotten.

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Chapter 1: Introduction to the Study

Introduction

The fire service is plagued with annual line-of-duty deaths that are arguably preventable (United States Fire Association [USFA], 2019a). For the past 30 years, the number of firefighter fatalities remained unchanged at a rate of approximately 100 line-of-duty fatalities annually (Brunacini, 2002; Rounds, 2013; USFA, 2019a). The National Fallen Firefighters Foundation (NFFF) associated this recurring trend of line-of-duty deaths (LODDs) to a lack of uniform and effective response policies, a lack of understanding relating to causes of firefighter LODDs, a failure to establish and realize national standards for training and certification, and ineffective, or lack of, risk management practices (NFFF, 2019).

Scholars agreed that little research existed for firefighter safety standards related to LODDs and how fire service professionals' behaviour changes following a firefighter LODD (Brauer, 2016; Rounds, 2012; Griffin, 2013). There is a lack of research on chief fire officers' perceptions regarding fire service safety standards and how their perception is impacted following an LODD. During the past decade there have been many fire service seminars, conferences, and summits aimed at reducing annual firefighter LODDs through the promotion of policies, procedures, standards, and best practices for mitigating risks and hazards of emergency response. Despite these efforts, a significant reduction of firefighter LODDs has not occurred (Rounds, 2012). Firefighter fatality reports continue to offer the same reoccurring recommendations for preventing similar firefighter LODDs.

This study explores the perceptions of chief fire officers pertaining to national standards and industry accepted practices and how LODDs impacts that same perception.

Background

The United States Fire Administration reviewed firefighter LODDs between 1996 and 2010 and found that approximately 253 firefighters LODDs resulted from vehicular collisions. Seventy firefighter LODDs were attributed to firefighters being struck lethally by vehicles from 1996 to 2010 (USFA, 2019b). Researchers using LODD statistics concluded that on average, approximately eight percent of firefighters' deaths annually occur after being struck by a passenger vehicle during an emergency roadway incident operation (Fahy et al., 2020). The National Institute for Occupational Safety and Health (NIOSH) actively examines deaths that firefighters have undergone while on duty. According to the conclusions discovered through LODD investigations, NIOSH authored a report depicting various preliminary steps and recommendations for firefighters to take that could reduce the risk or altogether avoid the hazards from commonly known fatalities. Implementation of national standards has helped reduce certain risks associated with various hazardous occupations, such as the work of the firefighters and emergency medical technicians (Burgess et al., 2014).

Problem Statement

There is a problem in United States fire services organizations. Despite the development of national standards to help reduce risks associated with the work of firefighters, there is evidence that the number of LODDs resulting from secondary crashes at vehicle incidents increase annually (Yu et al., 2013). Additionally, firefighters

who survive secondary crashes may develop posttraumatic stress disorder (PTSD), with negative effects on organizational performance and personal wellbeing (Kehl et al., 2014). To address the problem of firefighter LODDs resulting from secondary crashes at the scenes of roadway incidents, it is necessary to know more about chief fire officers' perceptions of incident management policies and standards for preventing LODDs of this kind (Fahy et al., 2015). Chief fire officers' perceptions may contribute wisdom to the efficacy and appropriateness of incident management policies and standards and may also lead to recommendations that will allow more effective policies and standards to be implemented in the future or improve compliance with existing policies and standards.

Purpose Statement

The purpose of this qualitative study is to explore chief fire officers' perceptions of incident management policies and standards for the prevention of firefighter LODDs resulting from secondary collisions at the scenes of roadway incidents. A qualitative research method for this study was considered most appropriate because the goal was to discover and evaluate chief fire officers' decision-making rationale regarding modern traffic incident management response guidelines and responder safety measures. Chief fire officers are the gatekeepers for fire department policy development and adherence to national industry accepted safety practices. Past and present chief fire officer opinions, perspectives, and rationale toward adherence to modern nationally accepted emergency response practices and standards fail to fulfill responsibilities toward firefighter safety (Kreis, 2004; Rounds, 2012). Adherence and applicability to industry-accepted standards

and practices for emergency incident response is directly related to the chief fire officer's decision-making rationale regarding responder safety (Brunacini, 2002; Rounds, 2012).

Development, adherence, and application of national emergency response standards and practices increase safety for the emergency responder. Failure to adhere to national standards usually have negative consequences (Waugn, 2006). Firefighter deaths are often attributed to chief fire officers who are cognizant of national industry-accepted emergency response standards and practices yet fail to adhere to and implement them (Daniels, 2002; Rounds, 2012). Following an LODD, a fire department usually experiences a significant amount of change that will likely burden the organization financially (Griffin, 2013). The financial impact of an LODD significantly burdens the local community. Discovering and exploring the rationale of chief fire officers regarding acceptance and adherence to national standards and practices may help provide solutions for the historical and current reluctance to develop and implement policies adherent to national safety standards.

Research Question

The following research question will be used to guide the study:

What are chief fire officers' perceptions of incident management policies and standards for preventing firefighter line-of-duty-deaths (LODDs) from secondary collisions at the scenes of roadway incidents following a traffic incident LODD?

Theoretical Framework

Public policy involves decisions, actions, or nonactions of the authorities having jurisdiction within a political subdivision (Sabatier & Weible, 2014). The public policy

process is complex due to the vast quantity of diverse people seeking political influence (Sabatier & Weible, 2014). Individuals possess personal biases and beliefs that shape their political perspective and agenda. Regarding one's personal policy perspective, Sabatier and Weible (2014) stated that people generally can only focus on one issue at a time. Stakeholders on one side of an issue seek political influence to focus and push solutions to their problem, while other groups of stakeholders with differing beliefs and agendas seek the same influences to achieve their respective political goals using the same means. Different agendas contribute to various conflicts to the policy process and seem to be the substantial protracting agent of bureaucratic decision-making. Most policy conflicts involve deep and personal values, interests, financial influences, and coercion from many policy actors (Sabatier & Weible, 2014). Public policy research is essential to study and better understand the interactions over time regarding public policy and encompassing environmental influences (Sabatier & Weible, 2014). Public policy research contributes to a concrete understanding of the policymaking process and the influences that contribute to policy change.

The tremendous complexity found in firefighting policy dynamics is equal to the complexity of the public policy process for amendments to policy for the fire service. The goal of this study is to gain a more complete understanding of how, and if, the impact of firefighter traffic incident line-of-duty fatalities, can invoke changes, amendments, and modifications to be decreed in the management practices and policies of the fire department traffic incident sector. Many theoretical frameworks are available to investigate, explore, and explain the policy process of the fire service. I have reviewed

several theoretical frameworks prior to settling on the punctuated equilibrium theory. I did so in conjunction with fire service professionals, who also concluded that, punctuated equilibrium theory multiple streams framework, and the advocacy coalition framework are the prevailing theories of fire service public policy (Wodicka, 2013).

The multiple streams theory states that the policy process is comprised of three streams: streams of problems, policies, and politics (Toavs, 2019). Each stream of the multiple streams theory typically exists as single and independent entities, each not contingent on the other's existence to function (Sabatier & Weible, 2014). The multiple streams theory also suggests that when the three independent streams are articulated as a unity - that is, when the problem is determined, solutions charted out, and political support for resolutions converges through a specific window of opportunity, major policy changes are set to occur (Wodicka, 2013). The multiple streams theory precisely depicts a policymaking approach for several public administration scenarios, including the fire service in various aspects of the profession (Robichau & Lynn Jr, 2009). The multiple streams theory applies to a variety of current problems faced by the fire service when convergence occurs.

The major problem of reoccurring firefighter fatalities at traffic incidents is clearly defined historically, persists currently, and poses a true concern for the future. An often-recommended route towards a solution to this problem may be considering the National Fire Protection Agency (NFPA 1091), who among many, suggest that traffic incident management standard operating procedures (SOPs) training is direly needed, and the lack thereof is to blame for the growing flurry of firefighter roadside line-of-duty

fatalities (NIOSH, 2017). There exists a gap of literary inquiry, into the perspective of chief fire officers who are influenced by the loss of their personnel when a roadside fatality occurs. This lack of qualitative academic inquiry forms a barrier and contributes to the vague nature of knowledge regarding the secondary deaths of firefighters at road accident scenes and the seeming inability to instate the national safety protocol. This has resulted in the challenges to develop the needed formation of a national safety policy for firefighters. To further the development of this policy it is imperative to voice the perspectives of those who are at risk and in charge of others at risk (Fahy et al., 2015). The problem at hand is prevalent, and the gap in knowledge in this area cannot be overstated. This study seeks to fill this gap in hopes of the formation and implementation of a firefighter line-of-duty safety code, on a grand, national level as to maximize widespread efficacy. Most industry experts and LODD reports support the aforementioned theoretical solution that the study will utilize for the tragic problem (Yu et al., 2013).

The second theoretical framework that should be mentioned is the advocacy coalition framework. I elected not to use this framework in my study because it is not aligned with the purpose and scope of this study. However, it provides a much-needed context.

This framework focuses on the examination and investigation of the various components of policy and its changes over time (Sabatier & Weible, 2014). According to Kübler (2001), this framework defines the policy process as opposition among various coalitions of stakeholders who promote their impetuous set of beliefs regarding problems

and solutions, leading to an antithesis of one position and the negation of the other, thus one step forward after taking two steps back. The advocacy coalition framework is designed to deal with policy problems with significant goal conflicts and disputes, and when studying this framework, it is no surprise that a significant number of problems plague the fire service (Wodicka, 2013). Fire department unions, tradition, culture, industry-accepted practices, fire service administration, and external stakeholders from the community all compete to influence safety and change throughout the fire service profession (Moore-Merrell et al., 2008; Rounds, 2012; United States Fire Administration, 2008).

Different groups within the fire service itself may push for different solutions to a problem facing the organization, creating greater disharmony from within the group where the policy is made to guide and train. In this way policy development within the fire service becomes more challenging (Wodicka, 2013). Kübler (2001) also argued that policy stakeholders seek allies who share core beliefs regarding the solutions to the problem, which can formulate dichotomous coalitions who pose different approaches to the same problem. For example, unions may seek public support and advocacy to help push for policy change in accordance with their solution. The advocacy coalition framework is prevalent in many areas of fire service policymaking processes and provides a means to comprehend and explain policy changes when opposition is present in a solution (Sabatier & Weible, 2006).

The problem and solution of traffic incident LODDs are well-documented and agreed upon throughout firefighter fatality literature and investigative reports. Fire

service experts recommend adherence to NFPA 1091and NFPA 1500 as solutions to the problem of traffic incident line-of-duty deaths (NOISH, 2017). If the solution to fire service LODDs is adherence and implementation of NFPA standards, then why do chief fire officers not adopt and implement NFPA Standards? The goal of the study is to better understand the rationale and perceptions of chief fire officers' adherence to decisions regarding industry accepted national standards.

The organizational culture of many fire service organizations contributes to a resistance to change and adherence to standards of safety, subsequently resulting in an LODD (Brauer, 2016; Temporado, 2012). According to Kunadharaju et al. (2011), cultural attributes of the fire service may be linked backed to a contributing root cause for many firefighter fatalities. As noted before, I do not to use this framework for this study but it is important because the framework is pervasive in the community and is mentioned in the interest of completeness. The advocacy coalition framework would be better suited to study how different groups within the fire service influence the organizational culture related to adherence to national standards for emergency response.

Punctuate Equilibrium

Biologists Gould and Eldredge (1972) initially established the theory of punctuated equilibrium to illustrate evolutionary advances of different animal species through time. In 1993, and reiterated in 2009, political researchers Baumgartner et al. (2009) borrowed from the scientific concepts of punctuated equilibrium developed by Gould and Eldredge and articulated it for political investigation. These researchers developed the punctuated equilibrium theory after analyzing a variety of United States

policymaking cases over time (Sabatier & Weible, 2014). Baumgartner et al. argued that advances in public policy occur gradually in the short term. Thereafter, subtle changes take place due to external disturbances. Finally, quicker more drastic changes begin to unfold (Givel, 2010). This theory originally sought to recognize the dynamic of policy evolution in public subsystems but later, the punctuated equilibrium theory was expanded to develop an understanding of public policymaking on a larger scale and over a greater period (Sabatier & Weible, 2014).

A major assertion of the punctuated equilibrium theory related to public policy is that long-term and gradual advances in policy precede a significant disturbance to the policy status quo, resulting in a radical, abrupt, and rampant policy change (Givel, 2010). Punctuated equilibrium political scientists argued that abrupt policy advancements result from an articulation of disruptive incidents spawned from crises (Givel, 2010; Repetto, 2006). Human tragedies, developing technologies, scientific improvements, and financial disruptions historically have contributed to many abrupt policy changes in the fire service protocol, and thus lead Gould and Eldredge (1977) to believe that punctuated change dominates human life, both biologically and politically. However, as Wodicka (2013) pointed out that, for the fire service, a punctuated change is often a crisis event and policy monopolies of a public policy subsystem can hinder policy changes until the onset of a punctuated event (Givel, 2010). In general, authority has jurisdiction over a political subdivision and makes up the monopoly of the policy for the fire service. A lack of professional competition and external interferences strengthens the power of these fire service monopolies. Historically, the fire service administration, has followed a path of

alternating small policy changes that happen over extended periods of time, and often are followed by radical, swift, and momentous change, incited because of a crisis. Griffin (2013) argued that the fatality of a fire service professional can function as an organizational crisis for any fire protection agency.

An organizational crisis is defined as an event that disrupts and damages the state of equilibrium for the operations of an organization (Griffin, 2013; Snyder et al., 2006). Griffin (2013), and the other previously cited authors, believed nothing to be more disruptive to an emergency service organization than an LODD. Many merited professionals of the fire service reported to have experienced significant emotional and psychological trauma resulting from losing one or more colleagues during emergency response operations. The impact of line-of-duty fatalities carry repercussions on the affected organization and bear an emotional toll that reverberates its weighty influence throughout the fire service industry. Griffin also highlighted research that indicated that negative experiences from one organization because of a crisis could negatively impact another organization of the same industry (Griffin, 2013; Yu et al., 2008).

Much of the policy monopoly is actually altered from the outside, due to the dialectical prevalence of the three steps of punctuated equilibrium (Givel, 2010). Givel (2010) indicated that, at first, policy change operates in an incremental, sluggish, and long-term manner. Once a traumatic event occurs, it finally results in a radical sudden dramatic policy change. Wodicka (2013) believed this process (i.e., policy monopolies in its entirety) to be what controls the occurrence of this change, as change does not generally occur until the monopoly's control is broken. Jones and Baumgartner (1993)

imperatively noted the strategic articulation of policy monopoly establishment, as occurring when the political subdivision is dominated by a single interest. In lieu of a nationwide decree of assets and specific procedures for the firefighting services, fire departments are autonomous and have complete control of their resources within the area they serve with no other competition. Jones and Baumgartner conferred that policy monopolies are usually led by and made up of executives. Fire departments monopolize emergency response at the local level and the chief fire officer is the one authorized with jurisdiction and monopoly over the fire service organization with almost complete autonomy (Wodicka, 2013). Generally, fire departments do enjoy the freedom that the current structure of the system affords them, that is, up until the point where control is lost and the equilibrium disturbed by the external occurrence of one or many fatalities from a traumatic disastrous event (Wodicka, 2013).

After a disaster, or in this case a line-of-duty firefighter fatality, the event gains not only the attention of the media, but also policy stakeholders, and subsequently an acquired fixation on tragedy from the public. This ultimately results in a drastic deviation from the homeostasis of the standard operations of the system (McNew-Birren, 2015). John (2003) indicated that crisis events contribute to gained attention of a certain event and encourage, incite, and incur changes in that district. Although the fire service is a monopoly at the local level and has a substantial level of autonomy, each monopoly is held accountable to, and moulded by, its affiliated stakeholders. The stakeholders of the fire department are primarily comprised of taxpayers, elected officials, employees, and elected fire department board members.

Given the prevalence and the overabundance of media sources, policy issues related to a LODD are often quickly highlighted and publicized through a variety of news and media sources. Expediently following a significant line-of-duty injury or firefighter fatality, stakeholders will gain notice and will be made aware of policy issues. At the same speed amendments are often made due to the public pressure of relegating the old system, which was thought to be responsible for the tragic error.

Kunadharaju et al. (2011) believed that firefighter fatalities are related to cultural factors, which contribute to a systemic cause for error and certain death. These cultural errors are things such as: responding with insufficient resources, failing to fulfil vital responsibilities, overlooking essential safeguards, and relying on risky heroics while operating within the fire service leading to injury or death (Kunadharaju et al., 2011). An issue arises from the fact that fire service culture is so resistant to change, that significant policy shifts will only act in shaping culture once a considerable crisis forces a significant policy shift. Significant tragedies, developing technologies, scientific improvements, and negative economic impacts result in swift and immediate policy changes in the fire service profession. But due to the hardy cultural organization of many of those working within the system, fire service culture largely remains resistant to change and adherence to the standards of safety regulations. Significant policy changes point to events that resulted in significant injuries, death, or departmental embarrassment (Wodicka, 2013).

The fire service historically accepts and enacts small policy changes extending the span of a long period. However, organizational crises forces major expedient policy changes in an abruptly short span of time following the period of stasis. An

organizational crisis is defined as an event that disrupts and damages the state of operations of an organization (Griffin, 2013; Snyder et al., 2006). An occupational loss of life is usually the cornerstone crisis event that forces fire service organizations to change and adopt national practices, policies, and standards. The predominant public policy theory for the fire service is the punctuated equilibrium theory because, the cycle of long stasis periods proceeding abrupt and significant policy changes are often caused by an organizational crisis (Wodicka, 2013).

True et al. (1999) affirmed the punctuated equilibrium framework is defined by the bureaucratic policy processes in the United States. According to True et al., the bureaucratic policy changes of the United States is identified by extending spans of minor modifications disrupted by short spans of momentous policy modification. Sabatier and Weible (2014) agreed that policymaking throughout the United States contributes to abrupt policy changes following a lengthy span of minor incremental policy developments. Major policy changes usually occur following the emergence of an emergency crisis. The fire service historically allows small incremental policy changes in times of stasis preceding a major change following a crisis. One of the best-known examples of this sort of change is the growth and application of the national incident management system (Wodicka, 2013). Prior to 9/11, incident management systems differed at each local level fire service organization. The incident management system also differed at the state and federal levels. Wodicka (2013) pointed out that the tragedy observed during the 9/11 terrorists' attacks effectively contributed to the development and implementation of the national incident management system. Small changes of

incident management and command eventually change over a long span of time, until rapid changes for each individual monopoly adhere to the sweeping changes in incident command.

Kunadharaju et al. (2011) concurred that the fire service will perpetually be a hazardous profession, but there is unanimity among professional fire service organizations and the scientific community, that improvements to safety can be made. Recommendations for mitigating firefighter line-of-duty fatalities are often and abundantly made available to fire service leadership in the form of presentations that follow an incident (Moore-Merrell et al., 2008). The National Fire Protection Association developed voluntary consensus standards with the goal of mitigating the dangers related to the fire service. Fire service culture historically is rather resistant to major changes until organizational crisis forces abrupt and swift changes aimed towards the totality of the system (Brauer, 2016). Punctuated equilibrium is pertinent in assessing how a firefighter fatality at a traffic incident contributes to significant policy advancements spanning an abbreviated timeframe following small incremental policy advancements spanning an extended timeframe, that crises downtime often brings forth.

Nature of Study

This qualitative study based upon interviews with chief fire officers in the State of Louisiana is structured to observe the subjective perspectives of these professionals while focusing on the state of traffic incident management policies and standards following the aftermath of a firefighter LODD at the emergency roadway incident scene. The semistructured interviews were documented through handwritten notes composed by the

interviewer and through audio recording for adequate fidelity when referencing the data for analysis. An audio recording was transcribed and coded thereafter. O'Sullivan et al. (2017) confirmed that exploring and investigating beyond the surface of a phenomena, such as a phenomenological subjective inquiry, that case studies serve as the proper means for a well-practiced research method. This research includes a review of firefighter LODD documents and reports from NIOSH related to emergency roadway incident responses. Thematic analysis regarding firefighter LODD investigative findings is also analyzed in this study. This study utilized qualitative data collection methods that include, intensive but loosely structured first-hand interviews with chief fire officers in the Louisiana area, document reviews, field notes, and artifact and observational data.

The chief fire officer of any fire protection agency is the major decision-maker regarding public and organizational policy, but there must be buy-in at the level of the individual for change to be adequately implemented during operational periods of the response. Fire service professionals in operation divisions can contribute drastically to organizational change or also remain silent regarding change. Chief fire officers' motivations and perspectives regarding the selection of which NFPA standard to follow and implement into policy of the agency is a fact necessitating significant examination for the sake of safety. This study proposes to fill the gap and better comprehend the phenomena related to chief fire officers' perceptions and motivations concerning adherence to NFPA consensus standards as guidance for policy development. Currently employed chief fire officers from fulltime fire protection organizations in Louisiana were qualitatively interviewed.

It is essential that policy makers comprehend how and why firefighter LODDs happened at an emergency roadway incident. Policy makers must also understand how firefighter fatalities thereafter influence the views of fire service professionals related to traffic incident management policies and standards. Firefighter LODD investigation reports are case study conclusions that should provide key themes as to how and why firefighter LODDs happened and what that death means to the system and its procedures.

Definition of Terms

Terms often have multiple meanings based on the perspective of the reader. To ensure that everyone who reads this study uses the same definition for terms, I provide definitions below for terms as they are to be interpreted for this study.

Career fire service employee: All full-time employees of a municipal or parish fire department, or fire protection districts for firefighting or prevention. This includes the fire record clerk, fire investigation officers, fire protection, and fire training officers (Louisiana State Legislature, 2019).

Chief fire officer: Also called fire chief, the chief fire officer is the "highest-ranking officer" in and the administrative head of a fire department (USFA, 2019a).

Command: Established by the first-arriving officer with expected actions such as: establishing command, making the initial size-up, deploying available resources, communicating the situation to the communication center and other responding units (Stowell & Murnane, 2013).

Incidents: Motor vehicle collisions, hazardous material releases, motor vehicle fires, disabled vehicles, construction zones, or other traffic delays resulting in backups along the roadways (Haddow, Bullock, & Coppola, 2011).

Line of duty death (LODD): The death of a firefighter while he or she is engaged in the performance of his or her duties (USFA, 2019a).

Manual on uniform traffic control devices (MUTCD): The standards that road manager in the United States use to maintain traffic control on all public roads (US Department of Transportation, 2019).

Mitigation: The process of identifying potential hazards and the actions that are taken to eliminate or mitigate against these hazards (FEMA, 2018).

National Institute of Occupational Safety and Health (NIOSH): Is part of the CDC and is tasked for conducting research and developing recommendations for the prevention of work related injury and illness (NIOSH, 2018).

Organizational crisis: An event that disrupts and damages the state of equilibrium for the operations of an organization (Griffin, 2013).

