

**Pennsylvania Fire and Rescue Services in Suburban and Rural Communities: Providing
Adequate and Sustainable Fire Protection Services**

Research Presented in Partial Fulfillment
of the Requirements for the
Executive Fire Officer Program

Curvin L Wolfgang, Jr.

National Fire Academy

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Abstract

In 1974, Governor Shapp of Pennsylvania directed a commission to study the impact of fire and recommend ways to respond and prevent the loss of life and property within the Commonwealth. This commission produced a report titled *Pennsylvania Burning* (1975) that detailed several concerns, including the inadequacy of almost 72% of the commonwealth's fire protection due to poor training and communities' inability to determine the level of fire protection needed. Two additional commonwealth-appointed commissions examined Pennsylvania's fire problem in subsequent decades and reported similar concerns. Additionally, these studies identified a significant decline in volunteers and extreme variations in the level of fire services delivered throughout the Commonwealth. With a decline in volunteer participation and increased demand for fire services, many rural and suburban communities face the problem of determining ways to provide adequate and sustainable fire protection for their communities without definitive guidance from the commonwealth. Through an extensive literature review and using a modified Delphi research methodology, this study assembled a group of Pennsylvania fire service experts to determine a solution, through consensus, to help communities within the Commonwealth provide adequate and sustainable fire protection. Recommendations arising from this research are (a) adoption of statewide minimum standards of cover to ensure an adequate level of fire protection for communities and (b) statewide adoption of minimum training and qualifications for firefighting personnel to maintain a safe and effective delivery of these services.

Keywords: Pennsylvania fire service, standards of cover, firefighter training, qualifications, certification, and volunteer

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CHAPTER 1. INTRODUCTION

The Commonwealth of Pennsylvania has a long fire service history dating back to 1736 when Benjamin Franklin co-founded the Union fire company in Philadelphia, Pennsylvania, which would become a nationwide model for volunteer fire departments. The issue Pennsylvania is facing is that the model of providing fire and emergency service through a volunteer staffing model has become problematic for many communities. Pennsylvania has seen a decline in volunteer firefighters from an estimated 360,000 in the 1970s to just over an estimated 36,000 in 2018 (Commonwealth of Pennsylvania [PA], 2018). The lack of volunteers and increased demand for services is causing many communities to look for alternatives to provide fire protection to their communities. In essence, the model created in 1736 is unsustainable and has been for decades. A foundational issue that communities are facing is determining the appropriate level of fire protection service they need to provide. Currently, Pennsylvania lacks universally mandated training and service levels that fire departments must achieve and maintain, creating variation in service and response to emergencies throughout the commonwealth.

Background

In the Commonwealth of Pennsylvania, over 90 percent of communities receive fire protection from independent volunteer fire companies (U.S. Fire Administration [USFA], 2022b). Many of these agencies operate independently with little to no formal state or local oversight. While the volunteer fire service model provides a cost-effective solution for smaller communities lacking the financial resources or needs for a fully staffed paid fire department, it does have limitations. The decline in volunteer numbers and increased demand for fire services is challenging the historical model of providing fire and emergency services with strictly volunteer agencies (PA Township News, 2022).

While Benjamin Franklin is credited with co-creating the model volunteer fire service, it was not until 1974 that Pennsylvania would thoroughly review the issue of fire protection as a statewide problem. Under the direction of Governor Shapp, a commission would be appointed to study the fire problem within the Commonwealth and then report back to the Governor with their findings. In 1975 this commission released the results of this study, named appropriately "Pennsylvania Burning" (Governor's commission on fire prevention and control, 1975). This report made several points about the loss of life and property, due to fire, throughout the commonwealth. The central theme of these points is that "hardly anybody cares [about the fire problem]" (p. 1). In addition, the commission pointed out that citizens, builders, governing bodies, manufacturers, and even the fire service seemed not to be actively engaged in finding solutions to the fire problem.

Over the last few decades, many studies, including those commissioned by the Commonwealth legislature, highlighted the need for improving emergency service delivery through the adoption of policies that mandate minimal standards of cover, minimum training for personnel, and adequate funding to support these efforts (Commonwealth of Pennsylvania, 2004; 2005; 2018). However, communities throughout the Commonwealth continue to face the challenge of providing these essential services and still lack sufficient guidance on how or what the minimal level of service should be acceptable for their communities. Without definitive emergency service delivery guidance from the commonwealth, many communities may need to rely on local opinions, locally commissioned studies, governmental cooperatives, and national consensus standards.

While some agencies may choose to self-assess, other participate in programs such as the Center for Public Safety Excellence (CPSE) accreditation program that evaluates an agency's operation through a peer review process and then issues a certification based on passing the

evaluation process. Currently, there are only three CPSE accredited fire agencies in the Commonwealth (Center for Public Safety Excellence [CPSE], 2022). The Pennsylvania Office of the State Fire Commissioner (OSFC) also provides a voluntary recognition program based on the certification level of their personnel, but similar to the CPSE program; there is minimal participation in the program, with only thirty-one agencies meeting the 100% participation level (Office of the State Fire Commissioner [OSFC], 2022). While these programs may be beneficial to individual agencies, a limitation of these types of processes is that they are specific to an individual agency and may not encompass emergency services within a community or region.

This variation in service and lack of minimal standards can create service disparities, even for adjoining communities. For example, in some cases, communities may provide a high level of all-hazards emergency services with qualified staffing 24 hours a day, every day of the year (VFIS [VFIS], 2018). In contrast, a neighboring community with similar demographics may be unable to provide a consistent response due to "insufficient manpower to accomplish all required tasks" (Catino, 2015, p. 1). Additionally, Pennsylvania consistently has one of the highest firefighter line-of-duty death rates in the nation (U.S. Fire Administration [USFA], 2022a), along with a higher than national average civilian fire death rate (USFA, 2022b). Another factor is how to adequately fund these organizations when there is a lack of guidance on the level of service that these organizations should provide.

As pointed out by each of the studies commissioned by the commonwealth, there is a need for minimum standards of cover, minimum qualifications, and education of local community leaders to adequately address the variation and inequality of emergency services throughout the Commonwealth (Commonwealth of Pennsylvania, 2004; 2018). In addition, reforms to how current funding is dispersed and expended, along with financial oversight, may also be a solution to help communities provide essential emergency services. Finally, as the

decline of volunteer firefighters continues, guidance from the Commonwealth for alternatives in delivering emergency services may be needed. While the efforts to recruit and retain volunteers are essential, communities may need an alternative solution if those efforts fail. Pennsylvania mandates that communities ensure adequate fire and emergency services are provided to the community. However, as identified in Pennsylvania Burning, S.R. 60 (2004) and S.R. 6 (2018) reports, many communities may lack the knowledge, guidance, and financial support to meet the mandate.