Perception: The process that people use to interpret and organize sensory impressions to give meaning to their environment (Robbins, 2003).

Post-traumatic stress disorder (PTSD): A mental disorder developed in response to a traumatic event, with symptoms potentially including recurring thoughts about the event and negative effects on overall wellbeing and occupational functioning; PTSD may occur in firefighters who have survived a secondary collision (Kehl et al., 2014)

Punctuated equilibrium: Long periods of organizational stability in which few changes occur, followed by a sudden, drastic, disruptive crisis that causes rapid change within a short time (Givel, 2010).

Secondary collision: An additional vehicular collision that occurs after and at the scene of a primary collision to which firefighters are responding (FEMA, 2008).

Standard operating procedures: For the purposes of this study, this term refers to the national standards developed by NIOSH to promote first responder safety, to be followed by firefighters during traffic incident management (NIOSH, 2017).

Traffic incident management: The procedures followed by first responders such as firefighters and paramedics at the scene of a traffic incident such as a vehicular collision (NIOSH, 2017).

Assumptions

The main assumption is that policy modification as result of a firefighter fatality can be captured via participant interviews, even with the triangulation of data from other studies and sources. Another assumption of the study is that the entirety of the bureaucratic policy making process for the fire service and its complex interaction with the nation can be understood by a single compressed theory. Furthermore, in dealing with participants who have experienced the loss of a fellow fireman or firewoman, it cannot be known whether they are alone in experiencing PTSD symptoms.

Furthermore, this study assumes that we can recognize and record the physical experience of individuals and their subjectivity in total capacity. It is assumed that the occurrence of line-of-duty fatality in the fire service are well known throughout the local

fire service community. This study assumes that chief fire officers are cognizant of traffic incident management practices and National Fire Protection Association Standards. A final assumption is that those chief fire officers that choose to participate will provide honest answers.

Scope

The scope for this study covers exploring the implications of a firefighter line-of-duty roadside death on national policy-making procedures concerned with the issue and providing the proper training to avoid the accidental fatalities of firefighters in the future. This study utilized qualitative data collection methods that include, intensive but loosely structured first-hand interviews with chief fire officers in the Louisiana area, document reviews, field notes, and artifact and observational data.

The significance of this study is that it may lead to insights that will contribute to the prevention of firefighter fatalities. The significance is to take these errors that cost many firefighters' lives, and learn from them, by avoiding mistakes of the past and implementing a systematic nationwide change, as to lower the margin of fatalities in the future.

Delimitations

There are over 1,160,450 career and volunteer firefighters in the United States in 2015 (Haynes & Stein, 2017). The researcher is attempting to investigate this specific sample designation because 1,160,450 may be too large for this study. The geographic boundaries of data collection are the State of Louisiana. Additionally, study participants were paid civil servants of the State of Louisiana and hold a standing as a chief fire

officer. According to Reichard and Jackson (2010), there are approximately 179,000 emergency medical technicians and over 1,000,000 law enforcement officers throughout the United States. The researcher attempting to investigate every classification of first responder may be too large for this study. This study included five chief fire officers, but future studies may examine these other categories along with different population sizes.

Limitations

In terms of theoretical design, boundaries exist where data collection is to occur. Gathering the primary data of the study, Louisiana serves twofold as a place of margin, first for the lack of diversity by interviewees hailing from this single state and as a bias, in that Louisiana will be used theoretically to represent the totality of the fire service for the entire United States, making generalizability difficult. Further, while searching NIOSH for firefighter fatality reports, all elements included ranks, ages, sexes, and the chronology between 1994 and 2018. Nonfatal struck-by incidents were precluded from NIOSH search results.

To augment the aforementioned limitations, findings will be cross-referenced with the USFA database, NIOSH, and other literary studies relevant to this inquiry. The search conducted using the USFA database were set to include all types of incidents to gain insight on the multiple perspectives of many different firefighters involved in different situational variations from incidences of the same nature. Furthermore, search criteria were set to include private and public incident records and all events of subsequent injuries that resulted in death within 24 hours such as acts of terrorism or aggravated fatal heart conditions.

Significance of the Study

Firefighter LODDs negatively impact their fire protection agency, their community, surviving family members and friends, and society. The loss of a family member, partner, or friend carries an emotional trauma that permeates through the life of all impacted. Line-of-duty deaths not only negatively impact public administration, but also the public perceptions about the adequacy of existing safety procedures. Additionally, the financial consequences can be devastating to the fire protection agency, the family, and society. The financial consequences may only leave a deficit in federal and local budgets, but also an emotional trauma of the families, friends, and community. Federal compensation distributed to surviving family members of an LODD can extend to a one-time payment upwards of $350,000 (Szymendera, 2020). Many state levels of government, fire service organizations, and insurance companies contribute financial benefits to the surviving benefactor's family. The surviving fire protection agency usually experiences a vast amount of change following the LODD, change that is likely to cause significant financial burden to the organization (Griffin, 2013). As such, it is not just the monetary consequences from an LODD which crucially weighs upon and detrimentally influence society.

In terms of the detriment of administration, the effect of a firefighter LODD often contributes to the loss of current and experienced employees due to emotional trauma. This study could possibly address ongoing policy and training shortcomings related to traffic incident management standards and practices. This study may also result in compelling positive implications concerning policies and practices in traffic incident

management nationwide. Proven and acceptable traffic management should result in a utilitarianism of sorts by reducing risk of injury or fatality and improving safety for first responders working on an emergency roadway incident. Secondary crashes may spawn from the original roadway incident. First responders and civilians are exposed to the possibility of a consequential crash while normal traffic flow is disrupted due to the primary roadway incident (Yang et al., 2014). This research may be helpful in mitigating the risk of secondary crashes. This research could directly help benefit the safety of not only those emergency personnel responsible for the lives of others, but in effect the entire civilian population who uses the highways in any vehicle. Then research provided by this study is not just warranted, it is vital. the efficacy of safety measures for the current state of affairs has produced some of the desired results, but it also showed the limitations. This detriment effect is present both in the local and national spheres.

Summary

This chapter provided a general outline, including the background, literary support, research questions, theoretical models, definitions, assumptions, delimitations, scope, and nature of the study. The research premise rests upon entering the space that exists between the relations of line-of-duty firefighter fatalities and the stagnation of the juridical decree of safety standards. As advised by Baumgartner and Jones (1991), demonstrated alterations in public political policy initially occur slowly over a long period of time and then, following a tragedy, are prone to abrupt into expedient change (Givel, 2010).

The nature of the study asks why is it that policy change follows the punctuated equilibrium model with such fidelity and remains the only adequate explanation for why things depart from stasis? In other words, why must a firefighter die, before the implementation of nationwide amendments and safety standards mandated to the system as a whole? Currently, radical policy change seems contingent upon fatal national tragedies, yet these changes remain to take place at statewide levels, rather than national or federal.

Regarding social change, public policy research is essential to study and better understand the public policy and encompassing environmental influences and interactions over time regarding, within the existing system (Sabatier & Weible, 2014). Public policy research contributes to better awareness of the policymaking procedure and the influences that contribute to policy change. This study seeks to bridge the gap in literature in the hope of facilitating the formation and implementation of a firefighter line-of-duty safety code on a national scale, to maximize efficacy and impact.

On the level of personhood, such as the customs of the fire service culture, there is a certain holdfast repudiator principle focused on maintaining standards and practices from the past and resisting to adopt new practices and procedures. Such an attitude may follow common metaphorical aphorisms like “if it ain’t broke, don’t fix it” and in an uncanny way sort of mimics the punctuated equilibrium framework for policy change because it takes a true tragedy to incite change in practice. In addition, some patterns of impetuous actions within the cultural sphere of fire service have led to grave injuries or death. For example, common careless practices include, responding with insufficient

resources, failing to fulfill vital responsibilities, overlooking essential safeguards, and relying on risky (Kunadharaju et al., 2011). This expresses not only a disjunction on the level of federal policy but also on the level of maintaining a harmonious level of operation within the fire service across the board.

This chapter also touched on the data collection methods for the study. Given that the research is in the domain of qualitative inquiry, exploring the perspective and subjectivity of chief fire officers will be of key importance. Primary data were gathered using semi-structured interviews as to allow for the full, unrestricted flow of ideas, expression, and experiences to be reported in the research. To capture subjectivity is no small task and it is no coincidence that in attempting to do that we are met with certain limitations and delimitations. As with all studies, theoretical design limits and boundaries exist where data collection is to occur. When trying to record and translate the data acquired from recalled experience of subjectivity and the encompassed experiences to a level of universal saturation and consistency, equivocation is encountered. This is the condition of being in language, and it is guaranteed to be elusive. This is because experiences can only be described with words of experience and those words by more words. These words now have multiple meanings and results in a fluidity regarding the meaning of the words used. The same event explained by two people will be done dissimilar, even if the same lexicon was employed, which is unlikely. Here this study meets with indubitable limitations when endeavoring to translate an equivocal phenomenon into a universal experience. These delimitations and assumptions, although daunting, must be faced to truly gain anything new and help further contribute to the

academic inquiry focused on such national policy of such an important subject. The study does not merely dwell on the challenges of the past, but is geared to proactively make a call for action with the aim of aiding a growing problem that is owed more attention.

In Chapter 2, the study incorporates a review of the literature as it relates to the proposed study. Chapter 3 provides an explanation of the research design and methodology that was used. This chapter explains the case study approach, describe data collection, procedures, and how data were analyzed. Chapter 4 includes the data collected, the results of the data analysis and other important data significant to this study. In Chapter 5 I restate the purpose of the study, overview of the research methodology used to conduct study, results of data collected, and conclusions based on the data analyzed. It also includes implications for social change and make recommendations for future research.

Chapter 2: Literature Review

Introduction

This chapter provides a review of the literature on the role and history of the fire service related to traffic incident response and management, traffic incident management practices and standards, fatalities that occurred during traffic incident response, topics surrounding industry accepted traffic incident management practices, NFPA standards, and punctuated equilibrium as it relates to fire service. The literature review is based on peer-reviewed journals, firefighter fatality reports from government organizations such as NIOSH, the National Institute of Standards and Technology (NIST), the USFA, and the FEMA. In addition, books, policies, fire service publications, training materials, and dissertations related to the fire service were consulted.

Organization of Literature

This chapter is divided into four sections: the first defines punctuated equilibrium and how it relates to the fire service. The second section includes the history and evolving role of the fire service toward and all hazard response, including the fire service's role in traffic management at emergency roadway incidents. The third section defines traffic incident management and the problems associated with failures in traffic incident management, including firefighter injuries and fatalities during an emergency roadway response. The final section includes a review of traffic incident fatalities of firefighters working at emergency traffic incidents.

Literature Search Strategy

I conducted a primary search through the Walden University Homeland Security Digital Library Database resulting in 6,438 results. Most of the results consisted of reports and findings of firefighter fatalities from different periods of time. Many of the reports displayed information about the different types of firefighter fatalities reported over a period or a specific year. SAGE Journals (formerly SAGE Premier) and Walden University Thoreau Multi-Database are additional databases that provided information significant to this study.

After the initial search, subsequent searches of the following databases were conducted: EBSCO Databases, Dissertation & Theses @ Walden University, ProQuest Dissertations & Theses Global, Sage Online Journals, Military and Government Collection, Academic Search Complete, International Security and Counter Terrorism Reference Center, and ProQuest Science Journals. The following terms were used in each search: firefighter fatalities, firefighter LODD, traffic incident management, NFPA 1091, and punctuated equilibrium. Searches were also conducted using the same key terms through National Fire Protection Association (NFPA), NIOSH, NIST, USFA, and FEMA.

I conducted searches through fire service professional journals and trade publications related to traffic incident management. The search provided 256 results after a search for line-of-duty deaths from traffic incident management through fire engineering online publications. A search for LODDs due to traffic incident management

from Fire Rescue Magazine yielded 147 results. A subsequent search through Firehouse online publications LODDs and traffic incident management yielded 152 results.

The National Fire Protection Agency's NFPA 1091 was first published in 2015 (NFPA, 2018a). Many articles and publications used are dated preceding 2015; however, this material is essential to the study, as they are related to roadway incident fatalities and traffic incident management.

Theoretical Framework

Public policy involves the decisions, actions, or non-actions of the authorities having jurisdiction within a political subdivision (Sabatier & Weible, 2014). The public policy process is complex due to the vast quantity of diverse people seeking political influence (Sabatier & Weible, 2014). Each individual carry personal biases and beliefs that shape their political perspective and agenda. Generally, people can only focus on one issue at a time (Sabatier & Weible, 2014). Stakeholders on one side of an issue seek political influence to focus and push solutions to their problem while another group of stakeholders with differing beliefs and agendas seek the same influences to achieve their respective political goals. In this way different agendas contribute to conflicts during the policy development process. Most policy conflicts involve deep and personal values, interests, financial influences, and coercion from many policy actors (Sabatier & Weible, 2014). Public policy research is essential to study and better understand the interactions over time regarding public policy and encompassing environmental influences (Sabatier & Weible, 2014). Public policy research provides for concrete understanding of the policy making process and the influences that contribute to policy change.

The goal of this study is to better understand how and if a traffic incident line-of-duty firefighter fatality contributes to changes in fire department traffic incident management practices and policies. A variety of theoretical frameworks are available to investigate and explain the policy process of the fire service. I reviewed several theoretical frameworks prior to selecting the punctuated equilibrium theory. Fire service professionals concluded that the punctuated-equilibrium theory, advocacy coalition framework and multiple streams framework are the prevailing theories of the fire service public policy (Wodicka, 2013).

John Kingdon developed the multiple streams theory (Wodicka, 2013). This theory states that the policy process is composed of three streams that includes a flow of issues, a flow of political solutions, and a flow of campaigning (Toavs, 2019). Each stream of the theory normally exists independently from each other (Sabatier & Weible, 2014). The multiple streams theory suggests that "major policy changes occur when the problem is identified, solutions mapped out, and political support for change converge through a window of opportunity" (Wodicka, 2013, p. 14). The multiple streams methodology provides a precise policymaking process for public policy that may apply to the fire service in various aspects of the profession (Robichau & Lynn Jr, 2009). The multiple streams theory may apply to a variety of problems facing the fire service when convergence occurs, however ambiguous nature of this approach contributed the researcher's rationale for bypassing this approach in this dissertation. This theory deals with policy changes under ambiguous conditions (Sabatier & Weible, 2014). The major problem of reoccurring firefighter fatalities at traffic incidents is clearly defined. The

suggested solution to the problem is considering NFPA 1091 (NIOSH, 2017). The recommended solution to the problem is agreed upon by most industry experts and line-of-duty fatality reports.

The advocacy coalition framework seeks to explain policy changes over a long span of time (Sabatier & Weible, 2014). This framework defines the policy process as opposition among coalitions of stakeholders that promote their beliefs regarding problems and solutions (Kübler, 2001). It is designed to deal with policy problems with significant goal conflicts and disputes (Wodicka, 2013). A significant number of problems plague the fire service. Different groups within the fire service may push for different solutions to a problem facing the organization (Wodicka, 2013). Kübler argued that policy stakeholders will seek allies who share core beliefs regarding the solutions to the problem (Kübler, 2001). The advocacy coalition framework is prevalent in many areas of fire service policymaking processes and acts as a framework to understand policy changes in instances where there is disagreement regarding the solution (Sabatier & Weible, 2006). The problem and solution are well documented and agreed upon throughout firefighter fatality literature and investigative reports. Fire service experts recommend NFPA 1091 as a solution to the problem of traffic incident LODDs (NOISH, 2017). The researcher elected not to use this framework for this research.

Punctuated Equilibrium Theory

Biologists Gould and Eldredge first introduced punctuated equilibrium to explain the evolutional advances of different animal species of time (Gould & Eldredge, 1972). In 1993, and reiterated in 2009, political scientists Baumgartner and Jones borrowed from

the scientific concepts of punctuated equilibria developed by Gould and Eldredge (Baumgartner et al., 2009; Givel, 2010). Baumgartner and his colleagues developed the punctuated equilibrium theory after analyzing a variety of United States policymaking cases over time (Sabatier & Weible, 2014). Baumgartner and Jones argued that the change in public policy occurred slowly with short term and abrupt changes occurring following an external disturbance (Givel, 2010). This theory was originally developed to understand policy change in public subsystems (Sabatier & Weible, 2014). Punctuated equilibrium later expanded to develop understanding of public policymaking more generally.

The major assertion of punctuated equilibrium regarding public policy is that "long-term minor incremental changes in policy precedes a significant disturbance to a policy monopoly resulting in abrupt and rampant policy change" (Givel, 2010, p. 188). Theorists have argued that abrupt policy change can appear due to disruptions caused by crises (Givel, 2010; Repetto, 2006). Human tragedies, developing technologies, scientific improvements, and financial disruptions historically contribute to abrupt policy changes in the fire service. Punctuated change dominates human life (Gould & Eldredge, 1977). For the fire service, a punctuated change is often a crisis event (Wodicka, 2013). Policy monopolies of a public policy subsystem can hinder policy changes until the onset of a punctuated event (Givel, 2010). The authority having jurisdiction of a political subdivision is the policy monopoly of the fire service. A lack of professional competition and external interferences strengthens the power of fire service monopolies. The fire service historically follows a change pattern of small policy changes over long period of

time followed by swift and momentous change organizational crisis. Dr. David Griffin argued that a fire service professional work-related fatality is an organizational crisis for any fire protection agency (Griffin, 2013).

Organizational crisis is defined as an event that disrupts and damages the state of operations of an organization (Griffin, 2013; Snyder et al., 2006). Nothing is more disruptive to an emergency service organization than an LODD. Many fire service professionals experienced significant emotional and psychological impacts after losing a colleague during emergency response operations. The impact of an LODD not only impacts the affected organization, but the emotional toll weighs heavy throughout the fire service industry. Dr. Griffin highlighted research that indicated negative experiences from one organization resulting from a crisis can negatively impact another organization of the same industry (Griffin, 2013; Yu et al., 2008).

"Punctuated-equilibrium in public policy has been specifically defined as long-term and relatively incremental policy change followed by an exogenous shock to a policy monopoly resulting in a tipping point oriented toward sharp and explosive policy change" (Givel, 2010, p. 188). Policy monopolies control the occurrence of change. Change does not generally occur until the monopoly's control is broken (Wodicka, 2013). A policy monopoly is established when the political subdivision is dominated by a single interest (Baumgartner & Jones, 1993). Fire departments have complete control of their resources and the area they serve with no competition. Policy monopolies are usually executives (Baumgartner & Jones, 1993). Fire departments monopolize emergency response at the local level and the chief officer is the authority having jurisdiction and

monopoly with almost complete autonomy over the fire service organization. Fire departments enjoy control of issues until the control is interrupted by external factors (Wodicka, 2013).

Significant changes from normal operations of a system occurs after an issue is forced to the attention of policy stakeholders by external forces (McNew-Birren, 2015). Although the fire service is a monopoly at the local level, each monopoly is held accountable to stakeholders. The stakeholders of the fire department are the taxpayers, elected officials, employees, and fire department board members. Crisis events contribute to changes in attention and encourage changes (John, 2003). Stakeholders are made aware of policy issues following a significant line-of-duty injury or death of a firefighter. Policy issues related to an LODD is highlighted through a variety of news and media sources.

According to Kunadharaju et al. (2011), cultural attributes of the fire service may be linked backed to a contributing root cause for many firefighter fatalities. Responding with insufficient resources, failing to fulfill vital responsibilities, overlooking essential safeguards, and relying on risky heroics may reflect the cultural of the fire service (Kunadharaju et al., 2011). Fire service culture is resistant to significant policy shifts until a considerable organizational crisis forces such a shift. The organizational culture of many fire service organizations contributes to a resistance to change and adherence to standards of safety. Significant tragedies, developing technologies, scientific improvements, and negative economic impacts result in swift and immediate policy

changes in the fire service profession. Significant policy changes point to events that resulted in significant injuries, death, or departmental embarrassment (Wodicka, 2013).

Recommendations from the leading industry experts contribute to the development of national standards and recommended practices. The literature recognizes how the culture of the fire service contributes to a lack of major policy shifts, yet there remains a lack of understanding of the decision making process of fire service policy makers regarding resistance to developing, implementing, and enforcing national standards and industry accepted practices. The fire service historically accepts and enacts small policy changes extending the span of time before an organizational crisis. An organizational crisis forces major policy changes in an abrupt time span following the period of stasis. Organizational crisis is defined as an event that disrupts and damages the state of operations of an organization (Griffin, 2013; Snyder et al., 2006). An occupational loss of life is usually the crisis event that forces fire service organizations to change and adopt national best practices, policies, and standards. The cycle of long periods of stasis proceeding abrupt and significant policy changes caused by an organizational crisis is why punctuated equilibrium is the predominant theory of public policy for fire service. (Wodicka, 2013).

Toavs (2019) affirmed that the punctuated equilibrium framework, in relation to policymaking in the United States, is identified by extended spans of minor modifications disrupted by short spans of momentous policy modification. Sabatier and Weible (2014) agreed that policymaking throughout the United States contribute to abrupt policy changes following a lengthy span of minor incremental policy developments. One of the

best-known examples of this sort of change is the growth and application of the national incident management system (Wodicka, 2013). The tragedy observed during the 9/11 terrorists' attacks contributed to the development and implementation of the national incident management system (Wodicka, 2013). Prior to 9/11, incident management systems differed at each local level fire service organization. The incident management system also differed at the state and federal levels. Small changes of incident management and command evolved on a long time span until there is a dire need for rapid changes in each individual monopoly to adhere to sweeping changes in incident command.

The fire service will perpetually be a hazardous profession, but there is an unanimity amongst professional fire service organizations, and the scientific community, that improvements to safety can be made (Kunadharaju et al., 2011). Recommendations for mitigating firefighter line-of-duty fatalities is abundantly available to fire service leadership (Moore-Merrell et al., 2008). The NFPA develops voluntary consensus standards with the goal of mitigating the dangers related to the fire service. The fire service culture is historically resistant to major changes until an organizational crisis forces abrupt and swift changes (Brauer, 2016). Punctuated equilibrium is pertinent to assess how, and if, a firefighter fatality at a traffic incident contribute to significant policy changes in a short period of time following small incremental policy changes over a long period of time.

Punctuated Equilibrium is the Fire Service

Major changes and policy shifts in the fire service follows catastrophic losses of life. These major tragedies have proven to be the major contributing factor to significant and swift changes in the fire service. Throughout the history of the United States, significant fire-related disasters occurred across the nation. Over 70 major fire-related disasters occurred in the 20th century alone (Barillo & Wolf, 2006). Each disaster contributed to changes in fire and life safety regulations and laws. Although each incident provides lessons learned, changes at the local level generally occur in response to a disaster experienced at that level. When it comes to fire and life safety issues, communities are more reactive instead of being proactive (Stowell & Murnane, 2013). According to historical evidence, some disastrous events have an impact toward change in fire service legislation and operations (Drabeck & Quarantelli, 1967).

On March 25, 1911, a massive fire at a high-rise garment factory, located in New York City, contributed to the loss life for 146 female employees (Von Drehle, 2004). Prior to the Triangle Shirtwaist Fire, a variety of workplace incidents contributed to regular losses of life in the early 1900s (Von Drehle, 2004). The triangle shirtwaist fire highlighted unsafe workplace practices that contributed to significant loss of life. Prior to the terrorists' attacks of 9/11, this event was considered the deadliest workplace disaster in New York City history (Von Drehle, 2004). The lack of fire and life safety regulations and enforcement contributed to this significant loss of life. The employers of this factory locked the women employees behind closed doors during work hours (Todd, 2005). The locked doors prevented employees from escaping the flames and smoke. Inadequate fire

escape is also blamed for the number of lives lost (Todd, 2005). The triangle shirtwaist fire contributed to significant changes to fire and life safety regulations. Several months after the fire, government officials passed legislation giving inspectors additional enforcement ability and established fire prevention (Drabeck & Quarantelli, 1967). Legislation also required installation of alarm systems, sprinklers, and fire escapes.

On November 28, 1942, a fire killed 149 people and injured hundreds in Boston at the Cocoanut Grove nightclub fire (Saffle, 1993). This fire is considered the deadliest nightclub fire in United States history. Overcrowding of the nightclub occupancy, combustible interior finishes and decorations, and absent fire safety contributed to the tremendous death toll (Stowell & Murnane, 2013). The Cocoanut Grove nightclub fire contributed to significant changes in public safety legislation (Saffle, 1993). Government officials enacted stricter fire and life safety regulations for assembly occupancies.

On July 6, 1944, in Hartford, Connecticut, a massive circus tent fire resulted in the deaths of 168 people and injuring over 480 (Halpern & Chaffee, 2005). *The Ringling Brothers and Barnum and Baily Circus* fire claimed the lives of many circus attendees, including children. Flammable materials were used to waterproof the canvas of the tent. The flammable mixture included gasoline and paraffin that contributed to rapid fire spread (Stowell & Murnane, 2013). Following the Hartford Circus fire, government officials enacted strict regulations for public assemblies.

The City of Chicago has experienced the catastrophic impact of massive fire events. On October 8, 1871, a major fire devastated the city of Chicago (Stowell & Murnane, 2013). The Great Chicago fire contributed to significant financial and human

losses (History, 2010). In the aftermath of the great Chicago fire in 1871, government sought stricter building and fire codes. In 1958, Chicago again witnessed the aftermath of a tragic fire at Our Lady of the Angels School. The fire at the school killed 92 children and three teachers (Stowell & Murnane, 2013). As a result of the school fire, legislation required fire detection and fire alarm systems in schools.

Significant losses of life plague the history of fire service and protection in the United States. Several major fire events that contributed to significant losses of human life could have been prevented through implantation of modern fire protection practices. The MGM Grand hotel fire in Las Vegas and the Station nightclub fire in Rhode Island provide additional examples of significant fire service changes following a major loss of life event. The MGM Grand hotel fire occurred in 1980, claiming the lives of 85 people and injuring up to 679 people (Stowell & Murnane, 2013). The outcome of the MGM Grand hotel fire would have been very different if the building contained a sprinkler system. Following the MGM Grand hotel fire, legislation required sprinklers in high-rise buildings. In 2003, a fast-growing fire claimed the lives of 100 patrons and injured 256 people at the Station nightclub in Rhode Island (Gutman et al., 2003). The tragedy of the Station nightclub fire contributed to changes in NFPA regarding fire sprinkler installation and crowd management at nightclubs (Stowell & Murnane, 2013).

In 2003, wildland fires in Southern California contributed to one of the most destructive wildland fire catastrophes in California history. Over 750,000 acres were burned, 4,000 homes damaged, and 24 human fatalities reported, including one firefighter (Blackwell & Tuttle, 2003). Prior to the outbreak of numerous key fires throughout the

region, public officials acknowledged the necessity for preparation due to the prominent number of dead and diseased trees. Multiple years of near-drought conditions contributed to making ignition of fuel easier. Local, state, and federal governmental officials planned for evacuation after intuition and spread of the fire. Powerful Santa Ana winds contributed to rapid westward expansion of fire through the region. Several local, state, and federal agencies responded resulting in the development of fuel reduction projects, increased firefighter staffing, and public education projects (Blackwell & Tuttle, 2003).

Historical terrorist attacks contributed to significant changes to the fire service. The Oklahoma City Bombing and the September 11, 2001, terror attacks forced significant and swift legislative and operational changes to the fire service. Historical losses of life all contributed to changes in incident management that evolved in the aftermath of each tragic event. History provides insight into how to effectively manage disaster (Sylves, 2008). Ineffective management is displayed in the lessons learned from historical events. Modern incident management protocols and practices evolved through a history of failures. Following the terrorist attacks of 9/11, the incident management concepts from southern California and the National Wildfire Coordinating Group (NWCG) contributed to the modern incident management practices know as national incident management system (NIMS). Terrorism is a global problem that could affect any nation at any time (Spindlove & Simonsen, 2010). Terrorism and terrorism response are not localized issues. The normal monopolized response of the fire department has proven ineffective in response to major mass casualty events such as terrorism.

The foundation of modern incident command stemmed from the significant losses witnessed during Wildland fires in southern California. FIRESCOPE was established in the wake of devastating wildfires in southern California in 1970 (FIRESCOPE, 2016). FIRESCOPE is an acronym for Fighting Resources of Southern California Organized for Potential Emergencies. The Laguna fire in 1970 resulted in the destruction of 175,000 acres, 382 structures burned and five casualties (Cal Fire, 2016). The wildland fires resulted in better incident management practices, which were adopted across the state of California. In 1976, the NWCG was formed through the enactment of a memorandum of understanding with between the Department of Agriculture and the Department of the Interior (NWCG, 2016). The NWCG contributed to the development of the federal national interagency incident management system (NIIMS).

On April 19, 1995, a homemade vehicle bomb exploded at the Alfred P. Murrah Federal building in Oklahoma City (Teague, 2004). The force of the explosion destroyed one-third of the structure, causing a major collapse of the damaged structure. The Oklahoma City bombing killed 168 and injured hundreds of people (Teague, 2004). Emergency response professionals identified communication, inter-agency coordination and incident management and command as major obstacles to the response effort (Maningas et al., 1997). Emergency response experts identified resource management and freelancing as issues observed during the Oklahoma City bombing response (Anteau & Williams, 1998). Many volunteers converged on scene without official deployment, contributing to significant accountability and incident management problems. The lessons learned from this event contributed to changes in fire service operations and command.

On September 11, 2001, terrorist cells hijacked several passenger aircraft and coordinated a series of suicide attacks to the World Trade Center, Twin Towers, and the Pentagon (Bergen, 2018). The attacks on 9/11 demolished the World Trade Center resulting in over 3,000 civilian fatalities (9/11 Commission, n.d.). The collapse of the Twin Towers also contributed to the line-of-duty fatalities of 343 firefighters. McKinsey & Company (2002) reported that minimal inter-agency coordination, ineffective and complex resource management, inaccurate accountability, and recording keeping, along with the lack of planning and logistics as significant failures in the overall response effort to the Twin Towers at 9/11. In the aftermath of 9/11, sweeping national legislative efforts contributed to swift and significant changes to incident management and command.

On August 29, 2005, Hurricane Katrina made landfall in the Gulf Coast region of the United States (Pruitt, 2020). Sustain winds ranged from 100 to 130 miles per hour. The hurricane covered a four-hundred-mile area (History, 2014). Hundreds of thousands of residents along the Gulf Coast region of Louisiana, Mississippi, and Alabama were evacuated. Over 1,500 people of the New Orleans area died from the storm (United States House of Representatives, 2006). Most of the City of New Orleans received flood damage. Governmental committees recognized multiple preparatory and response failures for Hurricane Katrina (Koliba et al., 2011). One of the factors contributing to the perspective of failure is a lack of adequate coordination (Koliba et al., 2011). The committee noted poor leadership as a key factor in the failures observed during Hurricane Katrina (U.S. House of Representatives, 2006). The failures observed, and the impact of the hurricane contributed to significant legislative and response changes.

The Super Sofa fire in Charleston, South Carolina on June 18, 2007, resulted in the fatalities of nine Charleston City firefighters (Bryner et al., 2011). The Charleston Fire Department underwent significant changes following the aftermath of the tragedy. Dr. Griffin, a firefighter for Charleston was on scene while the tragedy unfolded. Thereafter, Griffin completed his dissertation in how the City of Charleston Fire Department changed following an incident on June 18, 2007, that involved multiple line-of-duty fatalities. Griffin identified how a line-of-duty death places a fire department organization in a state of crisis. Failure to learn and change following an organizational crisis may result in negative consequences. Griffin researched how a fire department that experienced a line of duty death learned from the critical incident. The Charleston Fire Department and the City of Charleston made significant changes following the fatalities Griffin (2013).

Griffin (2013) argued the importance of fire department operations and leadership meeting the requirements of national best practices. It is often the failure of the organizational leadership of meeting the basic national best practices that result in operational failure and line of duty deaths. Outdated and unsafe practices contributed the line of duty deaths of nine Charleston Fire Department personnel (Griffin, 2013). Organizations must continuously evolve relating to their operational environment to increase survival and success following an incident leading to critical incident (Griffin, 2013; Lähteenmäki et al., 2001). Emergency response incidents continually change, presenting emergency response personnel with significant challenges and danger. Response operations and policy should continually be assessed and adapted to meet

national best practices, industry accepted practices, and national standards. Table 1 (Appendix A) illustrates tragic fire service incidents that have taken place throughout the United States that contributed to immediate and significant policy changes.

Fire Service History and Evolution

The history of the fire service shows the relationship between the fire service and Punctuated Equilibrium. The origin and development of the fire service is in response to a series of major events (Stowell & Murnane, 2013). The reoccurring problem of massive fire incidents contributed to significant changes in fire service response organizations and strict fire prevention laws (Smeby, 2006).

Fire Service History

Prior to the spread of fire that burn several major cities, fire service response and fire prevention law was of little concern to society and governing authorities. Throughout the history of civilization, it is not until there is significant loss of life and property before governing authorities and society develops solutions associated with the risk of fire. Historical trends indicate that society is more reactive than proactive considering life safety and fire safety (Stowell & Murnane, 2013).

The modern fire service evolved over an extended period. One of the first known fire services is dated around 6 CE, at the height of the Roman Empire. Some elements of modern fire service equipment and personnel mirrors the distribution of fire protection measures distributed throughout the city of Rome. The influences of later fire protection measure from 1600s in London contributed to the growth and evolution of the fire service

in the United States. History proves that the development and evolution of the United States fire service is the result of some type of tragic and financially costly event.

One of the first known organized fire protection services originated because of a significant societal problem, fire. It is only after a major fire-related disaster in a major city that the danger of fire is realized (Rainbird, 1976). Fire service organizations and fire prevention measures quickly spawn into existence following a major conflagration. Many fire service experts agree that the first known organized fire service originated at the height of the Roman Empire (Rhodes, 2006). Roman emperor, Augustus, created the Vigiles in 6 CE to mitigate the risk of fire that previously plagued the capital of the empire, Rome (Cartwright, 2016). Rome suffered several major fires prior to the establishment of the Vigiles due to the dense population and highly combustible construction and housing materials (Cartwright, 2016). The first known governmental fire service came into existence because of several major disasters.

Slaves served as the original members of the Vigiles until the ranks were later filled by Roman soldiers. The structure of the Vigiles mirrored that of the army's organizational structure. Several thousand men filled the ranks of the Vigiles (Rainbird, 1976). The Roman authorities divided the city into fourteen patrol zones where they distributed fire protection equipment and cohorts (Cartwright, 2016). The Vigiles exhibited some form of police authority along with the fire protection role (Rainbird, 1976). The Vigiles also patrolled Rome in efforts to prevent fires from spreading through enforcement of laws related to fire prevention regulations (Cartwright, 2016). The Vigiles

protected the capital of the Roman Empire for over four hundred years until the collapse of the empire (Rhodes, 2006).

The fire service did not advance for hundreds of years following the downfall of the Roman Empire. Civilizations continued to converge and form many great cities throughout the ancient world. Following a major fire in London in 1666, the fire service experienced major advancements. In 1666, densely packed homes, dense population, and flammable building material contributed to widespread death and destruction throughout the city of London (Field, 2017). This great fire in London lasted over a period of four days and destroyed much of London, causing significant financial damages (Field, 2017). The insurance industry contributed to the development of the first fire brigades in London (London Fire Brigade, 2018). The insurance industry offered subscriptions to buildings for insurance and fire protection services. Each insurance company developed its own fire brigade that would be sent to the insured properties to minimize damage (London Fire Brigade, 2018).

Influences and procedures from the United Kingdom contributed to the development of the initial United States fire service. Due to the dense populations and combustibility of construction methods and building materials, fire incidents plagued early settlements of Colonial United States. Major fire in Jamestown in 1608 contributed to the development of the first form of fire incident response in the New World (Stowell & Murnane, 2013). Great conflagrations swept through and consumed many communities (Rhodes, 2006). As a result of several fire events, communities established fire protection services, fire prevention laws and building code (Granito, 2003). The original firefighters

consisted of members of the community that would ban together with buckets of water for fire suppression (Rhodes, 2006). Some communities established fire wardens to monitor and enforce strict fire preventive ordnances. Like the Roman Vigiles, fire watch personnel would observe and report any observation of fire.

One of the first known organized fire service organizations began in 1648 in New Amsterdam, a city later renamed New York (Smeby, 2006). Another early form of fire service was a coordinated volunteer fire suppression department, formed in 1736 by Benjamin Franklin in Philadelphia following a widespread fire (Rhodes, 2006). According to Rhodes, the first paid fire department was established in Cincinnati in April of 1853. Governmental-based paid fire departments eventually formed and provided services for major metropolitan areas (Granito, 2003). Due to the lack of federal regulation, much of the early fire services operated at the local level of government (Smeby, 2006). Likewise, the modern fire service mostly operates at the local level of government throughout the United States. Throughout the history of the fire service, each local level of the profession operated independently from each other. This form of autonomy resulted in a wide range of strategies and tactics involving fire department operations (Smeby, 2006). Many fire departments simply refused to help each other due those differences. The modern fire service still exhibits the impact of individualism and solitude regarding operations (Smeby, 2006).

The modern fire service identifies as a paramilitary organization with much of its structure reflective of the military. This tradition was instituted and widely accepted following the Civil War (Rhodes, 2006). Prior to the Civil War, many fire departments

were operated and organized like a business. Many fire service organizations were private companies, paid by the insurance industry (Rhodes, 2006). Early fire service organizations modeled the fire service counterpart in London following the Great London Fire of 1666. Military rank structures influenced the development and organization of the fire service. Servicemen from various wars returned to employment within the fire service while still being recognized according to their rank held during military service (Rhodes, 2006). The modern fire service still operates according to the paramilitary organizational style.

The American Fire Service evolved significantly since the development of early colonies. The original fire suppression personnel were regular members of the community that carried buckets of water with the common goal of preventing the fire from consuming the entire community (Rhodes, 2006). The original members of the "bucket brigade" did not need special skills or training, they only needed the ability to carry buckets of water to the fire and splash the area with the original extinguishing agent. Advancements in technology, construction, and civilizations contributed to needed advancements with fire suppression knowledge, technology, and equipment.

Fire Service Evolution

The evolution of the fire service is connected to the history of civilization and in direct response to losses in life and property. The United States fire service continually evolved throughout its history (Stowell & Murnane, 2013). The fire service began with ordinary citizens working together with neighbors to stop the spread of fire (Smeby, 2006). As the problem of fire and impact of conflagrations grew, the demand upon

government to take the leading of the fire service developed (Smeby, 2006). The growth and development of the fire service was influenced by public demand and expectation. The skills developed and needed for effective fire ground operations spilled into vacant roles of emergency medical service and technical rescue. Public demand significantly influenced the fire service in how the scope of the fire service transitioned from a fire response service to an all-hazard response service. The mission of the fire service evolved from saving property from fire to saving lives and property. The mission of the fire service slightly changed to later include protection of the environment. Stowell and Murnane (2013) argued that the current mission of the modern fire protection profession is "to save lives and protect property and the environment from fires and other hazardous situations" (p. 21).

Fire service equipment evolved from buckets of water to hand pumps for more effective delivery of volume and pressure (Stowell & Murnane, 2013). The Industrial Revolution significantly change the country and American Fire Service. Horse-drawn steam pumpers replaced outdated hand pumps (Stowell & Murnane, 2013). The industrial revolution contributed to changing the environment for fire service personnel. Buildings and construction equipment contributed to the need to change fire ground technologies, strategies and tactics, and fire prevention codes. Automotive apparatus replaced outdated horse-drawn steam engines as society entered the twentieth century (Stowell & Murnane, 2013).

Significant advancements in the twentieth century contributed to the rapid evolution of fire service. The public need and demand for rapid emergency medical care

quickly expanded across the nation (Stowell & Murnane, 2013). Many fire departments across the nation expanded the scope of the fire service to include emergency medical response to meet the needs of their communities and customers (Janing & Sachs, 2003). Public demand for rapid prehospital emergency medical care contributed to the rapid advancement Emergency Medical Services (EMS) throughout the United States (Janing & Sachs, 2003). Like the fire service, much of the modern emergency management services (EMS) was influenced by military war time practices (Bass, 2015). The role of the fire service in rescuing and rendering aid to fire victims contributed to the development and transition of the fire service to include EMS services (Janing & Sachs, 2003).

The development of the major highways across the nation contributed growing public concern of significant injury and death cause by high-speed traffic collisions (Janing & Sachs, 2003). The fire service contributed to many initial advancements in the origin story of EMS development (Bass, 2015). The fire service evolved alongside EMS to provide rapid prehospital emergency care. A reduction of the number of fires and the increased demand for additional services is contributing factors for fire service evolution into the EMS scope (Janing & Sachs, 2003). According to Janing and Sachs, approximately 85% of over 43,000 fire departments across the United States provide EMS response and services.

The scope of the fire service expanded to include highway and roadway response due to the types of traffic incidents that occur. Traffic incidents include vehicle breakdowns, hazardous material spills, transport spills, lane blockages, severe weather,

vehicle crashes and vehicle fires (Taylor, 2008). The familiarity of the fire service with victim rescue from fire scenes contributed to public demand and expectation for fire service expansion into technical rescue. Since 1998, an average of approximately 6 million vehicle crashes occurs throughout the United States annually (Sweet, 2011). Vehicle extrication and rescue is the most common type of technical rescue performed by fire service personnel (Collins, 2003). According to the United States Department of Transportation, thousands of new chemicals enter transportation and commerce annually (US Department of Transportation, 2019). Vehicle crashes involving hazardous material transport vehicles and cargo spills of chemicals in transit required the skilled response from the fire service. Traffic incidents accounted for approximately 14% of the 31.6 million fire department responses in 2014 (Ahrens & Evarts, 2017).

Traffic Incident Management

Vehicle collisions plague society. “Vehicle collisions have both immediate and long-term economic effects on the individual and society” (United States Fire Administration, 2008, p. 89). Traffic incidents contribute an estimated 25 percent of overall traffic congestion across the United States roadway (Dougald et al., 2016). The traffic incident management handbook by Owens et al. (2010, p. 7) defined a traffic incident as “any non-recurring event that causes a reduction of roadway capacity or an abnormal increase in demand. Such events include traffic crashes, disabled vehicles, spilled cargo, highway maintenance and reconstruction projects, and special non-emergency events.”

Traffic incidents cause a significant negative impact upon society. In 2014, the reported financial impact for traffic congestion totalled around $160 billion in economic losses (Dougald et al., 2016). Another report estimated the financial impact to range from $83 billion to $124 billion annually (Levy et al., 2010). The EPA reported that an estimated amount of 2.8 billion fuel was wasted because of traffic congestion in 2007 (Owens et al., 2010). The financial burden of traffic incidents is a significant societal problem at every level of government.

Traffic incidents pose danger to the lives of emergency response personnel and civilians caught within the perimeters of the traffic incident and related congestion. The risk of suffering injury or death from a secondary crash significantly increases for emergency first responders and roadway commuters while operating, traveling, or resting within the perimeters of a primary roadway incident (Yang et al., 2014). Studies indicate that ancillary crashes are estimated to contribute to 18% of traffic fatalities (Owens et al., 2010). Secondary crashes are vehicle collisions that occur as an indirect result of a primary traffic incident (Goodall, 2017). A secondary crash in the vicinity of the initial traffic incident, poses significant risk to responders and civilians located within the traffic incident area (Dougald et al., 2016). Many of the secondary crashes occur with the primary traffic incident's queue, contributing to civilian injuries and deaths (Goodall, 2017). Studies indicate that improvement in all areas of traffic incident management reduces the probability of secondary crashes (Owens et al., 2010).

Over 70 fire service personnel died because of being stuck by another vehicle during a secondary crash from 1996 to 2010 (Kruger, 2012). According to national data

sources, struck-by vehicle collisions contribute to five firefighter fatalities each year (Kruger, 2012). A significant number of emergency response personnel are injured and killed while working at roadway incidents (VFIS, 2011). Other emergency responders that contribute to national traffic fatality statistics include police officers, EMS personnel, tow and recovery, and transportation personnel. According to the National Traffic Incident Management Coalition (NTIMC), traffic collisions and secondary struck-by crashes are the leading causes of on-duty injuries and fatalities for law enforcement, fire service personnel and tow and recovery personnel (Owens et al., 2010).

The impact of traffic congestion and ongoing concern for safety on United States roadways received national attention from transportation professionals (Dougald et al., 2016). Modern traffic incident management practices, policies, and standards are the result of two decades of contributions from public and private organizations that sought solutions to solve concerns from the impact of traffic incidents (Dougald et al., 2016). The progression of traffic incident management took a similar track of the national incident management system. Several organizations and studies contributed to the evolution of traffic incident management.

In 1990, the American Trucking Association Foundation (ATAF) published one of the first documents linked to effective traffic management in the U.S. (Owens et al., 2010). The ATAF joined forces with the Federal Highway Administration (FHWA) to help create and manage the national incident management coalition (NIMC). Many NIMS partners converged to form the national conference on traffic incident management in 2002 with the goals to improve traffic incident management at the national level

(Owens et al., 2010). The national conference on traffic incident management resulted to the development of the American Association of State Highway Transportation Officials (AASHTO) (Owens et al., 2010).

The AASHTO sought to help develop a national traffic incident management organization, which resulted to the establishment of the National Traffic Incident Management Coalition (NTIMC) in 2004 (Helman, 2004). The NTIMC was the first organization completely focused on incident management on roadways (Vasconez, 2013). The NTIMC developed a national unified goal (NUG) for traffic incident management with the objectives of responder safety, safe, quick clearance, and prompt, reliable interoperable communications (Dougald et al., 2016). In 2005, the United States congress authorized a second strategic highway research program (SHRP 2), which contributed to the creation of the national traffic incident responder training program (Owens et al., 2010).