Significance of the Study

By looking at the need for adequate fire protection through the lens of community leaders and fire service stakeholders, we can compare how communities determine the adequacy of the current fire protection services and provide insight into how community leaders and fire service stakeholders plan to provide adequate and sustainable fire protection to their communities in the future. While many studies focus on the decline of volunteerism and ways to recruit and retain additional volunteers, there are significant gaps in relevant studies that provide data on how communities determine the services they need. The data collected from this research aims to discover information that may help municipal officials, fire service professionals, and state legislators determine solutions to provide safe, sustainable, and adequate fire protection throughout the commonwealth. The Center for Public Safety Excellence (CPSE)(2020) stated in their 21st-century fire and EMS services white paper, "If the fire and emergency services hope to sustain itself in the future, it must be willing to redesign itself and address the issues that are having a negative impact on the service today" (p. 21).

Problem Statement

Over the last several decades, Pennsylvania has seen a significant decline in active volunteer firefighters (Miller, 2015). With the majority of Pennsylvania fire departments relying on

volunteer personnel, the problem of providing adequate fire and emergency services for communities continues to grow as these volunteer agencies may no longer be able to provide the service the community needs (PA Township News, 2022). Diminishing volunteers, along with an increase in service demands, has caused communities to derive solutions to provide fire protection through other means, which includes adding paid staff, contracting with other agencies, or in some cases allowing the status quo and allowing fire service agencies to operate without adequate training and personnel. The difficulty for some communities is that there is currently no statewide mandate on minimal qualifications or standards for how fire departments provide service to the community. Without mandated minimum standards, communities may face the reality of not knowing if the service provided by the fire departments is adequate to meet the community's needs (Commonwealth of Pennsylvania, 2004; 2018; Yarnal & Dowler, 2002).

Purpose Statement

In the absence of mandated standards related to the delivery of fire protection, this research assesses how municipal and fire service leaders within Pennsylvania determine the adequacy and level of fire protection needed in their communities. This work will also provide significant information that can help guide future research and policy by identifying the key factors municipal and fire service leaders view as most important in providing adequate and sustainable fire protection to the community.

Research Question(s)

RQ. What strategies or solutions can assist communities within the Commonwealth of Pennsylvania in ensuring adequate and sustainable fire protection?

SQ. What barriers exist or may arise that may prevent these strategies from being implemented?

SQ. Based on the identified solutions, which are the highest priority for the Commonwealth of Pennsylvania to address immediately?

Summary

Pennsylvania has a long history of volunteer fire protection and emergency services, and over 90% of Pennsylvania fire departments remain mostly or all-volunteer (USFA, 2022b). However, as communities grow and volunteers willing and able to serve as firefighters decline, communities face the need to continue providing adequate fire protection with limited or no volunteer staffing. Throughout the next chapter, we will explore existing literature, including academic studies, regional municipal studies, and other published information that will provide more insight into the issue. Chapter three will explain the methodology and research design utilized to explore the issue further and from the data collected and analyzed; chapter four will detail the findings discovered throughout this project.

CHAPTER 2: LITERATURE REVIEW

Introduction

This chapter provides a detailed accounting of the existing literature reviewed for this study. The literature sources include state, regional, and local studies, demographic data, and additional academic research related to fire and emergency service best practices. Each section of the literature review provides insight into specific areas of the current Pennsylvania fire and emergency service, including historical perspectives. The literature review begins with an overview of current Pennsylvania fire service demographics and its effectiveness compared to other states. The review then provides a detailed account of previous reform efforts recommended by studies commissioned by local, regional, and state entities. Additional literature from numerous academic journals and published industry standards and recommendations assist in capturing the essence of the challenges of providing emergency services throughout the commonwealth, including funding and the health and safety of Pennsylvania fire service personnel.

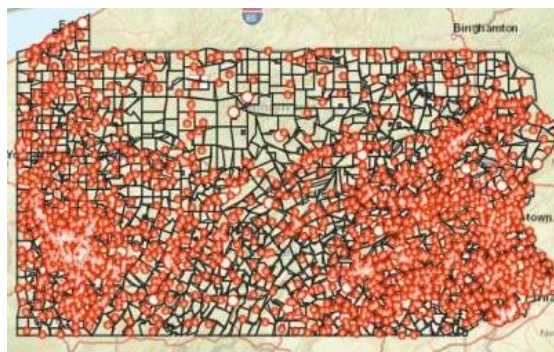
The Pennsylvania Fire Service

According to data provided by the Office of the State Fire Commissioner of Pennsylvania and the U.S. Fire Administration, Pennsylvania is home to the most fire departments in the United States. However, depending on the source, the number of actual fire departments varies from approximately 1,800 (USFA 2022b) to 2,400 (OFSC 2022). Even data collected from Commonwealth websites and reports showed numbers that varied greatly. The reason for this appears to be the inconsistent definition of what defines a fire department. For example, if we were to use data that included only fire departments that reported their incident responses to the commonwealth, then the number of fire departments would be 1,948 (see Figure 1). In

comparison, the state with the second most fire departments is North Carolina, with 1,090 registered with the U.S. Fire administration (2022).

Figure 1

Fire Departments in Pennsylvania



Note. Data: Office of the state fire commissioner (2019)

Along with an estimated 2,000 individual fire departments, mostly volunteer, Pennsylvania has 2,561 separate municipalities responsible for providing emergency services, including fire protection (Pennsylvania Department of economic development [DCED], 2022). In most Pennsylvania municipalities, this means either having or supporting a municipal-based fire department, independent volunteer, contracting services, or relying on neighboring communities to provide fire protection. Unfortunately, while these municipalities may bear the responsibility, the Commonwealth offers little guidance on how to meet that responsibility. Without formal regulation, this results in variation and duplication of services throughout the commonwealth, "Pennsylvania has more fire companies than any other state and, in some cases, multiple companies in close proximity are resulting in an unnecessary and inefficient overlap and duplication of firefighting resources" (Commonwealth of Pennsylvania, 2004, p. 8).

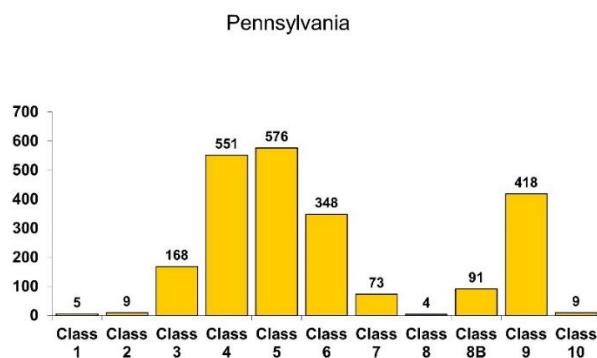
Effectiveness

With the number of fire departments throughout the Commonwealth, one would imagine that the safety and welfare of its citizens must be one of the best in the United States, but with limited data and a lack of adequate resources, the overall effectiveness is difficult to measure. Pennsylvania consistently has one of the highest civilian and firefighter death rates each year (USFA, 2022b). Li et al. (2017) considered fire protection as a two-part system—prevention and suppression. Looking at data that included fire loss, life and property, and financial investment from the states, the authors concluded that Pennsylvania is one of the least efficient states in providing fire protection (Li et al., 2017).