The SHRP2 research established the best practices of traffic incident management. In 2012, the strategic highway research program 2 (SHRP 2) developed a national, multidisciplinary traffic incident management process and training titled training of traffic incident responders (Dougald et al., 2016). The International Association of Fire Chiefs, the International Association of Chiefs of Police, the National Volunteer Fire Council, the Towing and Recovery Association of America, and the International Association of Directors of Law Enforcement Standards and Training endorsed the training (Dougald et al., 2016). According to the Federal Highway

Administration National, 2,142 TIM responders were trained in Louisiana as of March 23, 2015 (Dougald et al., 2016).

Responder Safety Learning Network

Cumberland Valley Volunteer Firemen's Association created the Emergency Responder Safety Institute, which provides the responder safety learning network (Emergency Responder Safety Institute, 2018a). The mission of the responder safety learning network (RSLN) is to improve the safety of the nation's emergency responders. The mission is achieved by engaging in and promoting the development of educational materials and support for safety training. The RSLN promotes the national unified goal (NUG) for traffic incident management (TIM). The RSLN encourages the implementation of TIM teams. The RSLN works toward keeping emergency responders current on national regulations and trends for safe roadway incident operations (Emergency Responder Safety Institute, 2018a). All content on the responder safety learning network is developed in cooperation with and vetted by nationally recognized consulting specialists in the many aspects of traffic incident management.

Consensus Standards

A lack of standardized qualifications between jurisdictional and disciplinary lines lead to the development and publication of a consensus standard aimed at traffic incident management (Wieder, 2017). NFPA 1091: Standard for traffic control incident management professional qualifications was developed in response to a recognized need for safe operations in traffic control incident management (Wieder, 2017). Consensus standards are documents that have been developed by committees to represent a

consensus expert opinion on methods and procedures (Lemons, 2013). traffic incident management was added to the 2018 edition of NFPA 1500: standard on occupational safety, health and included in Chapter 9 (NFPA, 2018b). Chapter 9: Traffic incident management of NFPA 1500: Standard on occupational safety, health and wellness program was added to further address traffic incident management and safety at roadway incidents (NFPA, 2018b).

The NFPA developed publications such as guides, codes, and standards, with the objective of eliminating fatality, injury, property, and economic loss due to fire, electrical, and other types of hazards (NFPA, 2018a). A standard is a document, established by consensus that provides rules, guidelines, or characteristics for activities or their results. The standards provided by the NFPA are voluntary unless adopted by the authority having jurisdiction (Stowell et al., 2016). Standards are developed through a consensus process involve technical committees and industry accepted professionals (NFPA, 2018b). The NFPA standards are universally accepted and espoused because they are established using an open, consensus-based process with a variety of professional expertise (Emergency Response Safety Institute, 2015).

The NFPA consensus standards development process is approved and accredited by the American National Standards Institute (ANSI, 2018). The ANSI accredits standards developers. The ANSI is a “private non-profit organization that oversees the development of voluntary consensus standards for products, services, processes, systems, and personnel in the United States” (Wikipedia, 2021, par. 1). The ANSI establishes the procedures that are the basis for the development of American national standards. The

ANSI also accredits standards developing organizations that operate in accordance with ANSI procedures, and approve their draft standards provided they are developed in accordance to ANSI processes (ANSI, 2018).

Development of NFPA 1091

The NFPA 1091: Standard for traffic control incident management professional qualifications was developed in response to a recognized need for safe operations at traffic incidents (Wieder, 2017). A significant number of emergency response personnel were injured and killed while working at traffic incidents. (VFIS, 2011). The USFA (2018) recognized that the occurrence of firefighter injuries and fatalities because of roadway incidents is an increasing problem that needed to be mitigated. Prior to the development of NFPA 1091, response experts recognized a nationwide lack of development, implementation, and training on traffic incident management policies, practices, and standards as a contributing factor for traffic incident LODDs (Emergency Responder Safety Institute, 2018b). NFPA 1091 was developed in response for the need for improvements in safe operations at traffic incidents (NFPA, 2018b).

Concepts from traffic incident management training programs contributed to elements of NFPA 1091. A technical committee of traffic incident experts guided the development of NFPA 1091 (Emergency Response Safety Institute, 2015). The NFPA published the 2015 edition of NFPA 1091 in December of 2014 and was immediately approved as an American national standard (NFPA, 2018a). NFPA 1091 is a multi-disciplinary document that includes job performance requirements (JPRs), written by and for traffic incident responders. The 2015 edition is the first publication of NFPA 1091:

Standard for traffic control incident management professional qualifications. Standards of the NFPA are revised and updated every three to five years (NFPA, 2018b). NFPA 1091 promotes safer operations through the development of minimum job performance requirements (JPRs) for traffic control incident management personnel (TCIMP), to ensure emergency responders are prepared to perform the duties of traffic incident management (Emergency Response Safety Institute, 2015).

Development of NFPA 1500: Chapter 9

NFPA 1500: Standard on occupational safety, health and wellness program was first developed in 1987 following the recognition for the need of an occupational safety and health program for the fire service (NFPA, 2018b). Data obtained from national firefighter LODDs, injury and illnesses statistics contributed to various revisions of NFPA 1500 since its original publication. The Data Analyses and Research Division of NFPA and firefighter investigation reports from NIOSH provided the data that contributed to changes, updates, and additions of NFPA 1500 to reflect the most current best practices (NFPA, 2018b). In the 2018 edition of NFPA 1500, Chapter 9: Traffic incident management was included to reflect the most current reference of best practices for roadway safety and wellbeing (NFPA, 2018b).

Elements of NFPA 1091

The NFPA published the first edition of NFPA 1091: Standard for traffic control incident management professional qualifications on December of 2014 and was immediately approved as an American national standard through ANSI (NFPA, 2018a). NFPA 1091 was developed in response to a recognized need for safe operations in traffic

control incident management (Wieder, 2017). Elements of the national traffic incident management responder training program contributed to the job performance requirements outlined throughout NFPA 1091. The definition of traffic incident management is, “a planned and coordinated multi-disciplinary process to detect, respond to, and clear traffic incidents so that traffic flow may be restored as safely and quickly as possible” (FHWA, 2013, par. 1). NFPA 1091 promotes safer operations at traffic Incidents through the development of minimum job performance requirements and to ensure emergency responders are prepared to perform the duties of the traffic control (Emergency Response Safety Institute, 2015).

NFPA 1091 is divided into four chapters, Chapter 1: Administrative, Chapter 2: Referenced publications, Chapter 3: Definitions, and Chapter 4: Traffic control incident management. Chapter 3: Definitions is not discussed in this section; the definitions are included in the definitions section of Chapter 1 of this dissertation. Chapter 2: Referenced publications contain of list of references of other NFPA standards.

NFPA Chapter 1: Administration

Chapter 1: Administratio*n*, of NFPA 1091 identifies the scope, purpose and application of NFPA 1091. The scope of NFPA 1091 identifies the minimum job performance requirements (JPRs) for traffic control incident management personnel (NFPA, 2014). All traffic incident responders, regardless of discipline, are covered under the scope of this standard (Wieder, 2017). Traffic incident responders include but are not limited to law enforcement, fire service personnel, tow and recovery, EMS, public works, and transportation personnel. This multi-disciplinary publication includes JPRs, written

by traffic incident responders and for traffic incident responders (Emergency Response Safety Institute, 2015).

The purpose of NFPA 1091 is to outline the minimum JPRs for service as traffic control incident management personnel and to define traffic control management personnel (NFPA, 2014). Another purpose of this publication is to ensure that personnel are qualified to serve as traffic incident management personnel. NFPA 1091 requires traffic control management personnel to remain current with the expertise and competences necessary to implement the JPRs outlined throughout this standard (NFPA, 2014). The application of this standard is directed to traffic control incident management personnel. The intent of NFPA 1091 is that the JPRs of NFPA 1091 shall be achieved concurrently with requirements and oversight from the authority having jurisdiction (AHJ) and in accordance with all applicable NFPA standards (NFPA, 2014).

NFPA Chapter 4: Traffic Control Incident Management

Chapter 4 contains the JPRs or tasks that traffic incident response personnel should be able to perform in order to carry out the duties of traffic control incident management (Wieder, 2017). NFPA 1091 outlines nine job performance requirements. Candidates must meet all nine JPRs requisite knowledge and requisite skills as defined in Chapter 4 to be qualified as a traffic control incident management personnel (NFPA, 2014). Executing traffic control incident management activities is the primary function of traffic control incident management personnel.

Job Performance Requirement 1

The first JPR is perform a preliminary scene size up and establishing command of the traffic incident (NFPA, 2014). This task is essential for recognizing potential hazards and identifying additional resource needs to effectively manage the incident. Identifying potential hazards and needed resources informs subsequent responders about the conditions on scene of the traffic incident. Scene size up is a systematic process of gathering information and evaluating the situation. An effective scene size-up will help the incident commander determine the resources needed to mitigate the hazards and achieve the objectives of the incident action plan.

Job Performance Requirement 2

The second JPR requires appropriate responder vehicle positioning at a traffic incident (NFPA, 2014). Appropriate vehicle positioning is essential for the establishment and management of a traffic incident management area (TIMA). Proper vehicle positioning placement improves the capacity of approaching motorists to identify the emergency vehicle and subsequently the emergency scene (Owens et al., 2010). The primary goal of vehicle placement and incident scene emergency lighting is to protect all relevant persons (including the victims, responders and other personnel), while ensuring traffic flow that is as safe as possible (Owens et al., 2010). An example of this task is placing a fire apparatus directly upstream from the TIMA, between the TIMA and oncoming traffic flow. This procedure blocks people located within the TIMA from the hazards of approaching vehicles.

Job Performance Requirement 3

The third JPR is the establishment of a TIMA with temporary traffic control (TTC) devices and approved personal protective equipment (PPE) for personnel (NFPA, 2014). Temporary traffic control devices include approved traffic cones and road flares. The primary function of TTC is to ensure the effective and safe flow of traffic near a TTC zone while protecting all parties and equipment (Federal Highway Administration, 2009). Temporary traffic control devices are essential for directing vehicles away from and around a TIMA safely and effectively. Personnel operating at a TIMA are required to don PPE, including high visibility traffic vests for safety. The wearing of high-visibility safety apparel by traffic incident responders is a key component of increasing responder safety (Owens et al., 2010). Emergency and incident responders at the traffic incident scene should wear high-visibility safety apparel that meets the performance requirements of the ANSI/ISEA 207-2006 (Federal Highway Administration, 2009).

Job Performance Requirement 4

The fourth JPR includes the deployment of advanced warning for approaching traffic (NFPA, 2014). The advance warning area is a section of the roadway where advance warning devices are positioned to signal drivers as they approach a forthcoming incident area (Owens et al., 2010). The advance warning devices and practices inform drivers about the upcoming traffic incident area that contribute to the reduction of secondary crashes (Federal Highway Administration, 2009). Many secondary crashes at a traffic incident occur at the transition area at the end of a queue. Traffic incident management personnel deploy advance warnings with the goal of preventing a secondary crash.

Job Performance Requirement 5

The fifth JPR requires traffic incident responders to operate within the incident command system, including unified command (NFPA, 2014). Incident command exemplifies a function and is responsible for all facets of traffic incident response (Owens et al., 2010). Life safety, incident stabilization, and property conservation are the three major priorities of command. Life safety protects traffic incident responders, victims, and the public. Incident stabilization minimizes the impact of the incident to the surrounding area and ensures effective deployment and use of resources. Property conservation reduces damage to property and the environment while concurrently achieving the objectives of the mission. For many incidents, the first arriving responder assumes to role of incident command (Owens et al., 2010).

A single incident command function should be utilized when there is no jurisdictional or functional agency overlap. The unified command structure is suggested when the incident involves multiple responding agencies, and each has a functional responsibility for a major tactical activity related to incident response (Owens et al., 2010). Due to the complexity of many traffic incidents, the unified command function is recommended.

Job Performance Requirement 6

The sixth JPR requires the establishment of scene control. Non-involved persons should be prevented from entering the TIMA (NFPA, 2014). The traffic incident scene is not safe for bystanders or media. People are naturally attracted to observe any type of traffic incident. People are fascinated with the events that occur at an emergency traffic

incident, such as vehicle crash and rescue or vehicle fire. It is important to ensure the safety of bystanders by prohibiting them from scene access (Urling, 2018). The incident commander or unified command system should direct media to an agreed upon and safe area for public information relations.

Job Performance Requirement 7

The seventh JPR involves managing temporary traffic control measures (NFPA, 2014). Traffic control incident management personnel continually assesses and reassesses the TIMA. Ongoing assessment of the scene is essential for management and safety considerations. Temporary traffic control measures may need to be adjusted upon changes in scene conditions. Advance warning applications should be monitored and readjusted to stay upstream from the traffic queue. Modifications of temporary traffic control plans may be necessary because of a change in conditions or the presentation of better procedures to competently handle road users (Federal Highway Administration, 2009).

Job Performance Requirement 8

The eighth JPR is adapt the TIMA to the hazard (NFPA, 2014). Hazards include fire, explosions, secondary crashes, or hazardous materials. A release of hazardous materials into other lanes of travel will require additional lane closures and adjustments to temporary traffic control devices. The TIMA and TTC devices is dependent on the size and location of a fire or other hazards. A variety of hazardous materials are transported throughout the national transportation system (Bierling, 2011). Approximately 50 transportation hazardous material incidents occur throughout the United States daily

(Bierling, 2011). Traffic incident responders must be cognizant of the potential for hazardous material release.

Job Performance Requirement 9

The final JPR is demobilizing resources from the TIMA (NFPA, 2014). Demobilizing resources is considered a dangerous time for traffic incident responders. At this stage, all temporary traffic control devices, resources, and personnel are removed from the scene. Traffic is returned to normal, pre-crash conditions following the removal of incident resources.

Elements of NFPA 1500: Chapter 9

Chapter 9 of NFPA 1500 is divided into three sections, emergency operations at traffic incidents, placement of apparatus and warning devices, and use of apparatus as a blocking device. The first section states that fire departments shall establish implement and enforce standard operating procedures that address responder operations in roadways, ensure personnel are adequately trained on traffic hazards and safety, and prepare to work concurrently with other response agencies (NFPA, 2018b). The second section states that apparatus and warning devices shall be deployed to effectively protect response personnel from traffic and warn approaching traffic of the traffic incident (NFPA, 2018b). The final section the proper placement of response apparatus, traffic control devices, personnel placement, and proper personal protective equipment (NFPA, 2018b). Chapter 9 states that, “Personnel assigned to traffic control shall receive training that is commensurate with their duties and in accordance with NFPA 1091” (NFPA, 2018b, p. 32).

Fire Service Injury, Fatality Reports, and Investigations

There are over 1 million fire service professionals protecting the citizens and property throughout the United States from fire (NIOSH, 2018). According to national statistics, approximately 80 to 100 fire service professionals die annually in the line of duty.

NIOSH Investigations

In 1998, the United States Congress appropriated funds to the NIOSH to conduct independent firefighter line-of-duty fatalities through the NIOSH firefighter fatality investigation and prevention program (FFFIPP) (NIOSH, 2018). The NIOSH investigation reports conclude with recommendations for ways to prevent firefighter deaths and injuries. The NIOSH has investigated approximately 40 percent of firefighter fatalities since the program began (NIOSH, 2018). The goal the FFFIPP is to learn from firefighter fatalities to prevent similar events (NIOSH, 2018). The NIOSH participates in several NFPA and other consensus standard committees. Key findings from NIOSH investigations to help influence change and improve firefighter safety and health (NIOSH, 2018).

The NIOSH firefighter fatality investigation and prevention program conduct investigations following a firefighter line-of-duty injury or death (NIOSH, 2018). The NIOSH investigative procedure following a five-step process. Step 1 begins with notification about a firefighter fatality from the United States Fire Administration, Fire Department representatives, the International Association of Fire Fighters (IAFF), State Fire Marshal's Office, or Media coverage (NIOSH, 2018). In step 2, NIOSH determines

whether they will investigate the fatality. In Step 3, NIOSH conducts a site visit to gather information from reports, documents, and photos. Once the investigation is complete, NIOSH drafts the report in step 4. NIOSH then disseminates the information in step 5. All NIOSH investigative reports and findings are made public and made available for training and educational purposes (NIOSH, 2018).

Emergency Responder Safety Institute

The Cumberland Valley Volunteer Firemen's Association created the Emergency Responder Safety Institute with the goal of reducing on-duty fatalities and injuries impacting traffic incident responders. Members of the Institute include "trainers, writers, managers, government officials, technical experts and leaders in the public safety" (Emergency Responder Safety Institute, 2018a, par. 1). The Emergency Responder Safety Institute develops educational material promoting the national unified goal for traffic incident management. The Emergency Responder Safety Institute provides information regarding near miss reporting, struck-by incidents, and line-of-duty news.

According to the responder safety learning network, the lack of development, implementation, and training on traffic incident management SOPs is a contributing factor for traffic incident LODDs (Emergency Responder Safety Institute, 2018). NFPA 1091 promotes safer operations with minimum JPRs for traffic control incident management personnel (TCIMP) and can be used for help establishing organizational policies and procedures related to traffic incident management (Wieder, 2017). The Emergency Responder Safety Institute reported the following SOP recommendations for Traffic Incident Management:

1. Mandate the wearing of high visibility apparel when operating on or near the roadway.
2. Require the implementation of the incident management system (ICS) at roadway incidents.
3. Specify how to set up and terminate a traffic incident management area (TIMA), also called a temporary traffic control zone (TTCZ) including advanced warning, transition areas, and a protected work area.
4. Define apparatus blocking procedures for response to roadway incidents.
5. Set policy regarding direct response to roadway incidents in privately owned vehicles (POVs).
6. Describe expectations for safety practices when operating on roadways, including scene control, emergency lighting deployment, situational awareness, and move it or work it decisions.
7. Spell out protocols that your personnel will be expected to follow when conducting manual traffic control.
8. Account for how personnel are expected to operate in the most common special situations, including vehicle fires, hazardous material incidents, crash investigations, and medical helicopter landings.
9. After action reviews following a traffic incident (Emergency Responder Safety Institute, 2018).

International Association of Fire Chiefs' Near Miss

Several agencies and organizations conduct firefighter injury and fatality investigations, but many fire service fatalities and injuries go unreported. Firefighters are often exposed to hazardous conditions in the normal course of their duties. Many firefighters across the United States are nearly injured and killed in the line of duty. The International Association of Fire Chiefs developed the near miss reporting program that collects and shared firefighter near-miss information (IAFC, 2018). The Department of Homeland Security and the Fireman's Fund Insurance Company developed the near miss program in 2005. The mission of the near miss program is to reduce firefighter and EMS injury and death through education and awareness of local lessons learn (IAFC, 2018). Near miss reports are submitted anonymously and used to develop training programs.

Additional sources report firefighter injury and fatalities. Additional sources include NFPA, FEMA, news and media, and fire service professional publications. This study will focus on struck-by traffic incident fatalities investigated and reported by near miss, Emergency Responder Safety Institute, NIOSH, NFPA and other creditable sources and publications.

Firefighter Stuck-By Vehicle Fatalities Since 2000

The literature presented in this section will review firefighter "struck-by" fatality incidents that occurred from 2000 through the present time. According to the literature, several firefighter fatalities include being struck-by fire department vehicles. The extent of this study focuses on fatalities by non-fire department vehicles. Information obtained from sources exclude struck-by incidents involving fire department apparatus. Data

sources regarding firefighter struck-by vehicle fatalities include NFPA, NIOSH, FEMA, near miss, Emergency Responder Safety Institute, news publications, media outlets, fire service professional publications, and other creditable sources reporting a firefighter struck-by vehicle fatality. The fatality reports were analyzed to attempt to understand why struck-by vehicle fatalities continue to occur during traffic incidents.

NFPA Reports of Firefighters Killed when Struck-By Vehicles 2000-2013

According to the National Fire Protection Association, approximately 61 United States firefighters were killed when struck-by a vehicle from 2000-2013 (Fahy, 2014). An average of up to five firefighters are killed annually due to a struck-by incident. During this period, 16 firefighters were struck by fire department vehicles and 45 firefighters were struck by non-fire department vehicles (Fahy, 2014). A higher number of firefighters died from being struck by non-fire department vehicles. Most of the struck-by fatalities occurred at non-fire ground incidents. Although all struck-by incidents are of significant concern, struck-by incidents involving fire department vehicles are beyond the extent of this study. The primary focus of this study is reviewing struck-by incidents involving non-fire departmental vehicles at a traffic incident.

According to Fahy (2014), failure to deploy industry-accepted traffic incident management practices contributed to the struck-by vehicle fatalities listed in the NFPA report. Several struck-by vehicle victims failed to wear personal protective equipment with approved reflective material. Researchers indicated that fire department personnel did not deploy temporary traffic control devices such as cones, road flares and signal

devices. The lack of traffic control, traffic incident management and the lack of advanced warning are cited as contributing factors to the line-of-duty deaths (Fahy, 2014).

NIOSH Reports of Firefighters Killed when Struck-By Vehicles

This section will indicate the review of non-fire department vehicle struck-by fatalities of firefighters that occurred since 2000 to present day. The NIOSH conducts firefighter fatality investigations through the firefighter fatality investigation and prevention program. The NIOSH performs investigations of firefighter line-of-duty fatalities to devise recommendations for preventing future casualties and injuries (NIOSH, 2018). The NIOSH provides reports of the findings of the investigations.

I conducted a search through the firefighter fatality investigation and prevention program database for firefighter fatalities and found 649 fatality reports between 1984 to 2017. The researcher only reviewed NIOSH reports of struck-by fatalities at traffic incidents by non-fire department vehicles. All other reports were excluded for review, as they did not fall within the parameters of this study. The NIOSH does not investigate and report all struck-by fatalities. The NIOSH elects to investigate and report firefighter fatalities according to the NIOSH criteria identified early in this chapter. From 2000 to 2017, the NIOSH provided investigations and reports for 17 firefighter struck-by vehicle fatalities. Of the 17 firefighter fatalities, 12 involved volunteer firefighters and five career firefighters. One of the career firefighter incidents were off duty personnel that stopped to help on duty firefighters at a traffic crash. The researcher reviewed five NIOSH investigative reports involving volunteer firefighters and four NIOSH investigative

reports that included on-duty career firefighters. Table 3 (Appendix B) illustrates struck-by vehicle fatalities that have taken place throughout the United States since 2000.

New York – January 9, 2001

On January 9, 2001, a 48-year-old male volunteer firefighter was struck and killed by an automobile while directing traffic at a vehicle crash (NIOSH, 2001). The NIOSH investigators developed several recommendations that should help mitigate the risk of a similar occurrence and outcomes in the future.