Another indicator of the effectiveness of the Pennsylvania fire service is data provided by the Insurance Services Office (ISO) that classifies the level of fire protection available to communities throughout the United States—using a scale of 1 to 10, with 1 being a superior level of protection and 10 that does not meet the standards for adequate protection as defined by ISO. Most communities in Pennsylvania received a score of 5 to 10, with only 14 communities receiving a score of two or better (Insurance Services Office [ISO], 2022), as indicated below in Figure 2.

Figure 2

Distribution of Communities by PPC Class Number within Classification, Pennsylvania

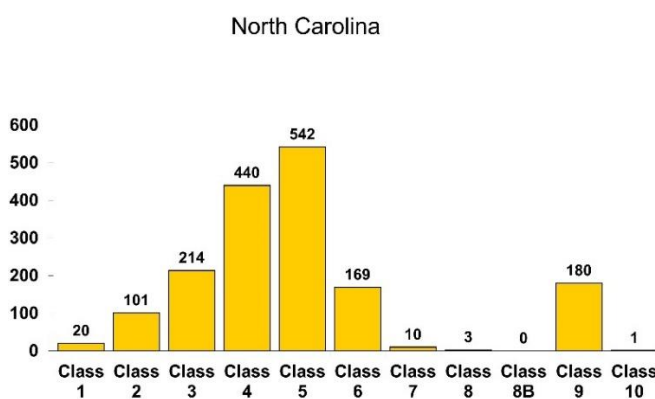


Note: Based on criteria set forth by the Insurance Services Office (ISO, 2022)

If we compare Pennsylvania's ISO class rating to neighboring states, Pennsylvania has the least effective fire protection level based on the ISO data. Most Delaware, Maryland, New York, Ohio, and West Virginia communities received ratings of class 5 or better, and New Jersey saw most communities at class 4 or better (ISO, 2022). Compared to North Carolina, the state with the second most fire departments in the U.S., North Carolina communities receive a higher average classification level than Pennsylvania. (Figure 3)

Figure 3

Distribution of Communities by PPC Class Number within Classification, North Carolina



Note: (ISO, 2022)

Pennsylvania commissioned studies

A significant portion of the literature contributing to this review comes from studies and reports commissioned by the Commonwealth of Pennsylvania. In 1974, the Commonwealth recognized the importance and problem of delivering fire and emergency services in the Commonwealth. In a report from the Governor's Commission on fire prevention and Control, the authors would release the results of this study, appropriately named "Pennsylvania Burning" (Governor's commission on fire prevention and control, 1975). This report made several points about the loss of life and property due to fire, throughout the commonwealth. The central theme

of these points is that "hardly anybody cares [about the fire problem]" (p. 1). In addition, the commission pointed out that citizens, builders, governing bodies, manufacturers, and even the fire service seemed not to be actively engaged in finding solutions to the fire problem. They would add if government bodies cared:

There would be more than only one-quarter of Pennsylvania's municipalities with fire or building codes, there would be more paid firefighters, and volunteers would be spending their time training instead of having to resort to raffles, tag days, and carnivals to raise money for equipment and operations. (p. 1)

While there may have been a few efforts at a statewide level after the 1975 report, it was not until 2004 that a blue-ribbon commission appointed by the state legislature would once again examine the Pennsylvania fire service system. In this study, they would also recognize the demands Emergency Medical Services (EMS) are placing on communities and would consider this as part of the scope of the study, thus using the term "emergency services" instead of fire agencies. This commission, appointed by an act of the legislature, Senate (S.R) 60 2003, would appoint a commission to reexamine the fire and emergency service delivery within the Commonwealth. The act of the legislature was precipitated by stakeholder groups that identified serious issues developing within the fire and EMS within the commonwealth. As a result of this commission's work, 23 recommendations would be made to the legislature for review and future policy enactment. These recommendations vary from enacting financial and administrative reforms to assisting agencies in establishing minimum standards of cover (Commonwealth of Pennsylvania, 2004).

The commission's first recommendation was to adopt "consistent statutory requirements" (Commonwealth of Pennsylvania, 2004, p. 22), stating that "lack of consistency creates a dilemma in the expectation of the citizenry, as well as service providers and elected officials as

the service delivery system can change from municipality to municipality" (p. 22). The second recommendation provided by this commission was to enact a "service delivery model" (p. 23) that could guide municipal governments in evaluating the level of service being provided. In this recommendation, the authors stated:

Currently, most elected officials do not understand the varying levels of capabilities of their Emergency Service departments to respond to incidents. This lack of understanding leads to unaccountable emergency services as well as inadequate, variable, or redundant service levels, which adversely affect cost-effective performance and appropriate distribution of needed funding. (p. 23)

This recommendation went on to add that not only should there be consistent standards, but there should also be processes in place to ensure the emergency services are meeting those standards prior to receiving any state funds (Commonwealth of Pennsylvania, 2004).

While some reforms were considered and some portions of the recommendations adopted, including sprinkler initiatives, the Pennsylvania Fire Service would not see any significant changes or improvements. Some legislation adopted (Act 7, Act 8, Act 9, and Act 31 of 2008) meant to address their first recommendation, consistent statutory requirements, seem to have failed to meet the recommended requirements, which intended the legislature to guide municipal leaders on ways to improve consistency of emergency services. It changed the language in specific regulations to solidify the requirements of Pennsylvania municipal governments to provide adequate emergency services but still leaves the responsibility of determining what is adequate to the local elected officials, who are then required to meet annually with local emergency services to determine the needs of the community. In admission from Commonwealth emergency service leaders as of 2018, "[m]any local government still do not hold annual meeting[s]" (PA, 2018, p. 77)

With the Pennsylvania emergency service still declining in service and volunteers, the Pennsylvania state legislature would again appoint a special commission in 2017, authorized by S.R. 6 (2018). Using foundational documents such as Pennsylvania Burning (1974) and the S.R. 60 (2004) report, the S.R. 6 (2018) commission would once again examine emergency service delivery and funding in communities throughout the Commonwealth. S.R. 6 (2018) would also review previous recommendations found in S.R. 60 (2004) and provide an update on where these recommendations stand in the context of adopted legislation. Of the 28 recommendations from S.R. 60 (2004), only eight were adopted, and a few more are in the legislative process (PA, 2018). The S.R. 6 (2004) report would provide 27 recommendations and echo many of the findings from previous studies, including Pennsylvania Burning (1974) and S.R. 60 (2004).

While many recommendations provided by the S.R. 6 (2004) committee considered ways to improve volunteer recruitment and retention, regionalization efforts, and financial and regulation reforms, the most striking is recommendation three, which recommends initiatives to "ensure minimum fire and EMS coverage through government partnership" (PA, 2018, p. 19). Recommendation three again addresses the lack of consistent emergency services throughout the Commonwealth and even makes the point that the emergency service should be considered essential, similar to other services such as education and law enforcement. Recommendation 16 also relates to earlier commission recommendations that point out that many local governments do not understand the operational, financial, and administrative needs of local emergency services, recommending that the Commonwealth should aid in educating communities about these needs.

Emergency Medical Services (EMS)

In Pennsylvania, the Emergency Medical Services (EMS) system is regulated separately from the fire service, with the Pennsylvania Department of Health (PADOH) providing regulation and oversight to agencies providing EMS services within the Commonwealth. There is a mix of public and private ambulance services in Pennsylvania, including a significant portion of volunteer-based public systems, with some integrated with local fire agencies (County Commissioners of Pennsylvania [CCAP], 2019). While local municipalities within Pennsylvania are responsible for ensuring adequate EMS services, PADOH provides very specific guidance on providing EMS services. As with the current fire service in Pennsylvania, EMS was once considered a local issue, with many communities establishing non-profit ambulance services staffed with volunteers. However, it was not until the passing of the Emergency Medical Services Act of 1985 that Pennsylvania would begin to create a consistent statewide system for EMS delivery (Commonwealth of Pennsylvania [PA], 1994). The purpose of this act is to "assure readily available and coordinated emergency medical services of the highest quality to the people of Pennsylvania" (p. 2). Additionally, this act would direct the PADOH secretary to "plan, guide, assist and coordinate the development of areawide emergency medical services systems into a unified Statewide system and to coordinate the system with similar systems in neighboring states" (p. 6).

Since adopting the EMS Act, Commonwealth EMS are generally independently operated but must receive a license by meeting PADOH guidelines and regulations to provide services. In addition, personnel must meet a certain level of training and certification and continue to maintain that training and certification to serve as prehospital emergency healthcare providers (PA, 1994). As the EMS system continues to evolve in Pennsylvania, even with PADOH guidance and oversight, there is still a concern that local communities may not be able to manage

an EMS system to meet the needs of their communities. In 2019 the County Commissioners Association of Pennsylvania (CCAP) recognized that communities might need to consider alternative service delivery models to provide EMS in their communities. As stated in the 2019 CCAP EMS task force report, "CCAP membership found that counties recognize that their municipalities have varying capacities to organize, promote, or provide emergency services and that the traditional reliance on volunteers and third-party providers does not match current societal engagement" (p. 2).

As previously stated, EMS and fire services are considered separate entities within Pennsylvania, but there are instances where the lines between EMS and Fire become blurred. For instance, in western portions of Pennsylvania, the rescue of victims from vehicles, confined spaces, water, and other types of hazards may be part of the EMS service and not the responsibility of the Fire Department. In other Commonwealth areas, rescue services may solely depend on the fire services. While current legislation does not define which agencies are responsible for specialized rescue services, there is some thought that rescue services are part of the EMS and fire service missions; Dr. Dave Johnson stated, "if there is a patient [needing to be rescued] then it must be an EMS incident" (personal communication, February 23, 2021). While the Commonwealth does not have mandated requirements for services that provide specialized rescue, a program jointly managed with the Office of the State Fire Commissioner (OSFC), and PADOH allows fire and EMS agencies to voluntarily certify to a basic, operational, or advanced level for vehicle and machinery rescue and one of five levels offered for water rescue (Pennsylvania Office of the State fire Commissioner [OSFC], 2022).

Regional studies

Along with commonwealth-commissioned studies, a large volume exists of local and regional studies published on the delivery of emergency services in Pennsylvania. One reason for

this may be the lack of specific guidance from the Pennsylvania legislature. Bacha et al.(2019) reviewed the fire and EMS services of Allegheny County to develop models to mitigate the crisis of declining volunteers. This study highlighted the number of municipal governments and fire departments within Allegheny County, pointing out that Allegheny County has more fire apparatus than New York City, which has a population of 8.6 million, and Allegheny county's population is just 1.2 million. The authors also compared Mecklenburg County, North Carolina, which has a population of 1.1 million, and found their apparatus count was just under 60 units, "The overabundance of major fire apparatuses causes questions of duplication and cost-effectiveness. While the volunteer fire department crisis continues and affects our ... communities, the cost of duplicative equipment could mitigate issues of staffing" (p. 6). In conclusion to this study, the authors point out that while many fire departments in Allegheny County are independent non-profit organizations, conversations need to occur at the municipal level when looking for staffing strategies.

Zoë et al. (2021) reviewed emergency service delivery in Allegheny County. Their study found similar themes discussed by Bacha et al. (2019) that present barriers to efficient fire and emergency service delivery within the county. At the core of the problem was the structure of the systems of government within the commonwealth-- "fragmented local government has...led to service duplication and gaps in service coverage. With municipalities ranging in size from 0.01 to 55 square miles, decentralization in Allegheny County has created a complicated web of service provision within its boundaries, particularly for fire services" (p 1).

Zoë et al. (2021) also provided additional findings in their study that expressed the need to adopt service standards to provide accountability and equity across the jurisdictions in the county. "Standardizing minimum service and training levels can increase jurisdictional equity in the region, where fire protection is determined by the wealth of a community" (p. 13). The

authors reference the recommendations of the S.R. 60 (2004) report that guides determining the service levels needed for the community. As Balsamo (2009) points out, standards adopted in one municipality may not be the same as those in others. While the data provided in Zoë et al. (2021) study was in-depth and offered insight into the problem, the most striking finding made was;

...[Officials] acknowledge[ing] that measures to address these problems will start through conversations between municipal officials and fire chiefs. Unfortunately, we also discover that there has been no increased capacity to collaborate between fire chiefs and elected officials, whether due to lack of oversight, lack of pedagogical training for volunteer fire chiefs to reach out to elected officials, or the continuous succession of elected officials by-elections. (p. 8)

Studies that looked at other areas of the Commonwealth or the Commonwealth as a whole seemed to provide similar data and conclusions, including a study performed by VFIS (2018). This study pointed out that "severe lack of funding, reduced staffing (related to changing volunteer commitment and demographics), increased political strife, and failings in the service delivery model are all contributors to this crisis" (p. 3). The lack of statewide mandates and regulations has resulted in individual agencies and local jurisdictions providing varying levels of service that may not be adequate for the community. Additionally, the lack of uniform standards of cover has resulted in duplication of efforts that strains staffing and financial resources and does not provide equitable service to the citizens of Pennsylvania.

Requirements and Standards

While Pennsylvania has mandated standards that must be met for EMS services to provide care within the commonwealth, Pennsylvania does not currently have any regulations, standards, or requirements for agencies to serve as fire departments. While some communities

within the Commonwealth may require agencies to meet specific requirements, such as local ordinances and consensus standards, or provide evidence of meeting best practices, this remains a local decision and may vary from one community to another or change depending on changes in local governance (PA, 2018). This lack of regulation extends beyond just the fire service agency; there is also a lack of mandated requirements for individuals performing direct fire suppression activities. While the OSFC provides extensive training, education, and nationally accredited certification testing, it is up to the individual or agency if they choose to pursue or be required to obtain the training and certifications offered (OSFC, 2022).