The NIOSH investigators concluded that fire service organizations should establish, and adhere to, a reinforced standard operating procedure for traffic incident response. Standard operating procedures can establish adequate traffic control measures. Traffic incident response SOPs should include positioning fire department apparatus, lane closures, securing the work area, PPE, clearing lanes, and returning the scene back to normal conditions (NIOSH, 2001).

The NIOSH investigators recommended that emergency response personnel should receive training in proper procedures and hazards while operating at a traffic incident (NIOSH, 2001). This includes deploying proper signaling devices such as cones and flares to direct traffic around a work area. The NIOSH recommends that traffic management personnel wear appropriate reflective clothing.

The NIOSH investigators recommended that fire departments should develop, implement, and enforce pre-incident plans for traffic control at emergency roadway incidents (NIOSH, 2003a). Curves, hilltops, sloped areas, and high traffic areas of the roadway are known to be more dangerous than others. Fire department personnel should

work with other emergency response agencies to identify problem areas and develop plans to mitigate the hazards during an emergency traffic incident response.

Mississippi – March 20, 2002

On March 20, 2002, a 19-year-old male volunteer firefighter responded to a vehicle crash along an interstate highway (NIOSH, 2003b). The firefighter was struck by an automobile and launched into traffic, subsequently being struck by another vehicle. The victim was transported to the hospital and pronounced dead. The NIOSH investigated this struck-by fatality and reported several recommendations to prevent a reoccurrence of a similar outcome.

The NIOSH recommended that fire service organizations should establish, adhere to, and reinforce SOPs regarding emergency operations at traffic incidents. The NIOSH recommended implementing traffic incident policies that includes incident command, apparatus placement, lane closures, securing the work area, proper PPE, clearing lanes, and returning the scene back to normal conditions (NIOSH, 2003b).

The NIOSH recommended that the fire service personnel should establish a protected work area prior to beginning on-scene operations (NIOSH, 2003b). The NIOSH recommended placing a fire department apparatus between oncoming approaching traffic on the scene, also known as a “block” procedure. The NIOSH also recommended limited POV response due to the lack of emergency lighting and inability to carry emergency equipment and provide downstream protection. Finally, the NIOSH recommended that fire department should develop, implement, and enforce pre-incident plans for traffic control at emergency roadway incidents (NIOSH, 2003b). The NIOSH reiterated that

curves, hilltops, and other areas of the roadway are known to be more dangerous than others and that fire department personnel should work with other emergency response agencies to identify problem areas and develop plans to mitigate the hazards during an emergency traffic incident response.

Minnesota – July 1, 2002

On July 1, 2002, A 28-year-old male volunteer firefighter was struck and killed by a vehicle while operating at the scene of a traffic incident (NIOSH, 2003b). The fire department responded to an automobile fire on the shoulder of the interstate. The victim was standing in front of the incident vehicle prior to being struck. The fire department apparatus positioned in front of the incident vehicle. A vehicle traveling toward the incident was hit from behind by another vehicle, causing the vehicle to slide toward the location of the victim. The NIOSH investigated this struck-by fatality and reported several recommendations to prevent a reoccurrence of a similar outcome.

The NIOSH recommended that fire department apparatus should be positioned to protect firefighters from approaching traffic (Cudaback, 2005). Positioning the fire apparatus between approaching traffic and the incident scene will create a barrier against approaching traffic. Firefighters should remain within the protected area at all times of the incident.

Once again, the NIOSH recommended that fire departments should develop, implement, and enforce pre-incident plans and work with law enforcement and other agencies for traffic control at emergency roadway incidents (NIOSH, 2003b). Each traffic

incident response agency should be aware of the role and responsibilities of the other to effectively management the incident.

The NIOSH recommended that fire departments develop, implement, and enforce SOPs regarding “apparatus positioning, lane closures, methods to establish a secure work area, clearing traffic lanes, releasing the incident scene back to normal operation, and wearing appropriate protective clothing at all times including the use of high-visibility reflective apparel when operating in or near moving traffic” (NIOSH, 2001, par. 9). The NIOSH recommended reviewing resources from www.respondersafety.com to help with the development of traffic incident management SOPs. The NIOSH recommended that responders should receive training on proper procedures and hazards associated with traffic incident response (NIOSH, 2001).

Texas – March 18, 2003

On March 18, 2003, a 20-year-old male volunteer firefighter was struck and killed by a tractor-trailer truck on an interstate highway (NIOSH, 2004a). The firefighter responded to a motor vehicle crash on the shoulder of the roadway. The firefighter responded on scene in his POV and parked on the shoulder of the road, across from the original crash. The victim exited his POV and began to cross the lanes of the interstate toward the original incident location. As he entered the roadway, he was struck and killed. The NIOSH investigated this struck-by fatality and reported several recommendations to prevent a reoccurrence of a similar outcome.

The NIOSH recommended that fire departments should develop, implement, and enforce SOPs for responding to roadway incidents, including SOPs for parking vehicles

on the same side of the roadway as the traffic incident (NIOSH, 2004). The recommended SOPs should include parking on the same side, apparatus positioning, lane closures, securing a work area, clearing traffic lanes, returning the scene to normal conditions, and PPE (NIOSH, 2004). The NIOSH recommended that fire departments should ensure response personnel received adequate training on procedures and hazards for traffic incident response (NIOSH, 2004).

The NIOSH recommended that fire department apparatus should be positioned to protect firefighters from approaching traffic (NIOSH, 2004). Positioning the fire apparatus between approaching traffic and the incident scene will create a barrier against approaching traffic. Firefighters should remain within the protected area at all times of the incident.

The NIOSH recommended that fire departments should also develop, implement, and enforce pre-incident plans and work with law enforcement and other agencies for traffic control at emergency traffic incidents (NIOSH, 2004). Each traffic incident response agency should be aware of the role and responsibilities of the other to effectively management the incident.

The NIOSH recommended that fire departments should ensure that firefighters wear PPE, including appropriate high-visibility clothing such as approved reflective vest. NIOSH recommended developing SOPs regarding responses conducted in POVs.

Minnesota – October 27, 2003

On October 27, 2003, a 49-year-old male volunteer assistant chief was struck and killed by a vehicle at the scene of a smoke investigation (NIOSH, 2004b). The fire

department responded to the scene of a roadway construction for a report of smoking construction equipment. The fire department remained on site, waiting for a representative for the construction company. A vehicle failed to turn at the detour as ran into the scene, striking the victim. The victim was declared dead on scene. The NIOSH investigated this struck-by fatality and reported several recommendations to prevent a reoccurrence of a similar outcome.

The NIOSH recommended that fire departments position fire apparatus to protect firefighters from traffic (NIOSH, 2004). Fire apparatus should be positioned to create a physical barrier and firefighters should remain within the protected area.

The NIOSH recommended fire departments should develop, implement, and enforce SOPs for safe practices while responding to incidents near traffic (NIOSH, 2004b). Standard operating procedures should include positioning apparatus to provide a physical barrier between responders and moving traffic, operating defensively, methods to establish a secure work area, releasing the scene back to normal operation, and wearing appropriate personal protective apparel. The NIOSH recommended fire departments should train personnel in safe procedures for operating in or near moving traffic (NIOSH, 2004b).

The NIOSH recommended that fire departments should ensure that firefighters wear PPE, including appropriate high-visibility clothing such as an approved reflective vest when operating near traffic (NIOSH, 2004). High visibility vest help motorists see and avoid emergency response personnel operating near traffic.

South Carolina – November 13, 2010

On November 3, 2010, a 23-year-old paid fire service professional died after being ran over by a civilian vehicle while fighting a brush fire along the side of a major interstate (NIOSH, 2012). While fire suppression apparatus and personnel positioned on scene, a car and van were traveling toward towards the apparatus. The van ran into the rear of the car that was in front and in the same lane. The car then traveled onto the shoulder of the roadway between the apparatus and a guardrail, striking the victim and another firefighter. The victim was later pronounced dead at the hospital.

The NIOSH investigated the incident and reported several key recommendations for fire departments (NIOSH, 2012). The NIOSH investigators key recommendations are:

1. Develop pre-incident plans regarding response protocols, scene safety, and traffic control for roadway emergency work zones in conjunction with public safety agencies, traffic management organizations and private sector responders.
2. Develop, train on, and enforce SOPs for roadway incidents that include response protocols for all possible types, locations, and durations of emergency roadway incidents that may occur within the department's jurisdiction.
3. Ensure that all members receive training for responding to roadway incidents, with specific instruction on positioning apparatus to protect emergency workers from oncoming traffic.
4. Develop and train members on a situational awareness program that addresses hazards specific to working in a roadway emergency work zone.

5. Fire departments should ensure that a thorough scene size-up is conducted, incident command is established, and risks are assessed and managed throughout a roadway incident.
6. Fire departments should ensure that SOPs include guidance on how to properly establish advance warning and transition areas for highway emergency incidents.
7. Fire departments should ensure that firefighters wear suitable high-visibility retro-reflective apparel while working non-fire emergency scenes near moving traffic.
8. Fire departments should ensure that high visibility chevrons and reflective markings are applied to all apparatus to enhance visibility while parked at emergency scenes and during emergency response (NIOSH, 2012).

California – February 29, 2012

On February 29, 2012, a 35-year-old male career fire captain was struck and killed by a vehicle at the scene of a vehicle crash along the interstate (NIOSH, 2013a). The fire department was previously dispatched to the area for two vehicle crashes. While emergency responders were working the incident, a pickup truck lost control and slid into the victim. The NIOSH was notified and requested to investigate the incident.

The NIOSH investigators listed several contributing factors to the fatality. Causative factors included the fact that the motorist was traveling too fast for the weather as the road surface was slippery due to hail. The motorist lost control of the vehicle while passing by the accident scene and struck the firefighter due to the location that the firefighter was standing (NIOSH, 2013a).

NIOSH developed several key recommendations for fire departments (NIOSH, 2013a). The NIOSH investigators key recommendations are:

1. Develop, train on, and enforce SOPs for roadway incidents that include response protocols for all possible types, locations, and durations of emergency roadway incidents that may occur within the department's jurisdiction.
2. Develop pre-incident plans regarding response protocols, scene safety, and traffic control for roadway emergency work zones in conjunction with public safety agencies, traffic management organizations and private sector responders.
3. Ensure that all members receive guidance and training for responding to roadway incidents, with specific instruction on positioning apparatus and personnel to protect emergency workers from oncoming traffic.
4. Develop and train members on a situational awareness program that addresses hazards specific to working at a roadway emergency work zone.
5. Ensure that a thorough scene size-up is conducted, incident command is established, and risks are assessed and managed throughout a roadway incident.
6. Ensure that SOPs include guidance on how to properly establish advance warning and transition areas for highway emergency incidents.
7. Ensure that firefighters wear suitable high-visibility retro-reflective apparel while working non-fire emergency scenes near moving traffic.
8. Ensure that high visibility chevrons and reflective markings are applied to all apparatus to enhance visibility while parked at emergency scenes and during emergency response.

9. Ensure that all persons involved in training and operations of emergency response meet applicable requisite knowledge and skills (NIOSH, 2013a).

Arizona – March 19, 2012

On March 19, 2012, a 56-year-old fire officer was struck and killed by a vehicle at a motor vehicle crash scene (NIOSH, 2013b). The fire department responded to the scene of a single vehicle crash, where the vehicle damaged the gas meter. The damaged gas meter leaked gas into the scene. The victim, another firefighter and a police officer were standing on the shoulder of the two-lane road when a van struck them, killing the victim and injuring the other firefighter and police officer.

NIOSH reported the actions of the driver of the van, initial crash incident, inadequate protection of the work area, responders standing near moving traffic, inadequate traffic management and lack of procedures for controlling the gas leak as contributing factors to the event (NIOSH, 2013b). The NIOSH developed several key recommendations for fire departments (NIOSH, 2013b). The NIOSH investigators key recommendations are:

1. Develop pre-incident plans regarding deployment to traffic incidents, scene safety, situational awareness, and traffic control for highway/roadway emergency work zones.
2. Develop and implement SOPs for highway/roadway incidents including deployment protocols within the department's jurisdiction.
3. Ensure that all members receive training for conducting emergency operations at highway/roadway incidents.

4. Develop and implement standard operating procedures for response to incidents involving natural gas leaks.
5. Utilize the principles of the incident management system for effective command and control of highway/roadway incidents (NIOSH, 2013b).

Texas – February 10, 2014

On February 10, 2014, a 40-year-old male paid fire service professional lost his life following a struck-by commuter vehicle incident while operating at the scene of assisting a stranded motorist (NIOSH, 2014). The firefighter fell from an overpass after being struck by the approaching vehicle. Icy road conditions and weather contributed to a high call volume for the fire department. The victim was on an overpass, checking on the driver of a stranded vehicle. An approaching vehicle struck the victim, sending him over the side of the overpass and landing on the lower underpass of the roadway.

The NIOSH was requested to investigate the incident by the United States Fire Administration (NIOSH, 2014). The NIOSH conducted the investigation and recognized several contributing factors to the incident. Weather conditions, scene, and traffic management, operating in an unprotected area, and inattentive motorist were identified as contributing factors (NIOSH, 2014). The NIOSH developed several key recommendations for fire departments (NIOSH, 2014). The NIOSH investigators key recommendations are:

1. Fire departments should ensure that officers, firefighters and emergency responders are properly trained in highway incident safety procedures.

2. Fire departments should ensure that officers, firefighters and emergency responders are trained in situational awareness, risk assessment, firefighter and command safety responsibilities.
3. Municipalities and local authorities having jurisdiction should develop strategies for pre-treating bridges, overpasses, and roadways subject to early freezing (NIOSH, 2014).

Fatality Report Conclusion

These struck-by vehicle fatality reports were examined to understand why firefighter fatalities continue to occur while operating at traffic incidents. The frequency of firefighter injuries and casualties from incidents that occur on the roadway is an increasing problem that needs to be mitigated (USFA, 2008). The lack of development, implementation, and training on traffic incident management SOPs is a contributing factor for the traffic incident line of duty deaths (Emergency Responder Safety Institute, 2018b). Coordination with other responding organizations is critical to safe, quick clearance and preventing responder fatalities (Emergency Responder Safety Institute, 2018b). Traffic incident management policies help to develop unified coordination with the various organizations that respond to a traffic incident. Effective traffic incident management and coordination is rarely done in cooperation with other agencies outside the fire service (Emergency Responder Safety Institute, 2018b).

The NIOSH fatality reports indicated and shared several reoccurring recommendations to help mitigate reoccurring firefighter fatalities roadway incidents.

1. The NIOSH consistently recommended that fire service organizations develop, implement, and enforce SOPs for response to roadway incidents.
2. The NIOSH investigators repeatedly recommended the use of the emergency responder safety institute, which provides the responder safety learning network, for assistance with the development of SOPs.
3. The NIOSH investigators recommended initial and ongoing training for response to roadway incidents.
4. The NIOSH recommended training resources provided through the responder safety learning network for traffic incident management.
5. The NIOSH investigators recommended the use of PPE and high visibility vest and apparel.
6. The NIOSH investigators repeatedly suggested pre-incident planning and agency coordination for high hazard roadways.
7. The NIOSH recommended developing SOPs for protecting the work area at a traffic incident.
8. The NIOSH recommended training and polices for situational awareness, scene size up, incident command, and risk assessment.
9. The NIOSH also recommended training and policies for advanced warning and transitional areas for approaching traffic.
10. The NIOSH investigators recommended the responder safety learning network for resources with training and policies.

11. The most recent reports suggested high visibility chevrons and marking for fire department apparatus (NIOSH, 2014).

The NIOSH investigation reports provide recommendations aimed at mitigating future firefighter injuries and deaths. Recommendations for mitigating the events that lead to a firefighter LODD is not new information. Recommendations for mitigating firefighter line-of-duty fatalities is abundantly available to fire service leadership (Moore-Merrell et al., 2008). The NIOSH is one of many sources of scientific literature that provides recommendations to avoid future reoccurrences of LODDs. Failure to adhere to these recommendations continue to contribute to annual firefighter fatality rates (Moore-Merrell et al., 2008).

Fire service leadership decides to develop, implement, and enforce SOPs and NFPA standards according to law adopted by the authority having jurisdiction. Fire service leadership also subjectively decides whether to develop, implement, and enforce SOPs and NFPA standards according to personal perspective and rationale. There is a lack of understanding of the perspectives of chief fire officers regarding decisions related to developing, implementing, and enforcing SOPs and NFPA standards. The question that arises from evaluating traffic incident fatality reports is why chief fire officers do not develop traffic incident management SOPs or adopt NFPA 1091 for their fire department. The goal is to help develop an understanding of policy makers' decision-making rationale related to national standards and industry accepted practices considering firefighter fatalities at traffic incidents.

Summary

The literature reviewed to gather foundational information for this study included identifying the literature search strategy, punctuated equilibrium and how it relates to the fire service, traffic incident management, reviewing the history and evolution of the fire service, the development, elements, and aspects of national consensus standards, and reviewing firefighter line-of-duty fatalities. After a thorough examination of the literature, it is evident that firefighters are susceptible to a variety of health concerns related to traffic incident management and response. Hazards associated with traffic incident response may lead to significant injury or death. The gap in fire service literature includes limited research and understanding on how a firefighter LODD impacts the perspectives of the fire service administration. The need to conduct the proposed research is highlighted in this chapter. This research is designed and intended to investigate a reoccurring problem that plagues the fire service and society. The goal of this study is to better understand the perspectives and decision-making rationale of chief fire officers that may contribute to literature that helps fire service administrators make better decisions regarding traffic incident response and safety. Chapter 3 provides an explanation to the research design and methodology conducted. Chapter 3 explains the case study approach, describe data collection, procedures and how data was be analyzed.

Chapter 3: Research Method

Introduction

Firefighter fatalities at roadway incidents continue despite national standards and industry-accepted practices aimed at mitigating risks through proper traffic incident management. Fatality investigations conclude that the lack of the development, implementation, and training on traffic incident management SOPs contributes to traffic incident LODDs (Emergency Response Safety Institute, 2018b). The historical and present social issue is why the U.S. fire service has not institutionalized national standards and practices of traffic incident management to reduce and eliminate firefighter casualties at roadway incidents. The problem is that many possible barriers may contribute to a failure to institutionalize national traffic incident management standards and practices as an intervention to firefighter fatalities. The perceptions and beliefs of fire department leadership related to traffic incident response and management are possible barriers, yet no research has been conducted on the subject.

In this chapter, I will describe the methods utilized to analyze the perceptions of chief fire officers on traffic incident management standards and practices following a firefighter line-of-duty fatality. Furthermore, case selection parameters, research questions, the role of the researcher, participant selection criteria, ethical protection, data collection procedures, instrumentation, data analyses, and validity and trustworthiness are provided.

Research Design and Rationale

I employed a qualitative design and multisite case study method for this study. Qualitative research is warranted when researchers set out to comprehend the environment to which they live and work through experiences, opinions, reflections, and observations rather than through statistical analysis. Qualitative methods are best to describe, decode, and comprehend the meaning of naturally occurring phenomena in the social world (Creswell, 2009; Tracy, 2012). The objective of this research is to examine the meaning and perspectives of chief fire officers regarding traffic incident management standard and policies related to the social problem of recurring traffic incident line-of-duty fatalities. The following research questions were developed to answer the research objectives:

Research Question

The following research question guides the study:

What are chief fire officers' perceptions of incident management policies and standards for preventing firefighter line-of-duty-deaths (LODDs) from secondary collisions at the scenes of roadway incidents following a traffic incident LODD?

Qualitative research, unlike other methods and inquiries of science, does not attempt to resolve a problem universally but rather strives to build upon the knowledge and understanding of a specific phenomenon (Ravitch & Carl, 2016). Current fire service knowledge is rooted in the subjective experience and consensus of fire service practitioners (Clark et al., 2015). The fire service professionals do not yet follow empirically based practices. The fire service needs to be studied at the highest academic

level (Clark et al., 2015). Quantitative researchers look at the relationships between variables (Creswell, 2009). Creswell (2009) also noted that the qualitative method is most appropriate when the variables are not quantifiable. Quantitative methods will not provide understanding of the views and beliefs of fire chief officers behind the failure to institutionalize national traffic incident management standards and practices (Clark et al., 2015).

The research method is the preferred approach when the researcher desires to obtain insight into how and why something occurred (O'Sullivan et al., 2017). The beliefs of fire service administrators influence the behaviors, actions, and outcomes of others within the organization (Clark et al., 2015). Fire department policy is developed and set into practice based on the beliefs and perceptions of the fire department administrator. Institutionalization of traffic incident management standards and practices is generally decided upon at the discretion of chief fire officers. The case study method analyzes circumstances in which actors' performance is discretionary (O'Sullivan et al., 2017). A significant benefit of the case study method is that data may ascertained data in the natural environment (Gable, 1994).

A case study occurs following the event; thus, there is a probability of a loss or absence of vital information. This case involves the perceptions of chief fire officers related to traffic incident management standards and practices following a traffic incident LODD of a State of Louisiana firefighter. The historical bond of brotherhood and unity throughout fire service history remains constant through the present-day fire service

(Dixon, 2014). Firefighter line-of-duty deaths severely impact surviving members of the fire service, having negative implications for many years (Kehl et al., 2014).

Gable (1994) noted the lack of randomization as another limitation to case studies. A firefighter line-of-duty fatality is a random event that occurs unexpectedly. Case studies promote the exploration of unexpected circumstances and outcomes (Hodkinson & Hodkinson, 2001). Traffic incident fatalities occurred throughout decades, however, there lacks scholarly research into this phenomenon. The number of case studies about firefighter line-of-duty fatalities is limited (Brauer, 2016). Limited understanding and a lack of scholarly knowledge surrounding the totality of circumstances that contribute to line-of-duty deaths justify the in-depth analysis of this reoccurring phenomenon- the preventable firefighter fatality.

Role of the Researcher

I served as the principal investigator (PI) of this study and facilitated the interview process to collect qualitative data after obtaining Institutional Review Board (IRB) approval (approval number 09-03-20-0572852). I began the process by initiating contact with potential participants, informing the participants about the study and the aspects of informed consent. I ascertained qualitative data by facilitating in-depth, open-ended interviews with voluntary research participants. My role also included analyzing the data and presenting the findings.

Concerning the role of interviewer, I possess extensive training and experience in qualitative interview techniques and practices. I served a combined 15 years in law enforcement in both full-time patrol officer and reserve officer roles. I also served 19

years in various ranks and roles in the fire service including firefighter, drive/operator, fire investigator, fire captain, battalion chief, assistant chief, and fire chief. I served five years as an adjunct fire service instructor for the Louisiana State University Fire and Emergency Training Institute (LSU FETI). I excluded interviewing participants that attended my instruction as an adjunct instructor for LSU FETI. During my employment at LSU FETI, I primarily taught volunteer fire service members, which is another reason why career firefighters was selected as a participant criterion instead of volunteer. As a career fire service professional, I never obtained a rank of a supervisor over the current applicant pool.