Like the voluntary rescue certification program, the OSFC allows fire departments to participate in a voluntary department certification program. This program allows agencies that meet specific requirements to obtain recognition as a bronze, silver, or gold-certified agency. This program requires an agency to achieve and maintain a certain percentage of certified personnel within their agency to receive certification. For example, if an agency has at least 50 percent of their personnel certified, they would be classified as bronze, 75 percent or more, silver, and an agency with all personnel holding a certification would achieve the gold level. Based on the guidance published by the OSFC, agency personnel only need to obtain a certification presently offered by the OFSC, except for a hazardous material awareness training certification. The fascinating part of this requirement is that an agency could have all its personnel certified to levels requiring no fire suppression or rescue training and still be considered a certified participating department. (Office of the State Fire Commissioner [OSFC], 2017).

While the OSFC provides many levels of certification and the necessary training to achieve certification, there seems to be limited participation in the voluntary department certification program, despite offering classes and testing throughout many regions of the

commonwealth. With over 2,000 fire departments within Pennsylvania, there are currently only 186 participating departments as of July 2022 (Figure 4).

Figure 4

Pennsylvania OSFC participating department recognition program

CURRENT COMMONWEALTH STATISTICS

Percentage	Department Count
100%	31
75%	60
50%	59
10%	36

Note. OSFC, 2022

The data provided by the OSFC related to the number of participating agencies should not be considered a baseline fact for how many firefighters are adequately trained and certified within the commonwealth. Since there is currently no requirement for participation or even a requirement to report the level of training each fire agency requires, there is a lack of data available on how many firefighters are currently certified. This lack of data may be because "many of the fire departments in Pennsylvania are self-regulating in that the fire departments develop and set their own training and certification standards" (Balsamo, 2009, p. 3). While the PADOH requires each EMS provider to be licensed and certified, and each agency must report the level of certification of each person providing aid to an EMS patient during an incident; currently, the OSFC does not require any reporting of certification or training to their office. When speaking with a representative from the OFSC concerning the number of certified firefighters in the commonwealth, an OSFC representative reported, while they do have some information, there was no comprehensive database or way to know honestly how many active

firefighters are certified and to what level of certification they may have (OFSC Staff, personal communication July, 2022).

Regulations

Pennsylvania currently does not provide direct oversight, regulation, or specific guidance on what determines the level of service a fire agency provide and the minimal level of training needed by personnel performing those services (Legislative reference bureau, 2021). While each state's regulations on fire service delivery may vary considerably, many states have regulations that define the minimum requirements fire service agencies and their personnel must meet to provide service within their communities. As pointed out by the S.R. 6 report (2018):

The definition of a firefighter used in Section Four, subsections A and G of the West Virginia Commission report ... should be adopted. Other definitions in section four should also be considered for adoption. Definitions are needed to correctly ascertain the number of personnel in the system capable of delivering the services needed by our citizens. (p. 19)

West Virginia (WV) Title 87, series 8 (2015), defines the minimum training levels for rescue and firefighting personnel and the minimum standards volunteer fire agencies must meet in "response times, communications, level of water flow and pressure; and other performance measures as considered necessary" (p. 1). Additionally, title 87 mandates the level of training volunteer fire officers must maintain, the minimum amount of equipment apparatus must carry, and all fire apparatus operators must be trained and certified for the apparatus they would be operating (pp. 1-12). To ensure each agency meets these requirements, the West Virginia Fire Marshall's office requires each agency to recertify annually. A list of certified fire departments is maintained and available to the public through the WV Fire Marshall's office (West Virginia Fire Commission, office of the Fire Marshall [WVOFM], 2022).

Ohio has similar regulations that define the requirements of fire departments and fire personnel. Ohio title 5, section 505.38 (2007) titled "appointment of firefighting personnel" (p. 1), provides specific guidance on requirements for volunteer and full-time paid firefighters. The code requires all volunteer and paid personnel to pass a physical examination before being appointed as a firefighter and complete firefighting training within one year and prior to appointment for a full-time paid firefighter (Ohio legislative service commission, 2021a). Ohio administrative code rule 4765-20-02 (2019) defines the qualifications and specific training for a volunteer firefighter, including the completion of a 36-hour introduction to firefighting course and recertifying every three years by completing a minimum of 54 hours of continuing education. The rule also prevents those convicted of crimes such as felonies and misdemeanors of moral turpitude from being considered as an applicant firefighter (Ohio legislative service commission, 2021b).

Other states, including Tennessee, Arkansas, and Maryland, that rely on a predominate volunteer fire response system have regulations, recommendations, or guidelines for the qualifications of firefighting personnel and fire department operations (Arkansas municipal league, 2017; Maryland occupational safety and health [MOSH], 2002; Municipal technical advisory service [MTAS], 2022). This review of existing state regulations provided a simplistic review of how states attempt to ensure adequate fire protection within their communities. Additional research on how states regulate fire agencies and the impact on civilian fire fatalities, property loss, and firefighter injury and deaths would benefit the fire service community.

Consensus standards

Without state regulations and guidance, fire departments may rely on best practice recommendations from consensus standards. Consensus standards are generally developed by associations or groups that assemble subject matter experts and industry stakeholders to develop

recommendations for policy development. In the fire service, many associations may work to develop consensus standards, including state and local fire associations, labor groups, and associations of state and local governments. In some cases, these associations develop recommended policies, sample legislation, and provide expert assistance to fire departments seeking guidance.

The National Fire Protection Association (NFPA) is often referenced as an expert authority in providing best-practice consensus standards for fire protection. The NFPA provides guidance and recommended standards for many facets of fire prevention, fire protection, rescue, and EMS. In addition, publications provided by NFPA offer guidance on fire department operations, firefighter safety, and minimum qualifications for personnel. In some cases, the recommended NFPA standards are adopted by a state through the regulatory process and become laws, ordinances, or regulations (National Volunteer Fire Council [NVFC], 2013).

While NFPA provides over 300 different consensus standards, NFPA 1500 (2021), 1710 (2020), and 1720 (2020) specifically detail best practices for fire department operations and firefighter safety. NFPA 1500 (2021), *Standard on fire department occupational safety, health, and wellness program*, details specific criteria fire departments and fire department personnel must meet to ensure healthy and safe working conditions. Chapter four of NFPA 1500 (2021) states that "[t]he fire department shall prepare and maintain a written statement or policy that establishes the existence of the fire department, the services the fire department is authorized and expected to perform" (p. 13). Additionally, in section 5.1.2 it states that "[t]he fire department shall provide training, education, and professional development for all department members commensurate with the duties and functions that they are expected to perform" (p.18).

NFPA 1710 (2020) and 1720 (2020), *standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations*, guide

fire departments and governing bodies in developing response models for fire, EMS, and special emergencies within their communities. The main difference between 1710 and 1720 is that 1720 provides response requirements for volunteer agencies and 1710 for career-staffed agencies. While there are significant differences between the two standards, the primary purpose is to detail the minimum criteria to provide efficient and effective emergency services (National Fire Protection Association [NFPA], 2020b, 1.2.1 section). These standards define how many people are needed to fight a fire effectively, as well as the maximum time it should take to have that personnel on the scene after the fire is reported to the call center, which in most places is the 911 center. Specifically for volunteer fire departments, NFPA provides a table that details these requirements (Figure 5).

Figure 5

NFPA 1720 (2020) staffing and response time

Demand Zone ^a	Demographics	Minimum Staff to Respond ^b	Response Time (minutes) ^c	Meets Objective (%)
Urban area	>1000 people/mi ² (2.6 km ²)	15	9	90
Suburban area	500–1000 people/mi ² (2.6 km ²)	10	10	80
Rural area	<500 people/mi ² (2.6 km ²)	6	14	80
Remote area	Travel distance ≥ 8 mi (12.87 km)	4	Directly dependent on travel distance	90
Special risks	Determined by AHJ	Determined by AHJ based on risk	Determined by AHJ	90

^aA jurisdiction can have more than one demand zone.

^bMinimum staffing includes members responding from the AHJ's department and automatic aid

^cResponse time begins upon completion of the dispatch notification and ends at the time interval shown in the table.

Note. NFPA 1720 (2020) table 4.3.2

While individual agencies may follow these recommendations, it would be strictly voluntary unless the sponsoring municipality or the Commonwealth would adopt the standard(s) as policy in the form of an ordinance or code. Currently, in Pennsylvania, there is no statewide

requirement for fire agencies to meet NFPA 1710 (2020), 1720 (2020) or 1500 (2021), or any other similar standards.

Funding

The financial strains on Pennsylvania communities and organizations continue to increase (PA, 2018). In Pennsylvania, many fire departments rely on local support through private donations, municipal support, and fundraising to continually fund their operations. In addition, grant programs provided by the OFSC and the USFA provide additional funding for funding fire department operations. With the average cost of a fire engine exceeding \$350,000, aerial ladder trucks exceeding one million dollars, and properly outfitting and training a firefighter costing over \$20,000, organizations and communities are faced with finding ways to fund their fire services. (Lenau, 2019; National volunteer fire council [NVFC], 2022)

Fire Commissioner grants

Each year OSFC distributes approximately 30 million dollars through a grant program by providing eligible agencies with grants up to \$15,000.00. Eligibility for fire agencies, as described by the guidelines published by the OSFC, states "A volunteer fire company, a municipal fire company or a combined volunteer and municipal fire company located in this Commonwealth" and "actively responded to 15 or more fire or rescue emergencies during the previous calendar year and is officially recognized by the appropriate municipality" (Pennsylvania office of the state fire commissioner [OSFC], 2022b, pp. 2–4). While this program may be beneficial for Pennsylvania fire and EMS agencies, there seem to be inequities in how the funds are allocated.

For instance, nine fire companies in and around the city of Greensburg, Pennsylvania, received a total of \$135,000 from the 2021-2022 OSFC grant program (OSFC, 2022b). 2020

U.S. census data shows this area's population is just over 19,000 residents within 4.2 square miles (Census reporter, 2022; U.S. Census Bureau, 2022a). In contrast, in the city of Harrisburg, Pennsylvania, fire department, which protects a population of over 50,000 residents over an eight-square-mile area, received only \$15,000. (OSFC, 2020; U.S. Census Bureau, 2022b).

Federal grant programs

In 2001 the Federal Emergency Management Agency (FEMA) began awarding funds to fire and EMS agencies throughout the U.S. through the Assistance to Firefighters Grant program (AFG). Each year, congress authorizes funding through the budgetary process that allows FEMA to provide monetary awards to assist fire departments, EMS agencies, and fire training facilities with training, equipment, facilities, and apparatus(Federal Emergency Management Agency [FEMA], 2021). Since 2017 Pennsylvania fire and EMS agencies have received over 424 million dollars. In comparison, North Carolina received \$156 million over the same period, and Ohio \$341 million (FEMA, 2021). According to the U.S. Census Bureau (2020) the population of North Carolina is 10.39 million, Ohio 11.6 million, and Pennsylvania the highest at 12.79 million.

FEMA's additional program available to fire agencies in Pennsylvania is the Staffing for Adequate Fire, Emergency Response (SAFER) Grant Program. This program provides funding for agencies to recruit and retain volunteers or hire staffing in areas where there is a need for additional paid staffing or to hire staffing to augment or replace volunteer staffing. Since 2017, Pennsylvania has received over 64 million dollars, with \$28 million for recruiting and retaining volunteers (Federal Emergency Management Agency [FEMA], 2022b). In total, Pennsylvania, since 2017, has received over \$488 million through these federal grant programs.

Volunteers firefighters' relief funding

Each year Pennsylvania distributes money collected from Fire Insurance companies (based outside of the Commonwealth) in the form of a tax to Volunteer Firefighters' Relief Associations (VFRA) throughout the Commonwealth. The VFRA's are not fire companies or fire departments but essentially independent organizations that serve to support the efforts of volunteer fire agencies and are generally directly associated with a fire department. The money collected by the Commonwealth is distributed to municipalities throughout the Commonwealth that then must provide the collected funds to an eligible VFRA (Department of the auditor general, 2020). While funding varies from one municipality to another, the larger the community, generally, the larger the contribution. In 2021, 54 million dollars was distributed to VFRA's throughout the Commonwealth (Hennen, 2022).

While this program benefits communities that strictly rely on volunteers for their fire protection, recent issues have arisen, causing some to consider changing the current system. The issue creating some concern is that the funds distributed to these VFRA's can only be used for related volunteer fire department activities and cannot be used to pay firefighters or provide direct support to paid personnel, including the purchase of personal protective equipment for paid staffing. In one case, the VFRA affiliated with the City of York purchased over \$300,000 of personal protective equipment, including Self Contained Breathing Apparatus (SCBA) and Thermal Imaging Cameras (TIC) for the City of York Fire department, which is considered a combination (volunteer and paid staff) fire department. During an audit performed by the Auditor General's office, the agency that oversees the program, the City of York was ordered to repay 90% of the money back to the VFRA since the auditor determined the city only had five active firefighters (*Department of the auditor general, 2019*). According to information provided by the Internal Revenue Service, as of 2019, the York City volunteer firefighters relief

association reported having over four million dollars in assets, mainly in financial investments (*Internal Revenue Service [IRS], 2019*).