My current career fire department employer was excluded from the participant pool to eliminate personal and professional bias toward the participant. It stands to reason that I have met some chief fire officers on a professional level. I currently do not have any close personal relationships to chief fire officer participants. To further protect against personal bias, a former graduate student agreed to provide a peer review of the interview questions and redacted transcription of the interviews.

Methodology

Methodology is a systematic way of conducting research. Through methodology, the researcher outlines how to organize and explore the rationale, content, and discoveries of research practices (Krippendorff, 2018). The researcher also evaluates the techniques of research that will contribute to a body of knowledge. This section provides an overview of the methodology elected for this study. The methodology section addresses

the participant selection, case selection, instrument, data collection and review procedures, interview procedure and the data analysis plan.

Participant Selection Logic

The first criteria for study participant inclusion is the requirement of an active or retired chief fire officer of a paid civil service fire department. According to Louisiana State Law, a paid civil service fire department is one that is managed by a municipality with a population over thirteen thousand or an organization with firefighters hired by any parish or fire protection district (Louisiana State Legislature, 2018). A chief fire officer shall include the ranks of a chief of the department and all chief officers as designation by the chief of a department. A designated chief officer may consist of the ranks of deputy chief, assistant chief, district chief, battalion chief, division chief, chief of operations, or any other chief designation not listed here but designated by the authority having jurisdiction. Members of volunteer fire departments are excluded because the diversity of the criterion may impact the outcome of the study if mixed with members of paid fire departments.

Emerson (2015) argued in favor of random sampling as the preferred method in reducing the possibility of influence from independent factors. I elected to deploy the random sampling method to select the first participant. I assigned a number to each paid civil service fire departments located within the region matching the criteria for inclusion. The first participant was a chief fire officer of the fire department selected at random. The first participant was selected through Wheel Decide, a free virtual spinner to make an unpremeditated selection, at random (Wheel Decide, 2020). After randomly selecting the

first participate, I used the snowball sampling method thereafter. Random sampling is not practical beyond the selection of the first participant. The time required to gather a list of all chief fire officers from all fire departments located within the selected region would be too expensive and time-consuming. Emerson (2015) suggested that random sampling is burdensome and exceeds financial boundaries.

According to Dworkin (2012), the range for adequate participants of qualitative studies using in-depth interviews is between five and fifty. The number of participants selected for this study started at five and discontinued when saturation was achieved. Saturation was achieved at a total of five participants. Professional scholars consider saturation as the point when data collection discontinues to offer new or relevant data (Dworkin, 2012).

Case Selection

The selection process was based on the geographical location, researcher access to the fire department, media reports surrounding the LODD, and type of incident. Case selection begins by setting geographic parameters of fire departments located within the boundaries of the selected training region of the State, which spans an area that includes 21 parishes. The state is divided up into four training regions. The traffic incident LODD selected was from a fire department located in the training region most accessible to the researcher. The NIOSH firefighter fatality reports were used as selection criteria since the recommendations in the NIOSH reported serves as a comparison and analysis for LODDs in the existing literature. The search criteria were put into the NIOSH database (https://wwwn.cdc.gov/wisards/fffmap/).

The search criteria was broad. The search was conducted for all months between 1994 and 2018 within the state of Louisiana. There were few demographic limitations to the search. People of all ages and sexes were included in the search, as were firefighters of all ranks. Full time, volunteer, and a combination of volunteer and full-time officers was included. All types of injuries resulting in death were included, as were all causes of the death, including various events in which the firefighter sustained injury. Heart attacks and strokes that occurred within 24 hours of their activities were included, and deaths related to terrorism were also part of the search. Events with multiple fatalities were included, as were deaths that occurred while firefighters battled wildland fires.

I accessed the USFA database of firefighter fatalities, which contains cases ranging from 2008 to 2017. The search criteria put into the USFA database (https://apps.usfa.fema.gov/firefighter-fatalities/fatalityData/reportBuilder).

Both genders were included and all ages of firefighters as well. All classifications of firefighters were included, including career firefighters, and both those who were paid for being on-call and those categorized as industrial firefighters were included in the search. All injuries leading to death, and all causes of those injuries, were included in the search. All duty types were included, including those who arrived after the incident, those who were on-scene at a fire, and those who were on-scene at a non-fire. All activities the firefighter was performing, such as performing in-station duties or those performing a forcible entry. All types of incidents were also included, so incidents ranging from false alarms to vehicle fires were included. Finally, all types of property, such as industrial and

residential were included. None of the additional filters on the search page were used, which merely allowed to sort incidents by multiple fatalities or acts of terrorism.

The NIOSH report generated seven firefighter fatalities. The identities of the struck-by victims were not included in the NIOSH report. The USFA report generated three firefighter fatalities reported in Louisiana between Apr 21, 2008, to Aug 28, 2016. The USFA classified all three fatalities as struck-by vehicle incidents. The identities of the struck-by victims were not included in the USFA report. While the USFA database and the NIOSH database do not identify specific fire departments or individuals, by searching the National Fallen Firefighters Foundation database and news websites, departments and individuals are identified.

The NIOSH provided a brief synopsis of the incident that resulted in the line-of-duty fatality. The report indicated that four out of seven incidents occurred in within the same training region and are the most recent compared to the remaining three. This training region is the most accessible to me. I randomly selected one of the four cases located in the training region through Wheel Decide website. Wheel Decide allows decisions to be made by chance by inputting information onto an electronic wheel, then spinning the wheel and allowing it to decide randomly (Wheel Decide, 2018). The traffic incident LODD selected is the most recent struck-by firefighter fatality in Louisiana.

Instrument

To understand the participants' perspectives, the researcher's task is to open dialogue with participants about how their perspectives influence institutionalizing policy. Ravitch and Carl (2016) stated that the researcher is a primary instrument of

inquiry engaged during the qualitative research process. Interviews allow the researcher to explore details concerning the experiences, motives, perspectives, and other people (Rubin & Rubin, 2012). The researcher is scientifically obligated to view the data objectively and set aside personal expectations and beliefs on controversial issues (Creswell, 2009). Attention is focused on the respondent in respect for the opinions, feelings, and ideas expressed to the researcher (Ravitch & Carl, 2016).

The research instrument developed for this approach (Appendix C) includes in-depth and open-ended questions designed to specifically identify potential barriers in fire department leadership regarding institutionalization of nationally accepted traffic incident management standards and practices. The in-depth interview protocol begins with developing a methodical qualitative questionnaire with the open-ended interview questions inspired by the literature review (Creswell, 2009). The researcher developed open-ended interview questions framed around the topics of traffic incident management standards and practices, firefighter fatality incidents that occurred at traffic incidents, and perceptions regarding the institutionalization of traffic incident management standards and practices before and following a traffic incident firefighter fatality. In-depth interviews allow the researcher to inquire about and ascertain the respondent's opinions and perspectives related to certain incidents (Yin, 2009).

Data Collection Procedure

The qualitative case study approach facilitates examination of a phenomenon within its context by analyzing various forms of data (Baxter & Jack, 2008). Data collection included document review, observation and artifact data, semi-structured

interviews, field notes, focus groups, online data, questionnaires, and participatory methods of data collection (Ravitch & Carl, 2016). This study utilized in-depth interviews, literature review, and artifact and document review. Multiple data sources enhance the credibility of case study research (Baxter & Jack, 2008; Yin, 2003).

Literature and Document Review Procedure

A substantial quantity of data already exists within organizations (Ravitch & Carl, 2016). The review of pertinent and contextual organizational data is a fundamental element of the data acquisition and analysis procedure (Patton, 2015; Ravitch & Carl, 2016). The literature review process includes an analysis of traffic incident firefighter fatality investigations and reports. Firefighter fatality investigation reports and documents are accessible through organizations that administered the inquiries. These reports and documents are also accessible via the Internet. Creswell (2009) warned that incomplete material and document accuracy could be possible limitations for document analysis; however, the documents and reports were published by credible organizations. Documents and reports were obtained from the NFPA, the NIOSH, and the USFA. The traffic crash and fatality reports were also obtained for review and analysis.

Documentation and artifacts were used to triangulate data collected from document review and interview data collected. The review of pertinent and contextual organizational data was a fundamental component of the data acquisition and analysis procedure (Patton, 2015; Ravitch & Carl, 2016). This information was accurate and true, as there are many laws against storing fraudulent and false public information. Artifact data and documentation review used for triangulation included traffic incident standard

operating procedures and guidelines from the fire department and fire department memos. Additional artifact data included newspaper articles, fire service articles, and traffic-related legislation.

Interview Procedure

The interview process was used to explore the perspectives, experiences, and insights of those impacted by and who experienced a particular phenomenon. “Interviews are at the center of many qualitative studies since they provide deep, rich, individualized, and contextualized data that are centrally important to qualitative research” (Ravitch & Carl, 2016, p. 146). The individual interview collection process allows the researcher to focus on the individual’s experiences and perspectives related to a specific phenomenon. Interviews invite a research participant to provide as much information as possible for the study. A significant objective of this form of inquiry is to investigate the topic from the viewpoint of the participant while concurrently obtaining the understanding as to why the participant developed this perspective (Meyer, 2001).

Following obtaining agreement and consent from the participant to move forward with the interview, I began the interview with demographic questions to strengthen rapport and help the interviewer and the interviewee feel comfortable. I then explained definitions and key terms. A list of definitions and key terms was provided to the participant for review throughout the interview. The next step involved me providing an overview of the Traffic Incident LODD case selected for this research. I then asked open-ended questions from the designated interview guide. The interview concluded with inquiring about any final remarks from the participate related to this study.

All interviews were digitally recorded and transcribed verbatim. The respondents were awarded an opportunity to review the transcript for accuracy and contribute additional comments on previous statements to further elaborate on the information. All respondents were assigned a pseudonym known only to the researcher. Respondents are represented by the word "Chief" and a letter from the phonetic alphabet, commonly used by the military and paramilitary organizations. For example, the first respondent will be identified as "Chief Alpha", the second respondent as “Chief Bravo”, the third respondent as “Chief Charlie, etc. The pseudonym log is secured on a file in the researcher’s private computer. The computer is password secured and only accessible to the researcher.

Data Analysis Plan

The purpose of a qualitative case study is that it endeavors to explain conclusions, why they were made, how they were fulfilled, and with what effect. Decisions of chief fire officers related to the failure to institutionalize national traffic incident management standards and practices result in a traffic incident line-of-duty fatality. The decisions and perspectives associated with institutionalization of industry-accepted traffic incident standards and practices hide within the data, waiting to be illuminated through data analysis. The respondents’ beliefs, opinions, and perspectives were thoroughly explored throughout the data analysis process. The data was arranged, reduced, and analyzed by transcribing and organizing the interview data, coding, translating the data according to phrases and themes associated within the text, comparing the perspectives, and applying the theory.

A large volume of documents helped to develop an understanding of what has happened and to use in the analyses. When there is a firefighter line-of-duty fatality, there are often a vast number of documents that conclude the circumstances surrounding that incident that could build up an understanding of what has happened and can be used for analyses. Firefighter fatality reports related to roadway incidents are vast in number. Due to time constraints and applicability to the publishing dates of national traffic incident management standards and practices, it is not possible to collect and analyze all documents spanning the history of firefighter fatalities. I decided to analyze the firefighter struck-by fatality reports related to career firefighters, including LODDs applicable to Region 1 of Louisiana.

When all data was collected and transcribed, coding began. The first step in the qualitative data analysis process is transcription. The transcribed data is evaluated and assigned meaning through coding to help the research efficiently interpret the data (Rubin & Rubin, 2012). Coding is where the research develops meaning to a transcribed passage. In qualitative research, coding is the process of assigning meaning to the data obtained throughout the interview process (Ravitch & Carl, 2016). I selected open coding to analyze the data. Open coding can be accomplished by hand coding or highlighting the phrases or groups of words that stick out within the data. Open coding may involve multiple rounds the initially involve determining what stands out then moving on to another round that focuses specifically on the aspects of the research questions (Ravitch & Carl, 2016). A theme is the conclusion of coding and identifies it as a lengthy expression that describes what a unit of information is about or what it means (Saldaña,

2016). Reviewing several codes and categories can lead to a theme. Concepts or themes emerge from the data as the researcher examines each passage sequentially (Rubin & Rubin, 2012).

Computer programs, known as "computer-assisted qualitative data analysis software programs" assist the researcher with coding and discovering the meaning to the transcribed data collected during the interview process (Rubin & Rubin, 2012). Computer-assisted qualitative data analysis software can simplify an otherwise extensive and time-consuming qualitative data management process. Manually transcribing, sorting, and qualitatively coding data can be a daunting task for the qualitative researcher. Computer-assisted qualitative data analysis software program easily assists the researcher with data management.

I deployed NVivo as the software package for data analysis. This computer-assisted qualitative data analysis software was developed to help the qualitative researcher organize, analyze, and observe unforeseen insights in qualitative data and information. NVivo can reconstruct the way important qualitative data is reviewed, which is a major benefit of computer-assisted qualitative data analysis software programs (Bringer et al., 2006). Another significant benefit of this type of software package is it highlights links between themes and categories with other documents and categories (Bringer et al., 2006). As such, NVivo makes the ideal tool for dealing with the qualitative data that will be used for this study, since it will allow for nuanced analysis and streamlined organization collected data.

Validity and Reliability

I frequently evaluated credibility, transferability, dependability, and confirmability through the entire qualitative research process. Before beginning data collection for the study, some of these checks and balances were instituted to ensure validity and data quality. Creswell (2009) suggested utilizing a validity strategy to enhance and ensure the accuracy of the research. I used eight quality verification procedures to ensure the validity of this study (Creswell, 2009).

Verification occurs in several ways. Triangulation will be accomplished using the literature review, in-depth interviews, and both documentation and artifact analysis. Ravitch and Carl (2016) argued that triangulation and sequencing are methods to ensure dependability. Dependability is also achieved the documentation process of the research and further supported through retention of all documentation. I secured all documentation and data, as indicated previously in this chapter, related to the interviews and additional documentation to ensure dependability as well as confirmability.

Respondent member-checking is another form of verification. This process was achieved using a follow-up interview conducted with respondents of the study and providing the opportunity for them to review and comment on the accuracy of the findings. A third form of verification occurred through significant descriptions of the findings. This was achieved in a robustly detailed narrative of the findings. Dependability is attributed to the fortitude of the qualitative data (Ravitch & Carl, 2016).

Yet another form of verification occurs by clarifying the researcher's bias. This is achieved and identified in the role of the researcher section of this chapter. To ensure the

resolution of potential bias, the researcher entered an intercoder agreement with a qualitative expert to cross-check the interpretation of the data. Random selection of participants and appropriate cases for the study should alleviate the suspicions of researcher bias (Shento, 2004). Also, discrepant information will be addressed. The researcher will discuss and present evidence and information that may contradict the general perspectives of the theme.

In addition to the above forms of verification, there will be a peer debriefing. This was achieved by sending this study to a fire service expert and Walden University colleague to review the research process, data, findings, and conclusions. Trustworthiness is integral to the research process. In this study, the researcher is the primary factor related to trustworthiness. I prevented issues surrounding potential bias and established credibility by using a peer debriefer (Ravitch & Carl, 2016). The peer-review method was used to ensure an increased level of credibility of the research (Spall, 1998).

Finally, an external audit was conducted to reinforce all the previous forms of verification. This was achieved by sending this study to an outside research expert to determine whether the research process and research data supported the research findings and research conclusions. “Credibility is the researcher’s ability to take into account all of the complexities that present themselves in a study and to deal with patterns that are not easily explained” (Ravitch & Carl, 2016, p. 188). Ravitch and Carl (2016) argued that credibility is related to the design of the research study, the researcher’s instruments, and the data. The external audit will help obtain credibility.

External validity is anticipated to be achieved through transferability. Transferability is the way findings and conclusions of the research may be applied to other research studies and throughout emergency service professions (Ravitch & Carl, 2016). This may be determined by how representative the data is throughout the entire fire service. Examples of transferability may include the institutionalization of traffic incident management standards, policies, and practices as mitigation efforts to significantly reduce or eliminate preventable firefighter line-of-duty fatalities at roadway incidents. The data made available from this research is expected to reinforce and endorse training objectives throughout fire service organizations as well as other emergency response organizations and professions across the nation.

IRB Approval

Walden University's Institutional Review Board (IRB) approval was obtained to protect the privacy and rights of the respondents of this study. Walden University's approval number for this study is 09-03-20-0572852. In order protect the privacy and confidentiality of respondents, no comments were made regarding the participant's name, location, fire department, or jurisdiction. Participant identifying information was always secured and remained confidential. The researcher is the only individual with access to respondent information. It is essential that potential respondents were recruited based on informed consent, requiring that they understand what the study procedures entail and its purpose. The participants were also made aware of their right to withdraw and how their confidentiality will be maintained was also be discussed. Confidentiality and misinformation may contribute to misplaced fear, impacting the response rate. The

response rate is an additional concern due to potential fear and anxiety issues of the respondents. Various types of insecurities with participation in this study could result in the lack of participation or withdrawal from the study. As a measure to protect confidentiality of the respondents, they were represented by the word "Chief" and a letter from the phonetic alphabet, commonly used by the military and paramilitary organizations, for example, the first respondent will be identified as "Chief Alpha", the second respondent as "Chief Bravo", the third respondent as "Chief Charlie", etc.

To ensure that I would not cross any ethical boundaries, I emailed a letter (Appendix D) to the Louisiana Fire Chiefs Association (LFCA), introducing myself and informing the association of nature and purpose of my potential research. The Louisiana Fire Chiefs' Association is comprised of subscribed members of fire service officers of Louisiana. The purpose of the LFCA is "to promote the profession of the fire service, to improve the methods of fire prevention, training, protection, and extinguishment and to maintain high standards of professional ethics among the Fire Service Officers of Louisiana" (Louisiana Fire Chiefs' Association, 2018, p. 1). I informed the association that possible future participant information would be confidential and anonymous. I later received a letter (Appendix E) from the LFCA President supporting my desired research topic and goals.

Ethical Procedures

Ethical principles underlie all empirical research (American Psychological Association, 2010). Ethical principles are designed to achieve the various goals, which includes safeguarding the rights and wellbeing of research participants (American

Psychological Association, 2010). Prior to starting research, the researcher should evaluate potential ethical issues and develop a plan to mitigate associated risk. Research subjects rely on being treated respectfully and ethically (O'Sullivanet al., 2017).

Ethics

Ethical dilemmas should be anticipated and resolved by the researcher (Creswell, 2009). Cooper (2012) agreed that researchers should plan to resolve potential ethical dilemmas. The topic of firefighter fatality could be a sensitive subject for a fire service colleague addressing this issue during the interview process. Psychological discomfort is an ethical concern for the researcher (O'Sullivan et al., 2017). Respondents must remain unharmed throughout the research process (Rudestam & Newton, 2015). To ensure firefighter fatality research does not cross any ethical boundaries for chief fire officers, I emailed a letter informing the Louisiana Fire Chiefs' Association (Appendix D) of the subject of my desired research topic. I received a letter from the LFCA (Appendix E) supporting my research.

A detailed informed consent form (Appendix F) requesting permission to participate in the study was emailed to the interviewee by the interviewer before agreeing to the interview. I ensured that the interviewees understood the consent form and received the fire service behavioral health management guide before agreeing to the interview. The detailed informed consent form included a description of the study, the voluntary participation clause, and information on the anonymity of the results gathered from this study. Participants were not required to complete the study and may discontinue at any

time. All data collected are maintained by the researcher and secured on a computer with restricted access. The data will be destroyed after five years.

Presentation of Findings

Data amassed for the intent of this study was organized into thematically appropriate categories that were reviewed, with quotes, and used to substantiate claims made within those categories. In addition, all categories and sub-categories will be presented to provide an organized overview of the categories identified within the data.

Summary

This qualitative case study was designed to explore the perceptions, influences, and potential barriers of chief fire officers regarding the institutionalization of industry-accepted traffic incident management standards and practices. According to the literature, the fire service does not readily change until there is a significant tragedy or event, such as loss of life. This study explored why chief fire officers fail to institutionalize industry-accepted standards and practices. This chapter outlined the research design and case study methodology, case selection criteria, research questions, the role of the researcher, criteria for participant selection, consent, ethical protection, data collection procedures, data analysis procedures, and validity of the research. Data obtained through the procedures outlined in this chapter was evaluated and further discussed in Chapter 4.

Chapter 4 includes the data collected, the results of the data analysis and other important data significant to this study. Chapter 4 aligned data obtained from research participants into a suitable format to answer the research question regarding chief fire officers' perceptions of traffic incident management standards following an LODD at an

emergency roadway incident. Chapter 5 includes the purpose of the study, overview of the research methodology used to conduct study, results of data collected, and conclusions based on the data analyzed. Chapter 5 includes implications for social change and make recommendations for future research.

Chapter 4: Results

Introduction

The previous chapters established that chief fire officers' perceptions of incident management policies and standards for preventing roadway incident LODDs has been minimally explored in research. The purpose of this qualitative study was to explore chief fire officers' perceptions of incident management policies and standards for the prevention of firefighter LODDs resulting from secondary collisions at the scenes of roadway incidents. The research question that guided this study was:

What are chief fire officers' perceptions of incident management policies and standards for preventing firefighter line-of-duty-deaths (LODDs) from secondary collisions at the scenes of roadway incidents following a traffic incident LODD?

This chapter contains the results answering the research question. I will begin with a description of the setting of the study and the demographics of the sample to place the context of the results. Next, I will review the data collection, data analysis, and evidence of trustworthiness. I will then present results of the coding and thematizing processes conducted over the computer-assisted qualitative data analysis software program NVivo. The results are organized according to themes that described the meanings of the chief fire officers' perceptions of incident management policies and standards for preventing LODDs. The themes are supported by excerpts from the data.

Setting

The setting of this study was the State of Louisiana. The 2008 to 2017 data of firefighter fatalities from the USFA indicated that three fatalities occurred in Louisiana

between April 21, 2008, and August 28, 2016. The Louisiana State Law specified that paid civil service fire departments are managed by a municipality with a population over thirteen thousand or an organization with firefighters hired by any parish or fire protection district (Louisiana State Legislature, 2018).

During the time of data collection in January 2021, the United States and most of the world are placed under community restrictions due to the coronavirus (COVID-19) pandemic. Firefighters were expected to wear additional personal protective equipment (PPE) and follow safety protocols. Physical distancing was also imposed; hence, individual interviews were conducted in person in adherence to federal, state, and local COVID-19 protocols. All participants were given a choice of how interviews will be conducted, and each interview participant elected to the in-person interview with adherence to federal, state and local COVID-19 protocols.

Demographics

The sample of this study consisted of five chief fire officers from the state of Louisiana. All five participants were a chief fire officer of a paid civil service fire department and serves in a neighboring fire department jurisdiction to a fire department jurisdiction that experienced a traffic incident LODD. A brief description of each sample is provided below. All respondents were assigned a pseudonym known only to the researcher. Respondents are represented by the word "Chief" and a letter from the phonetic alphabet, commonly used by the military and paramilitary organizations. For example, the first respondent will be identified as "Chief Alpha", the second respondent as “Chief Bravo”, the third respondent as “Chief Charlie, etc. The pseudonym log is

secured on a file in the researcher's private computer. The computer is password secured and only accessible to the researcher. The actual name of the respondent was kept confidential.

Chief Alpha

Chief Alpha began his firefighting experience as a volunteer in the spring of 2001. He shared that he had a rough start, and almost quit volunteering. However, a successful training session involving search and rescue changed his mind. He emphasized, "I've loved it ever since. I would say [redacted] is why I'm here today, because of that one event on my first week of training."

In 2005, the volunteer group was campaigned to become a fire central for the district. Chief Alpha shared that their department was relatively new being established in 2006. During that time, he left his job in sales management, and joined the department as captain, claiming, "I really like doing this for free, let me go get paid for it." As the department grew, he was promoted to district chief in 2014. He explained that the department was led by "the fire chief, the deputy chief and the three district chiefs, one on each shift." The position of assistant chief was later added.

As a district chief, Chief Alpha perceived that he was the "operations chief." His responsibilities included administrative tasks such as "payroll, vacations/holidays." He was also responsible for supervising the assistant chiefs. Chief Alpha reports at the station during the day from Monday to Friday; however, he also stated that he was "on-call 24/7." His main task was to raise awareness relating to the fire service as a profession

within the community such that the department can get support on our tax renewals initiatives.

Chief Bravo

Chief Bravo has been a chief for a little over one year. His promotion was a result of over 20 years of firefighting experience. The first 10-years of his career were spent "riding a rescue truck" as a firefighter operator. He was later promoted as captain before becoming a chief. Chief Bravo has also been an instructor for the state fire training academy since 2013.

Chief Bravo perceived that the chief was the "uppermost level of the fire department." He perceived that his role as the chief was to manage the department, including "budgets, resources, purchasing, [and] manpower" in order for the department to "save lives, preserve property." With fire service as a profession, Chief Bravo believed that as a leader, he must "uphold standards, professionalism, and the core values."

Chief Charlie

Chief Charlie has been a chief for about five years. He has been fulltime in the firefighting service for nearly 22-years. He went up the ranks from being a firefighter, a captain, a deputy chief, to chief. As the chief officer, he perceived that his role was to "run the fire department." His duties included developing policies and procedures, and check whether the protocols were being followed. To ensure the safety of the firefighters, Chief Charlie shared that his role also included "keeping up with the changing technology and staying on top of training."

Chief Delta

Chief Delta started as a fire service volunteer from 1996 to 2006. During 1996, he also attended "rookie school" to get his training. The participant has a bachelor's degree in business but became a firefighter by profession in 2006. Currently, as the chief officer, he stated that he oversaw "training, records, policies, [and] procedures." He also emphasized the use of "past knowledge on job training to pass that on to the newer guys."

Chief Echo

Chief Echo began his career in fire service at the age of 18 when he began volunteering. After completing the necessary documents to join the organization, he was offered a part-time position. He became a fulltime firefighter in 1999, and "progressed through the ranks" from captain in 2007 to district chief in 2016. He is currently the fire chief, a position he held since 2018. As the chief officer, he was responsible for the "management functions" and the "financial side of the organization," as well as the development and implementation of the standard operating guidelines found in the employee manual.

Data Collection

The data collection method employed in this study was semi-structured interviews with five chief fire officers from the State of Louisiana. The interviews were conducted individually, in-person, and in adherence to federal, state, and local COVID-19 protocols and restrictions. The duration of each interview is presented in Table 1.

Table 1
Duration of Interviews

Participant	Duration
Chief Alpha	38 minutes 56 seconds
Chief Bravo	35 minutes 43 seconds
Chief Charlie	30 minutes 20 seconds
Chief Delta	18 minutes 40 seconds
Chief Echo	39 minutes 10 seconds

Participant Selection

Selection of the interview participants involved purposeful and snowball sampling. First, I set the selection criteria and decided that participants must be a chief fire officer of a paid civil service fire department in the State of Louisiana and be knowledgeable about NFPA1091, NFPA 1500, and the national standards process, and has encountered a Traffic Incident LODD. Second, I obtained a letter of endorsement from the LFCA to support my study. A letter containing the invitation to the study and informed consent, along with the fire department behavioral health management guide were e-mailed to chief fire officers in Louisiana. Third, I randomly selected the first participant (Chief Alpha) using Wheel Decide, a free virtual spinner to make an unpremeditated selection. Fourth, I asked Chief Alpha to refer other prospective participants. Recruitment of the participants continued until five participants were selected.

Permissions and Ethical Procedures

I emailed the informed consent form, representing the agreement and consent, to the participants. The interviews were conducted after obtaining the email reply, “I consent” from participants. Participants were given the option to have their interviews

completed via Zoom, over the phone, or in person. All participants decided to complete the interview in person, with adherence federal, state, and local COVID-19 protocols. The participants agreed to have their interviews audio recorded at a location of their choosing. Each participant elected the place of the interview. The interviews were conducted in a secluded location with strict adherence federal, state, and local COVID-19 protocols. The participants were also made aware that the interview topic might trigger emotional response, as an LODD fatality was involved. I reminded the participants that they can take breaks during the interview, that participation was voluntary, and that they can choose to withdraw at any point of the study without consequences.

Interview Process

All interviews were conducted in person and in adherence to federal, state, and local COVID-19 protocols and restrictions. An interview guide containing 16 open-ended questions directed the conversation. The first question was used to collect demographic information about the participants, as well as to build rapport. The remaining questions were about NFPA, policy development and implementation, and the national standards process. Probing questions were asked when needed. The audio recordings were transcribed immediately after each interview. Interview transcripts were imported to feed into NVivo.

Data Analysis

The interview data collected from five chief fire officers were analyzed thematically using NVivo. The two phases of analysis were open coding and identifying themes, as recommended by Saldaña (2016). After member checking and importing the

transcripts to NVivo, I began with repeatedly reading each transcript to grasp the main ideas of the data. Next, I started open coding through re-reading the transcripts, this time closely. I paid attention to each line and assigned meaning to relevant statements. In NVivo, I highlighted the key statements and assigned them into codes. Codes were the smallest units of meaning available in NVivo. Each code was labeled with a descriptor portraying the contents of the key statements. I generated as many codes as possible during open coding to minimize bias and to make sure that all the participants' responses were represented in the analysis (Saldaña, 2016).

After no new codes emerged from the data, I proceeded to identify patterns of meaning and trending information. In this step of the analysis, I grouped codes with similar patterns to form a category. In NVivo, a category was created using the hierarchy feature, in which the category is represented by a parent code, while the code is represented by a child code. The hierarchy feature created a visual representation of the coding and categorizing framework, which revealed further relationships among the data. I then reviewed each category in comparison with the coded texts, the research question, and the punctuated equilibrium theoretical framework to develop themes. I grouped categories with similar meanings to generate the themes. Overall, three themes emerged from the data, which were: Implementation of policies contributes to the problem of LODD, development of policies is a process, and NFPA standards as the minimum safety guideline.

Evidence of Trustworthiness

Trustworthiness of the study was established using four criteria: credibility, transferability, dependability, and confirmability. Credibility was increased through member checking. I provided the participants with the opportunity to review and edit their responses to the interview for accuracy. Transferability was established through obtaining rich descriptions of the context of the study such that readers may make their own inferences about the applicability of the findings to another context. Dependability was increased through triangulation of related literature and the interview data. Documentation of all processes and procedures and rich description also increased dependability, as well as confirmability.

Results

This section contains the presentation of the results of this study. The results were aimed to explore the chief fire officers' perceptions of incident management policies and standards for preventing firefighter LODDs from secondary collisions at the scenes of roadway incidents following a traffic incident LODD. Interview data with the five participants revealed three themes from the data: Implementation of policies contributes to the problem of LODDs, development of policies is a process, and NFPA standards as the minimum safety guideline. Descriptions of the themes along with supporting quotes from the data are presented in the sub-sections below.

Implementation of Polices Contributed to the Problem of LODD

All five participants shared their perceptions on the implementation of policies in connection to the problem of LODD. This theme was supported by 49 references from

the data and literature review. All the participants believed that the problem with policy implementation was that implementation and adherence tended to be reactive rather than proactive or preventive. All the participants shared that an LODD often resulted in changes in the way firefighters perceived policies. Chiefs Bravo and Delta stated that any LODD was a "wake-up call" to the department. Chiefs Alpha, Charlie, and Delta also believed that after an LODD incident, firefighters tend to realize that they were "not invincible." As a result, chiefs and the subordinates often think of how the department can do better in terms of safety, as Chief Alpha stated:

> So, we as a chief officer have to look back at it and go, "is there something from a command standpoint that we can do better- could we have done better at the training field to prevent this line of duty death?" I think if we can take every line of duty death and look at it from that standpoint to see "how can we do this better, so this doesn't happen?"

Despite similar perceptions, Chief Echo added that the department often attempted to implement preventive policies; however, the lack of resources usually prohibited the firefighters to follow the set of standards. Chief Echo explained:

> I guess the biggest determining factor is – I hate to even say this - is the overall monetary constraints on the organization. It's not going to be - I hate to put ourselves in a light where say we can't provide the necessary means for our people or the people can't provide the necessary means for the public but if all we have is a $5,000,000 budget, it only goes so far. So, we have to stay within our means and that would probably be the biggest override and it's not a lack of

> desire to provide the necessary results it's the physical means of being able to do it.

Three participants added that the lack of training contributed to the problem of implementing policies resulting in LODD. Chief Charlie perceived that firefighters can get "complacent" on duty and may not be as alert about following safety protocols indicated in the policies. Training can improve policy implementation. Chief Charlie explained:

> Training. Training, training, training would probably be the number one thing. With training, you know that people stay focused, they don't get tunnel vision, they don't get complacent in what they're doing…To me the biggest thing is training, owning, and understanding what you're being taught. Then being able to implement it and actually use it when you respond to these types of incidents.

Chief Echo elucidated that training did not need to cost a lot of money. Training needed to "hammer home" the points, "How can we most effectively use the limited manpower we have; create the biggest barrier we have between us and the oncoming traffic to keep ourselves safe" to prevent a secondary LODD.

Apart from internal issues in policy implementation, Chiefs Alpha and Charlie also believed that public buy-in of policies has an impact on the scenes of roadway incidents. Chief Charlie stated, "[Civilians can get] some basic understanding of what we may be doing; The emergency responders and then what they can do to maybe help safeguard us and themselves as well to where they don't become involved and possibly a victim or whatever."

Lastly, Chief Charlie reiterated that while implementation and adherence to policy may not necessarily prevent accidents causing injuries and LODD, following the rules can at least remove liability from the firefighters and the chiefs. Chief Charlie articulated:

> I guess as long as you do things by NFPA's recommendations, if there happens to be an injury that was caused, but you followed the standard, that probably helps take some of the liability off of the department or chief officer. Yes, the guy got hurt, he was doing this, he was doing how NFPA says it needs to be done, but there was still something that happened.

Development of Policies is a Process

All the participants perceived that the process involved in the development of policies impacted incident management policies and standards for preventing firefighter LODDs from secondary collisions at the scenes of roadway incidents following a traffic incident LODD. The participants shared 40 references from the interview data to support this theme. In this theme, the participants' perceptions on the policy development process began by reviewing existing policies and the need for new ones when incidents such as traffic incident LODD and LODDs from secondary collisions occurred. Some participants shared that policy review and development involved a 12-month timeline starting from January. Chief Alpha shared, "We start reviewing policies and procedures in January and we try to get things revised throughout the year." Conversely, Chief Bravo shared that the policy review was conducted on an "as-needed basis," and stated, "Every so often we'll review that policy to make sure that it's actually doing what it's supposed to do, it's working, it's still applicable."

Some participants perceived that certain changes result in policy development. One influential factor was technology. Changes in technology could result in changes to the equipment; therefore, policies needed to be changed. Chief Charlie explained:

> When you have a policy/procedure in place and people have been using it for an amount of time, there may be a change in technology or another change that affects your current policy or procedure. And so, you have to figure out what you need to change as far as the policy/guideline - whatever, and to keep it all in line after.

Chief Echo perceived that changes in society can also impact policy development. Chief Alpha perceived that public perception influenced policy development, as the participant shared, “I think the business model we do - we provide a customer service to our constituents.” Chief Delta was the only participant to cite past incidents influencing the development of policies, as he contended, “Learning from one of the jobs - something didn’t work out, we’ve got to analyze it and make changes.”

According to Chiefs Bravo, Delta, and Echo, policy development involved a team or a chain of command. Chief Delta stated:

> Normally the chief and the assistant chief handles all the policies…but basically procedures that are set forth and then if any of the firefighters at all have any input on what they think we should add then we’ll implement that too. So, it goes from the top to the bottom, anyone that wants to put in input can do so.

NFPA Standard as the Minimum Safety Guideline

All the participants perceived that NFPA standards served as the minimum safety guideline in incident management policies and standards for preventing firefighter LODDs from secondary collisions at the scenes of roadway incidents following a traffic incident LODD. The participants referenced 33 interview responses to support this theme. Chiefs Bravo an Echo specified that the NFPA standards were tried, tested, and validated. While the participants perceived that the NFPA was not mandatory, the standards were "nationally recognized" (Chief Bravo) "almost like the constitution of the United States" (Chief Alpha) and were the "minimum standard requirements" (Chief Charlie) in terms of safety. Chief Charlie stated:

> Well, with my fire department the local council actually adopted the NFPA codes as - like safety codes and basically adopted the NFPA as a minimum requirement code, so if it comes to planning and zoning, they know what the NFPA says that a fire hydrant must be so many feet off the street or no more than so many feet off the street for sub-division developments and stuff like that.

Nonetheless, several participants reiterated that the NFPA standards existed as a point of reference. Fire service departments can make changes as applicable to their area. Chief Delta shared, "Basically the standard is there as a guideline, they're not set-in-stone as far as your department - you can make changes as you see fit." Chief Bravo cited that adherence to the NFPA depended on the available budget within the department. Chief Brave articulated:

> It's recommended practices. We need to look at it, review it and see how close we can get to following it. Some standards are based on things that require - sometimes - outside of our budget. For instance, NFPA 1710, there's no way that we could afford to meet that standard, but we can try to get close and do what we can with what we have to work with

Specific to NFPA 1091, the standard for traffic control incident management professional qualifications, four participants stated that the standards provided direction for the department. Chief Alpha described, "I think it does a good job of getting us in the right direction." However, Chiefs Bravo and Echo both stated that compliance with NFPA 1091 may not be fully achieved. Chief Bravo explained:

> You can't always meet it 100% because something that also varies not only in the fire service state to state is how each area actually handles and who's responsible for certain aspects of traffic incident management. Where here in Louisiana, State Police - and another state may be a county sheriff or something like that. So, it's very hard to just 100% meet that standard.

Chiefs Bravo, Delta, and Echo reported that the scenario involving firefighter LODDs resulting from secondary collisions at the scenes of roadway incidents varied. From personal experiences to reading reports of past incidents, the participants generally perceived that several "different factors" contributed to LODD, which may not necessarily be covered by NFPA standards.

Summary

This chapter contained the presentation of the result of this qualitative study. This study aimed to explore chief fire officers' perceptions of incident management policies and standards for the prevention of firefighter LODDs resulting from secondary collisions at the scenes of roadway incidents. Five chief fire officers from the State of Louisiana were interviewed for this study. Analysis of the interview data resulted in three themes. The themes were: Implementation of policies contributes to the problem of LODD, development of policies is a process, and NFPA standards as the minimum safety guideline.

First, the chief fire officers' perceptions of incident management policies and standards for preventing firefighter LODDs from secondary collisions at the scenes of roadway incidents following a traffic incident LODD included the positive and negative impact of policy implementation. Most of the participants perceived that the fire department has existing policies and standards in place regarding safety. The issue, however, was that the policies and standards tend to be overlooked. Most of the participants revealed that as chief officers, their task included making sure that their subordinates adhered to the policies. While LODD and injuries may not necessarily be prevented by following the regulations, the participants generally believed that the firefighters and chiefs will be protected from liability when the policies and standards were followed. Additionally, the participants generally perceived that policy implementation tended to be reactive rather than proactive or preventive despite the chiefs' efforts due to the lack of gear and equipment and the lack of firefighters' training.

Second, apart from implementation of existing policies, most of the participants also perceived that preventing firefighter LODDs from secondary collisions at the scenes of roadway incidents following a traffic incident LODD included the development of new policies. According to most of the participants, policy development was a process involving the review of current policies and practices, the review of the need for a new policy, a team of policymakers, and a timeframe. Furthermore, the participants generally believed that policies needed to be updated when gadgets and equipment used during duty were technologically upgraded. One participant emphasized that the process of developing a policy, regardless of reason, was for the sole purpose of providing fire service to the public.

Third, in preventing firefighter LODDs from secondary collisions at the scenes of roadway incidents following a traffic incident LODD, most of the participants perceived that the NFPA was the basis for development and implementation of policies and standards. According to most participants, NFPA was currently not a requirement, but a recommendation or a reference for safety standards. Nonetheless, the participants generally treated the NFPA as the minimum safety guidelines applied nationally, like the "constitution." Furthermore, most of the participants perceived that NFPA, particularly NFPA 1091, provided direction for their department.

The three themes were aligned with the constructs of punctuated equilibrium in which small gradual amendments to the policy lead to a sudden, large change, often caused by crises (Givel, 2010; Gould & Eldredge, 1972; Repetto, 2006). The discussion of the results in line with the punctuated equilibrium theory and related literature are

provided in the next chapter. The next chapter also contains the implications, limitations, and recommendations of this study. A conclusion on how this study contributes to addressing the problem in the United States fire services organizations will culminate the study.

Chapter 5: Interpretation of Finds, Recommendations, Conclusion

Introduction

The purpose of this qualitative multisite case study was to explore chief fire officers' perceptions of incident management policies and standards for the prevention of firefighter LODDs resulting from secondary collisions at the scenes of roadway incidents. The investigator used a qualitative methodology with a multisite case study to answer the following research question, what are chief fire officers' perceptions of incident management policies and standards for preventing firefighter line-of-duty-deaths (LODDs) from secondary collisions at the scenes of roadway incidents following a traffic incident LODD? The choice for a qualitative study was made due to the knowledge that fire service experiences are subjective (Clark et al., 2015). The current study was based on a collection of perceptions rather than statistical data.

The data collected through semistructured interviews were analyzed through open coding and using the NVivo software package for qualitative data analysis to organize, analyze, and observe unforeseen insights in qualitative data and information. NVivo was implemented to reconstruct the way the collected data was reviewed (Bringer et al., 2006). The benefit of using NVivo was that it highlights the links between themes and categories with other documents and categories (Bringer et al., 2006). As such, NVivo allowed for a nuanced analysis streamlining the organization of the collected data. Three themes were extracted from this analysis: implementation of policies contributed to the problem of LODD, development of policies is a process, and NFPA standards as the minimum safety guideline.

Interpretation of the Findings

The findings examined resulting in themes and were based on the overreaching research question, what are chief fire officers' perceptions of incident management policies and standards for preventing firefighter LODDs from secondary collisions at the scenes of roadway incidents following a traffic incident LODD. The examination of the perceptions through the information collected via the semistructured interviews contributed to interpreting these findings. The findings exhibited contributing factors associated with firefighter fatalities at roadway incidents based on participants' perceptions suggested that a lack of development, implementation, and training on traffic incident management SOPs contributes to traffic incident LODD (Emergency Responder Safety Institute, 2018b).

Implementation of Policies Contributes to the Problem of LODD

This first theme was derived from the participant's belief that there were issues with policy implementation. Implementing such policies were believed to contribute to LODD incidences as the implementation and adherence tended to be reactive rather than proactive or preventive. However, the participants also felt that the policies were only effective when there was a public buy-in, when training was provided on the policies, and when the parish or city provided the necessary resources for such implementation. The participants understood that both fire departments and the public consistently ignored most attempts to implement policies for the prevention and protection against traffic incidences known to be the causation of LODDs. The participants considered the lack of

effective policies and procedures, the lack of leadership, preparedness, appropriate decision-making, and lack of personal responsibility for LODD.

Policy Change Perceptions

Firefighter's perceptions were also influential regarding policy change acceptance. How a firefighter perceived the policy changes and how such change affected their job was foremost of concern. The participants felt that most policy changes were reactive rather than proactive, and the firefighters were often shocked to realize that they were not invincible. The resulting outcomes often were condensed into the determination of safety protocol. However, there was a consensus that such safety concerns often came too late and after a tragic incident took a life of a firefighter. The participants claimed more concern about how the tragedy looked to the public, particularly with secondary collisions at the scenes of roadway incidents following a traffic incident LODD. The realization that policy changes could prevent these incidences was supported only with public backing.

Significant changes from standard operations of a system happen after the attention of policy stakeholders was caused by external forces (McNew-Birren, 2015). As the fire service is a monopoly at the local level, each monopoly was held accountable to stakeholders. This included board members, taxpayers, elected officials, and employees. Tragic events contribute to changes in attention and encourage changes (John, 2003). Stakeholders are made aware of policy issues following a significant LODD of a firefighter and when such policy issues related to an LODD were highlighted through the public venue.

Policy Change from Tragedy

While it was understood that fire departments must have a clear set of policies that underline the procedures for safety, such SOP was considered minimalized in the face of a mandated policy implementation system. There was also the knowledge that radical policy change often depended upon the happenings of national fatalities, ignoring the problem at the state or local level with policies driven on the federal need. The recognized customs of the fire service culture suggested a holdfast repudiator principle in sticking to orthodox standards and practices from the past. Most departments remain resistant to adopting new policies even if they were deemed a safety concern implementation. This attitude equates with the punctuated equilibrium theory for policy change since policy, procedure, and practice changes come only after a tragedy occurs. This model aligns with this theme as the participants explained that changes to the policy were often only implemented after a catastrophic incident. For the fire service, a punctuated change is often a crisis event (Wodicka, 2013). Literature showed that policy monopolies of a public policy subsystem could hinder policy changes until the onset of a punctuated event which correlates to the comments made by the participants (Givel, 2010; Griffin, 2013).

Literature of Policy Implementation

The literature reviewed related to this theme was examined. The literature examined contributed to recognizing how the fire service culture contributed to a lack of major policy shifts. Yet, there remains a lack of understanding of decisions making the process of fire service policymakers regarding resistance to developing, implementing,

and enforcing national standards and industry-accepted practices (Griffin, 2013; Snyder et al., 2006; Wodicka, 2013). The authority having jurisdiction of a political subdivision is the policy monopoly of the fire service. A lack of professional competence and external interferences strengthens the power of fire service monopolies. The fire service historically follows a changing pattern of small policy changes over a long time, followed by a swift and momentous organizational crisis.