The City of York is not unique with this issue in having a mostly career department with affiliated VFRAAs with large amounts of liquid assets but cannot provide the support needed by many of these fire agencies due to antiquated regulations. In a press conference held in 2019 by then Auditor General Eugen DePasquale and Fire Chief Brian Enterline of Harrisburg City, DePasquale stated:

...last year alone, my department awarded \$55.1 million in state aid to volunteer fire relief associations across Pennsylvania, [the] state law that created relief associations dates back to 1968 and has been updated only twice since then. Simply stated, the law has not kept pace with changing times and in my view puts too many restrictions on how relief associations can spend the state aid they receive. (Lenau, 2019, p. 1)

Chief Enterline added that "we have a pot of money that sits there, and you know, as the Auditor General said, we have 59 relief associations with over a million dollars in them... that's \$59 million, plus, that's sitting there that can't serve the citizens of this commonwealth, because of the archaic law that was written in 1968" (Lenau, 2019, p. 2). The VFRA laws and regulations seem to have not evolved to ensure that communities receive the financial support needed to provide adequate fire protection. As communities move to a paid staffing model for firefighting personnel, funds needed to provide essential equipment for firefighters to do their jobs remain in bank accounts and investments, while many communities struggle to provide the essential services needed to keep the community safe.

Safety and Health

Centers for Disease Control's (CDC), National Institute of Occupational Safety and Health (NIOSH), reported that seventy-nine Pennsylvania firefighters had lost their lives in the

line of duty since 2010. Of those 79, 55 were considered volunteer firefighters, most were fifty or older, and even three were over 80, with one being 95 years old. The causes of 43 of these fatalities, according to the CDC (2022), were stress and overexertion, leading to a stroke or heart attack. While NIOSH did not investigate all of these, they did investigate six of them. In all six cases, NIOSH recommended that agencies provide medical evaluations before allowing personnel to perform firefighting duties and provide subsequent annual physicals to ensure the continued health of their personnel (Centers for Disease Control and Prevention [CDC], 2022). Currently, in Pennsylvania, there is no physical or medical fitness requirement to serve as a firefighter, volunteer, or career.

The non-medical-related Pennsylvania Line of Duty Deaths (LODD) investigated since 2010 had common recommendations for agencies to prevent additional LODDs from similar circumstances. The overwhelming theme is that agencies need to train personnel and adopt policies that can help prevent injuries or death. Additionally, NIOSH also recommended that "[s]tates should consider establishing minimum training requirements for firefighters" (CDC, 2022; National Institute for Occupational Safety and Health [NIOSH], 2018). The National Fallen Firefighters Foundation (NFFF) reinforces this idea of policy adoption and training to prevent firefighter fatalities and injuries. The NFFF and partners produced "16 Life Safety Initiatives" that recommend ways to help reduce the risk of injury and death of firefighters (National Fallen Firefighters Foundation [NFFF], 2004).

Two of the recommendations from the NFFF 16 Life Safety Initiatives (2004), initiatives five and 11, address the need for response and training standards to reduce firefighter injuries and deaths. Recommendation five addresses the need for minimum and standardized training, recommending the development and implementation of "national standards for training, qualifications, and certification (including regular recertification) that are equally applicable to

all firefighters based on the duties they are expected to perform" (NFFF, 2004, Initiative 5). In essence, firefighting personnel must have and maintain adequate training to be firefighters.

Initiative eleven calls for adopting a "minimum set of activities that are universally recognized and understood to assure life safety at every fire—regardless of organizational composition or geographic location" (NFFF, 2004, Initiative 11). Whether volunteer, combination or a fully staffed career agency, there needs to be a consistency of services performed by fire departments. In a 2002 report, the Pennsylvania Emergency Management Agency (PEMA) made a similar recommendation of developing "statewide resource-typing and equipment and training standards for fire, rescue services so that regional and statewide Mutual Aid can be effectively implemented" (p. 30).

Responsibility

In the absence of statewide governance and regulation of the operation of fire departments, each municipality is ultimately responsible for providing its citizens with adequate fire protection and emergency services. There are exceptions related to larger cities, and regulations do exist that regulate labor practices, liability limitations, and protections for volunteer firefighters. In general, however, the level and effectiveness of the emergency services provided are the responsibility of the local government (Legislative reference bureau, 2021).

Commonwealth code specifies that boroughs, townships, and third-class cities are "responsible for ensuring that fire and emergency medical services are provided by the means and to the extent determined by the [municipality], including the appropriate financial and administrative assistance for these services" (Commonwealth of Pennsylvania [PA], 2008, section 69; Commonwealth of Pennsylvania [PA], 2008a, section 82; 2008b, section 1553). The language in these codes is vague and does not define the specific level of fire and emergency services local municipalities need to provide. The codes require that they consult with fire and

EMS providers to discuss the community's needs, but as stated in S.R. 6 (2018), that appears not to be consistently occurring throughout the Commonwealth. For some communities, this lack of definition or reliable emergency services to consult with may require the commissioning of studies or consulting consensus standards to determine the emergency service needs of their community.

Synthesis of the Existing Literature

While Pennsylvania continues to have the most fire departments in the nation, much research has shown that this does not translate into an effective and efficient solution for emergency services, specifically fire protection. From commissioned studies published over 40 years ago to recent peer-reviewed data, the literature reviewed provides reasoning and justification for needed reforms to the Pennsylvania laws that regulate fire departments. Duplication of resources, varying standards, lack of training, and variations in service were repeated themes throughout the literature reviewed. The lack of definitive data and viable solutions available to local and Commonwealth legislators and fire service stakeholders to address the issues facing the Commonwealth related to fire service delivery resounded throughout the review process.

Summary

Reviewing literature dating back to 1974 up to those completed recently, the lack of oversight and regulation is apparent, including the adverse effects it has on communities throughout the Commonwealth. The surprising discovery is how well-known the problem is and how difficult it may be to overcome such a complex issue. Lack of data, including an accurate number of fire departments or what defines a fire department, creates a need for further research and analysis of how local-level and Commonwealth leaders can begin to develop viable consensus-based solutions to reform a system created over 250 years ago.

CHAPTER 3: METHODOLOGY

Introduction

Due to the complexity of the topic and variations in approaches to address the delivery of adequate fire and emergency services, a Delphi research approach was chosen to collect input and develop a consensus among a group of experts from emergency services, local-level government, and industry professionals.

Delphi Methodology

Developed by the Rand Corporation in the early 1950s, the Delphi methodology uses the concept that obtaining more than one opinion will result in improved and more reliable outcomes (Dalkey, 1969). The Delphi methodology intends to collect and share the opinions of subject matter experts in an anonymous format to develop a consensus. Accomplishing this requires several rounds of survey data, generally 2-3, until a consensus emerges. Expert panelists are isolated, and anonymity is maintained throughout the study to prevent confrontation and the effects of opinion dominance and groupthink. Additionally, the Delphi methodology allows for independent thinking and time for participants to consider the ideas without defending them before responding (Fink-Hafner et al., 2019; Nasa et al., 2021).