The cycle of long periods of stasis proceeding abrupt and significant policy changes caused by an organizational crisis is why punctuated equilibrium is the predominant theory of public policy for fire service (Wodicka, 2013). This first theme agrees that policymaking throughout the United States contributes to abrupt policy changes following a lengthy span of minor incremental policy developments commonly ignored by firefighters and by the public (Wodicka, 2013). All the participants shared that an LODD often resulted in changes in the way firefighters perceived policies. The NIOSH recommended that the fire departments develop, implement, and enforce SOPs to respond to roadway incidents, including SOPs for parking vehicles on the same side of the roadway as the traffic incident (NIOSH, 2004a).

Development of Policies is a Process

The development of policies was an overall perception from all the participants who felt that policy implementation was not consistent, nor was it a quick-moving process. Traffic incident line-of-duty firefighter fatality contributes to changes in fire department traffic incident management practices and policies. The standards associated with prevention policies for firefighter LODDs were similar to any federal, state, or local

policy development, a drawn-out process that failed to impact the necessary changes in protocols of SOPs.

The participants recognized that public perception was influential to developing policies, and this was framed on the knowledge that fire service was understood to be a customer service. Changes in society would impact policy development, and changes in long-standing policies often were forced based on the public response to an incident. The participants felt that this was the most detrimental to policy change and was significantly influential to incidences of LODD because the concern was not for the firefighter's safety but for the overall situation and how it appeared to the public. Changes in policies were found to occur only as needed and as the public forum demanded.

Even though the departments were responsible for an annual review of each respective department's policies, the participants relayed that most reviews were conducted on an as-needed basis. Often, these reviews occurred after a death or tragic incident occurred. Safety protocols were considered standard, with the public not concerned with the requisite and necessary changes until a public incident resulting in death occurred. The participants agreed that the most prevalent changes in policy occurred after changes or advancements in such factors as technology.

Technological Impact to Policy

Changes in technology were foremost an issue because of the implementation of such required the implementation of new techniques or changes in the long-standing response practices. Policies need to be changed when this occurred for the safety of the firefighters. This policy change must include education. When you have a policy put into

place because of a change in the technology or equipment that has been used for an amount of time, the acceptance of such policy will not occur without some education. At the same time, there may be a change in technology or another change that affects your current policy or procedure. And so, you must decide out what you need to change as far as the policy and to keep it all in line after. Most participants agreed that an implemented policy does not mean it was automatically accepted or even understood.

The process for the development of policies was not considered a streamlined or easy process. Nor was it a shared process unless the firefighters stand up and request changes. Even then, the process is long and drawn out. Typically, the chief and the assistants will review all policies to determine what needs to be changed, addressed, or what new policies need education. However, the procedures were often preset with high-level stakeholders making the changes or implementing the new. The participants felt that if any of the firefighters wanted to contribute to policy changes, policymaking became too long a process.

The literature recognized how the culture of the fire service contributes to a lack of major policy shifts. Yet, there remains a lack of understanding of the decision making process of fire service policymakers regarding developing, implementing, and enforcing national standards and industry-accepted practices. The fire service historically accepts and enacts small policy changes extending the span of a long period of time. An organizational crisis forces major policy changes in an abrupt span of time following the period of stasis. An organizational crisis is defined as an event that disrupts and damages the state of operations of an organization (Griffin, 2013; Snyder et al., 2006). An

occupational loss of life is usually a crisis event that forces fire service organizations to change and adopt national best practices, policies, and standards. The cycle of long periods of stasis proceeding abrupt and significant policy changes caused by an organizational crisis is why punctuated equilibrium is the predominant theory of public policy for fire service. (Wodicka, 2013).

Punctuated-Equilibrium and National Policy

The punctuated equilibrium framework concerning policymaking in the United States was consistent in being recognized by extended spans of minor modifications disrupted by short spans of momentous policy modification (Toavs, 2019). Policymaking throughout the United States contributed to sudden policy changes following a lengthy span of minor incremental policy developments (Sabatier & Weible, 2014). Major policy changes usually occur following the emergence of a crisis. The fire service historically allows small policy changes in times of stasis, proceeding a major change following an organizational crisis. One of the best-known examples of this sort of change is the growth and application of the national incident management system (Wodicka, 2013). During the 9/11 terrorist attacks, the tragedy observed contributed to the national incident management system (Wodicka, 2013). Before 9/11, the incident management system differed at each local level fire service organization. The incident management system also differed at the state and federal levels. Small changes of incident management and command evolved over a long span of time until rapid changes for each monopoly to adhere to sweeping changes in incident command. From the literature and the thematic results, there was a noticeable similarity in recognizing how policy implementation,

policy change, and policy acceptance often occurred only upon the results of a tragic event such as an LODD. Significant losses of life plague the history of fire service and protection in the United States. Several major fire events contributing to significant losses of human life could have been prevented by implementing modern fire protection practices.

NFPA Standards as the Minimum Safety Guideline

Contextually, the participants agreed that the NFPA provided the minimum safety guidelines for incident management policies and standards for preventing firefighter LODDs from secondary collisions at the scenes of roadway incidents following a traffic incident LODD. The participants' consensus suggested that they recognized how the NFPA standards were tried, tested, and validated. While the participants perceived that the NFPA was not mandatory, they did agree that such policy standards were nationally recognized as the minimum standard requirements for safety protocols. Several participants claimed that the NFPA standards existed only as a point of reference, noting that all departments make changes applicable to their area and not based on the universal standards. The NFPA standards only set the guidelines, and each department has the capability to change or mold such standards to suit their respective department. It was also noted and true that any adherence to the NFPA depended on the available budget within the department.

The common agreement that the NFPA standards are solely recommended practices; all the participants recognized the need to review the standards and apply the inner-office policy to come close to following such recommendations. However, as the

participants stated, some standards were based on changes outside of a department's budget. Specific to the NFPA standard for traffic control incident management professional qualifications, the policies that expected adherence from departments were established in policy and provided a solid direction for preventative measures. However, compliance with this policy was often difficult as there were variants between each department that may include who handles such policy implementation, how it is handled, and who is responsible for specific traffic incident management aspects.

NFPA Related Literature

In conjunction with the literature review, the results from the interviews substantiated the general perceptions from experts who claimed the lack of standardized qualifications between jurisdictional and disciplinary lines lead to the development and publication of a consensus standard aimed at traffic incident management (Lemons, 2013; Wieder, 2017). The NFPA develops publications of guides, codes, and standards intending to eliminate fatality, injury, property, and economic loss due to fire, electrical and other types of hazards. A standard is a document established by consensus that provides rules, guidelines, or characteristics for activities or their results. The standards provided by the NFPA are voluntary unless adopted by the authority having jurisdiction (Stowell et al., 2016). Standards are developed through consensus processes involving technical committees and industry-accepted professionals (NFPA, 2018b). The NFPA standards are universally accepted and espoused because they are established using an open, consensus-based process with various professional expertise (Emergency Response Safety Institute, 2015).

However, as the results showed, the NFPA standards do not consider personal incidences, singular departmental needs, or firefighter perceptions on such issues as with incident management policies and standards for the prevention of firefighter LODDs resulting from secondary collisions at the scenes of roadway incidents. Each NFPA publication, based on the chapter, focuses on different policy improvements but not on different policy improvements by the incident, even with the public outcry of disaster causation.

NFPA 1091

The focus of NFPA 1091 was not limited to fire departments but included such traffic incident responders as law enforcement, tow and recovery, EMS, public works, and transportation personnel. This multi-disciplinary publication includes JPRs, written by traffic incident responders and for traffic incident responders. Chapter 4 contains the JPRs or tasks traffic incident response personnel should perform to carry out traffic control incident management (Wieder, 2017). This chapter outlines nine job performance requirements and candidates must meet all nine JPRs requisite knowledge and skills defined in chapter 4 to be qualified as a traffic control incident management personnel (NFPA, 2014). Executing traffic control incident management activities is the primary function of traffic control incident management personnel.

NFPA 1500

Chapter 9 of NFPA 1500 is divided into three sections, emergency operations at traffic incidents, placement of apparatus and warning devices, and use of apparatus as a blocking device. The first section states that fire departments shall establish, implement,

and enforce SOPs that address responder operations in roadways, ensure personnel was adequately trained on traffic hazards and safety, and prepare to work concurrently with other response agencies (NFPA, 2018b). The second section states that apparatus and warning devices shall be deployed to effectively protect response personnel from traffic and warn approaching traffic of the traffic incident (NFPA, 2018b). The final section explained that the proper placement of response apparatus, traffic control devices, personnel placement, and proper personal protective equipment (NFPA, 2018b).

Limitations of the Study

The purpose of this research was to determine the chief fire officer's perceptions of incident management policies and standards for the prevention of firefighter LODDs resulting from secondary collisions at the scenes of roadway incidents. The question of whether the findings of my study could be extended across all parishes with fire departments in Louisiana remains open and requires further research. Another potential limitation of the study is the sample size. The research sample was not large enough to represent all firefighters in the state of Louisiana, much less represent all the firefighters in any one given parish within the state. However, studies conducted on large samples showed the impossibility of including an entire target population. This suggested that research was always limited, and generalizations were not absolute.

My study focused only on chief fire officers of paid civil service fire departments in the State of Louisiana. This was a necessary to limit my scope of research and to make this doctoral study more manageable.

Through the qualitative research and interpretation of findings, I overcame the apparent gap in the literature related to fire department incident management policies and standards for preventing firefighter LODDs resulting from secondary collisions at the scenes of roadway incidents. I contributed to a better understanding of such policy changes, thereby making reliable predictions of how the target group may encounter these factors. Gathering the primary data of the study, Louisiana served twofold as a place of margin, first for the lack of diversity by interviewees hailing from this single state and as a bias, in that Louisiana will be used theoretically to represent the totality of the fire service for the entire nation. One final limitation should be noted, the number of nonfatal struck-by incidents was precluded from NIOSH search results.

Recommendations

The current study was qualitative in nature and used a case study design, exploring chief fire officers' perceptions of incident management policies and standards for preventing firefighter LODDs resulting from secondary collisions at the scenes of roadway incidents. My recommendation for future research is that future research should cover and compare other geographic areas where these incidences occurred and where policies were changed, adapted, or developed from LODDs resulting from secondary collisions at the scenes of roadway incidents. Future research could employ a quantitative approach to reach a bigger sample size and obtain more generalizable results.

Future research into differing public service organizations that also share the responsibility of responding to and managing traffic incidents. Traffic incidents require a multidisciplinary response and approach for adequate management of the incident. Law

enforcement, tow and recovery, EMS, public works, are other public service organizations tasked with the responsibility of traffic incident response and management should ideally also be included in such a study. Future research could explore any one of the different organization's leaderships' perceptions of incident management policies and standards for preventing firefighter LODDs resulting from secondary collisions at the scenes of roadway incidents.

Another recommendation for further studies includes using quality assurance and safety reports to determine how such policy changes were feasible and provided a decrease in LODD incidences. Also, as the scope for this study covered exploring the implications of a firefighter line-of-duty roadside death on national policy-making procedures concerned with the issue and providing the proper training as to avoid the accidental fatalities of the firefighter in the future, the use of data should be incorporated with perceived information from the participants. A mixed-methods study would provide the wide context of collected data that would include the intensive but loosely structured first-hand interviews with chief fire officers in the Louisiana area, document reviews, field notes, and artifact and observational data correlating such to statistical data and providing more substantiated and reliable results.

Implications

Research implications include possible impacts on future studies or policy decisions for the prevention of firefighter LODDs resulting from secondary collisions at the scenes of roadway incidents, and could have wide-ranging implications that provide positive social change. The public policy process is complex due to the vast quantity of

diverse people seeking political influence (Sabatier & Weible, 2014). Each individual carry personal biases and beliefs that shape their political perspective and agenda. Generally, people can only focus on one issue at a time (Sabatier & Weible, 2014). However, the current research could provide a foundation for change in the community with policy development and changes incorporating all stakeholders. The policy level's positive social change could interest stakeholders who, as responsible parties for the policy process, review the current standing policies regarding the prevention of firefighter LODDs and make the necessary changes to processes for scenes of roadway incidents.

Further implications suggested that with public policy research, there is a need to study and better understand the interactions regarding public policy over time and incorporate environmental influences that may affect LODDs in firefighters, particularly those who work at scenes of roadway incidents that have dangerous circumstances that may result in death. The need for policy changes precedes a significant disturbance to a policy monopoly resulting in abrupt and rampant policy change based on punctuated equilibrium as described by my research. Human tragedies, developing technologies, scientific improvements, and financial disruptions historically contribute to abrupt policy changes in the fire service. Punctuated equilibrium implied the need for change to assist in protecting human life.

Conclusion

The investigation of chief firefighters' perceptions of incident management policies and standards for preventing firefighter LODDs resulting from secondary collisions at the scenes of roadway incident resulted in three themes. It implied that such

social changes could be made for the benefit of safety precautions against any future LODDs. The results agreed with the literature reviewed as most experts found a need to examine necessary changes in policies based on traffic control incident management. Also, there was an agreement between the participant's perceptions on incident management with the literature. The chief fire officers' perceptions of incident management policies and standards for preventing firefighter LODDs from secondary collisions at the scenes of roadway incidents following a traffic incident LODD included the positive and negative impact of policy implementation. Even with the implementation of existing policies, most participants also perceived that preventing firefighter LODDs from secondary collisions at the scenes of roadway incidents following a traffic incident LODD included the development of new policies. Both the participants and the literature agreed that policy development was a process involving reviewing current policies and practices, the review of the need for a new policy, a team of policymakers, and a timeframe. The agreement extended to the knowledge that policies needed to be updated when gadgets and equipment used during duty were technologically upgraded. As well, literature and participants agreed that a process of developing a policy, regardless of reason, was for the sole purpose of providing fire service to the public.

Foundation to Fire Service Policy

The prevention of firefighter LODDs from secondary collisions at the scene of roadway incidents following a traffic incident LODD was the basis for the participants' perceptions. They believed that the NFPA was the foundation for the development and implementation of policies and standards. According to most participants, NFPA was

currently not a requirement but a recommendation or a reference for safety standards. Nonetheless, the participants generally treated the NFPA as the minimum safety guidelines applied nationally, similar to the constitution. Furthermore, most participants perceived that NFPA, particularly NFPA 1091, provided direction for the department.

Predominate Fire Service Theory

The alignment of the themes with the current literature reviewed in this research suggested that punctuated equilibrium was related to the fire service and the traffic incident management. Whereas punctuated equilibrium was considered the small gradual amendments to policy development but could lead to a sudden, large change, often caused by crises, future stakeholders involved with the fire department policy development necessitates change and awareness of the issues revealed in this study. The evidence showed that firefighters were susceptible to various health concerns related to traffic incident management and response. As such, hazards associated with traffic incident response may lead to significant injury or death, supporting the immediate need for revision of the most prevalent policies.

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Appendix A: Table 2 (Tragic Historical Fire Service Incidents)

Table 2

Tragic Historical Fire Service Incidents

Year	Name of Fire	Deaths	Reported contributions to the fire or event	Reference
1871	Great Chicago Fire	300 civilians	Lack of adequate building & fire codes	(History, 2010)
1911	Triangle Shirtwaist Fire	146 civilians	Lack of fire and life safety regulations and enforcement	(Von Drehle, 2004)
1942	Cocoanut Grove Nightclub Fire	149 civilians	Overcrowding of the occupancy, combustible interior finishes and decorations	(Stowell & Murnane, 2013)
1944	Ringling Brothers and Barnum and Baily Circus Fire	168 civilians	Flammable materials were used to waterproof the canvas tent	(Stowell & Murnane, 2013)
1958	Our Lady of the Angels School	95 civilians	Lack of fire detection & alarm system	(Stowell & Murnane, 2013)
1970	Laguna Fire	5 civilians	Lack adequate Incident Management practices	(FIRESCOPE, 2016)
1980	MGM Grand Hotel Fire	85 civilians	Lack of sprinklers; flammable furnishings & wall coverings	(Stowell & Murnane, 2013)
1995	Oklahoma City Bombing	186 civilians	Ineffective communication, inter-agency coordination and incident management	(Maningas, Robison & Mallonee, 1997)
2001	9/11 World Trade Center	3,000 civilian / 343 firefighters	Ineffective communication, inter-agency coordination and incident management	(U.S. House of Representatives, 2006)

Table 2 (continued)

Historical Tragic Fire Service Events in the United States

Year	Name of Fire	Deaths	Comments	Reference
2003	Southern California Wildfires	24 civilians	Lack of governmental planning and preparation	(Blackwell & Tuttle, 2003)
2003	Station Nightclub Fire	100 civilians	Lack of sprinklers, flammable wall coverings & overcrowding	(Gutman, Biffl, Suner, & Cioffi, 2003)
2007	Super Sofa Fire in Charleston	9 firefighters	Lack of incident command	(Bryner, Fuss, Klein, & Putorti Jr, 2011)

Appendix B: Table 3 (NIOSH Firefighter Struck-by Fatality Reports Since 2000)

Table 3

NIOSH Firefighter Struck-by Fatality Reports Since 2000

Year	Location	Gender	Age	Type	Investigation Recommendations
2001	New York	Male	48	Volunteer Firefighter	Traffic Incident Management SOPs
2002	Mississippi	Male	19	Volunteer Firefighter	Traffic Incident Management SOPs
2002	Minnesota	Male	28	Volunteer Firefighter	Traffic Incident Management SOPs & Training
2003	Texas	Male	20	Volunteer Firefighter	Traffic Incident Management SOPs & Training Personal Protective Equipment
2003	Minnesota	Male	49	Volunteer Firefighter	Traffic Incident Management SOPs & Training Personal Protective Equipment
2010	South Carolina	Male	23	Paid Firefighter	Traffic Incident Management SOPs & Training Personal Protective Equipment Advanced Warnings
2012	California	Male	35	Paid Firefighter	Traffic Incident Management SOPs & Training Personal Protective Equipment Advanced Warnings
2012	Arkansas	Male	56	Paid Firefighter	Traffic Incident Management SOPs & Training
2014	Texas	Male	40	Paid Firefighter	Traffic Incident Management SOPs & Training Inclement weather planning

Appendix C: Interview Guide

1. How many years have you served as a Chief Fire Officer?
    a. Describe your duties and responsibilities as a Chief Fire Officer?
    b. Describe your background within the fire service, including training, education, experience, and years of service.
    c. How would you describe your role and responsibilities as a Chief Fire Officer relating to the fire service as a profession?
2. Explain the process of policy, procedure, and/or guideline development and implementation for your department.
    a. What influences and contributes to policy, procedure, and/or guideline development and implementation?
    b. What influences and contributes to policy, procedure, and/or guideline changes?
3. Describe your perspective of National Fire Protection Association (NFPA) Standards?
4. In your perspective, what role does the NFPA Standards have toward the fire service?
5. Explain the process of adopting NFPA Standards into policy for your fire department?
    a. Explain the benefits and limitations of adherence to NFPA Standards regarding your fire department?

6. Explain the procedure and/or process regarding your fire department's response and incident management practices for roadway incidents.
7. How is knowledge of a firefighter line-of-duty fatality disseminated throughout the fire service?
    a. Following a line-of-duty death, what is the process in the fire service and within your department?
    b. How does a firefighter line-of-duty death impact the fire service?
8. What is your perception regarding what contributes to a firefighter line-of-duty fatality at roadway incidents?
9. Please describe your perspective on this firefighter line-of-duty death case and how this may impact the area fire service.
10. Explain the training and qualifications for personnel responding to and managing a roadway incident.
11. What are your thoughts on NFPA 1091, the Standard for Traffic Control Incident Management Professional Qualifications?
    a. What is your perception of NFPA 1091 relating to this line-of-duty death case?
12. What are your thoughts on NFPA 1500, the Standard for Fire Department Occupational Safety, Health, and Wellness Program, Chapter 9 Traffic Incident Management?
    a. What is your perception of NFPA 1500 Chapter 9 relating to this line-of-duty death case?

13. What are your thoughts on Traffic Incident Management training?
    a. What is your perception of Traffic Incident Management training relating to this line-of-duty death case?
14. Does this firefighter line-of-duty death case change, influence or impact your perspective on National Traffic Incident Management standards?
    a. If so, how does this firefighter line-of-duty death change influence or impact your perspective on National Traffic Incident Management standards?
15. In your opinion, explain what could mitigate firefighter line-of-duty deaths at roadway incidents?
16. Do you have any additional thoughts or comments related to this case and the topics addressed during this interview?

Appendix D: Letter to the Louisiana Fire Chiefs' Association

To: Louisiana Fire Chiefs' Association
From: Firefighter/Operator Charles David Hughes
Re: Research Support

I am pursuing my PhD. In Public Policy and Administration. Research and a dissertation is required to complete this goal. I hope to focus my research on the perceptions of Chief Fire Officers regarding Traffic Incident Management policies and standards with consideration to a roadway line-of-duty fatality. I am seeking a letter of support from association endorsing this research topic. All future participant information will be confidential and anonymous. This letter may be instrumental in gaining approval from the University to conduct my research.

An average of five firefighters die annually due to secondary crashes during a roadway incident (United States Fire Administration, 2012). Firefighter fatalities at roadway incidents continue despite National Fire Protection Association (NFPA) standards and training aimed at mitigating risks through traffic incident management. Statistics indicate that the number of struck-by crashes is increasing (Yu, Bill, Chitturi, & Noyce, 2013). These traumatic incidents may result in significant negative consequences for many years following the event.

Fatality investigations conclude that the lack of the development, implementation, and training on Traffic Incident Management SOPs contributes to traffic incident line of duty deaths (Emergency Responder Safety Institute, n.d.). Researchers have found that the majority of line-of-duty fatalities are preventable through the implementation of proper professional standards (Onieal, 2016). This study will contribute to the literature by providing data that may help mitigate roadway line-of-duty deaths of emergency response personnel.

Thank you for your consideration.

Respectfully,
Charles D. Hughes

Appendix E: Letter of Endorsement from the Louisiana Fire Chiefs' Association

Charles David Hughes

Dear Charles:

I write on behalf of the Louisiana Fire Chiefs Association (LFCA) in support of your dissertation research topic: Perception of Chief Fire Officers Regarding Traffic Incident Management Policies and Standards with Consideration to a Roadway Line-of-Duty Fatality.

The LFCA is an organization charged with promoting the welfare of all Louisiana firefighters; as such, we encourage research aimed at improving the health and safety of those in the fire service. Your research topic addresses this mandate of the LFCA by providing data that may help mitigate roadway line-of-duty deaths of emergency response personnel. It is for this reason that the LFCA advocates the intent of your dissertation and research topic.

We look forward to the data your research and dissertation will provide and wish you the best of luck in creating a positive impact for fire-safety personnel. If there is anything else that LFCA can do to assist you, please do not hesitate to ask.

Sincerely,

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