The Delphi method lends itself well to practical research since the research data can produce results that can inform practice (Brady, 2015). When considering the Delphi method for qualitative research, the pragmatic philosophical approach provides a way to relate personal experiences and knowledge to related truths (Dakely & Helmer, 1962). The Delphi method of study has gained acceptance in many fields of research, including information technology, business, human resources, and healthcare, to develop best practices when there is a lack of collective knowledge, little research exists, or issues related to logistics and ethics may delay or prevent the research (Nasa et al., 2021; Niederberger & Spranger, 2020; Skulmoski et al., 2007).

Researchers may also use the Delphi methodology to study issues facing the public to help improve understanding and design solutions to guide policy-making decisions (Brady, 2015). Issues such as mental health, care of aging populations, and family and social issues are all topics that Delphi research methods are relevant (Alder & Ziglio, 1996).

When considering methods for researching emergency services delivery, the Delphi methodology can provide a wide range of knowledge that can help guide decisions or improve the understanding of the core issues (Brady, 2015). Numerous studies that provide data on emergency services utilized the Delphi methodology. For example, Jensen et al. (2013) studied the need for evidence-based EMS care in Canada and the barriers preventing the needed research. As part of a mixed methodology approach, and by utilizing the Delphi method, the authors collected a wide range of qualitative and quantitative data and then developed a consensus among stakeholders to help focus further research on forwarding the goal of evidence-based EMS care (Jensen et al., 2013).

When Baker et al. (2013), chose to research the need for improved fire safety management in Canada, they chose the Delphi methodology. As explained in their writings,

[t]he value of the Delphi Method in the determination of a subjective issue is that the determination can be said to be an authoritative one because it comes from the deliberations of experienced and knowledgeable people in the field. This greatly improves its chances of becoming the accepted determination. (p. 40)

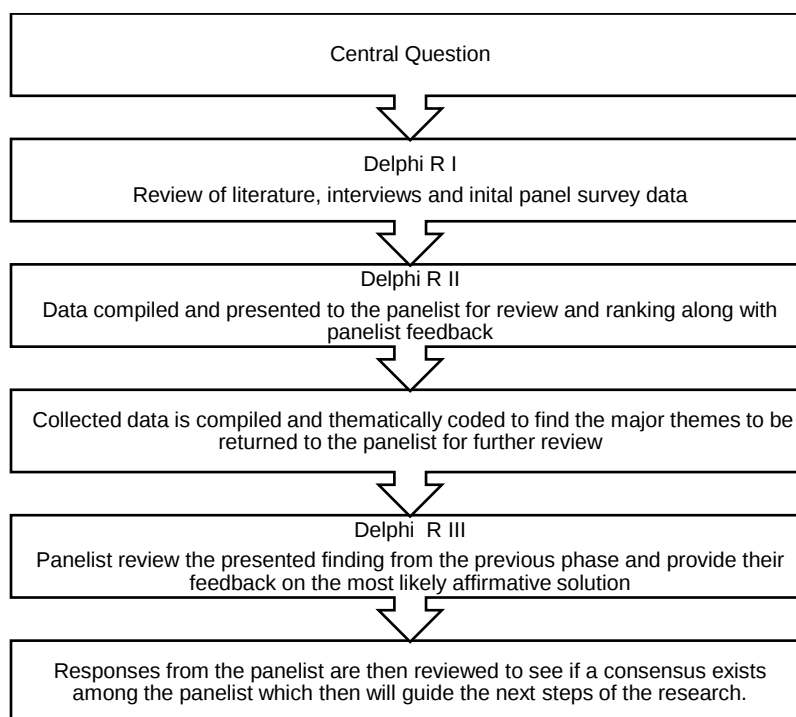
To complete this study, the authors assembled a group of over twenty industry experts, including practitioners, regulators, and academics having a mix of attributes, including experience, knowledge, and influence. The group's diversity was intentionally developed based on the panelist's level of expertise and level of influence.

Modified Delphi Research Design

The Delphi methodology is the method of choice for this study to collect data for analysis when considering solutions for determining and providing adequate fire protection to a community. By assembling a panel of experts to consider and provide viable solutions to the central question of the study, as the previous studies show, the Delphi methodology allows researchers to develop a consensus among experts on topics with varying issues with many potential outcomes (Avella, 2016; Baker et al., 2013). There are two traditional Delphi methods, conventional and modified.

The Conventional model begins by asking an open-ended question to the panelists, then collecting, tabulating, and forming a list of common themes from all the responses and providing a summary of the responses to all the panelists. After reviewing the summarized findings, the panelists will have the opportunity to respond again in round two to either modify their initial response or reaffirm it. This process continues until a consensus emerges (Fink-Hafner et al., 2019; Nasa et al., 2021). A consensus does not mean 100 percent agreement. In some cases, a 55 percent agreement among panelists may be acceptable; the consensus of 70 percent is considered the standard in Delphi research (Avella, 2016).

A modified version of Delphi follows the same process but replaces panelist responses to the initial broad, open-ended questions but instead utilizes data collected from literature, independent interviews, or surveys administered as part of the study. The information collected and compiled outside the conventional panelist review generates the information needed for phase two, which the panelists then review to continue the deduction process and determine which ideas can provide the best outcomes (Figure 6). Additionally, panelists are encouraged to add suggestions or comments to their responses, which may become additional information for the third round of inquiry (Avella, 2016).

Figure 6*Modified Delphi methodology process example*

Population and Sample Size

A vital component of a Delphi study is assembling experts to improve understanding or help determine outcomes (Clayton, 1997). As Clayton (1997) explains, "an expert is someone who possesses the knowledge and experience necessary to participate in a Delphi" (p. 381). Therefore, the proper selection of panelists for a Delphi study is imperative, and the criteria of the panelists need to include thorough knowledge of the subject being studied, ability and willingness to participate, including having the available time it takes to review and respond, and having solid communications skills to ensure the researcher correctly receives their ideas (Skulmoski et al., 2007).

Selection of panelists

To determine the knowledge and expertise of potential panelists, characteristics such as previous academic contributions to the subject, serve in roles that can influence legislation, legal and consensus policy development, or are part of interpreting and applying best practices in the field of study. Additionally, potential panelists need a thorough understanding of current fire service regulations, best practices, and Pennsylvania emergency service operations. While these characteristics provide a baseline, it is important to note that it is "the respective disciplines of the panel members that determine what [the] qualifications are and not the researcher" (Avella, 2016, p. 309).

Essentially the need to have a national authority on the subject may not be needed, but those that work in the field or contribute academically, legislatively, or regulate the practice of the subject being studied would meet the intent of the term expert for this study (Avella, 2016). Therefore, excluding participants from certain groups or specific subject matter experts is not intentional, but participants that could influence and impact future work in emergency services are preferred. Current fire chiefs, emergency services directors, municipal managers, fire service-related academics, and other closely related practitioners are considered candidates for the panel. Although their position alone would qualify them to participate, a combination of experience and knowledge are also factors.

Number of panelists

Through the literature review, the sizes of panels utilized for Delphi studies vary depending on the topic and reach desired. In some texts, the panel size recommendations range from as little as a few up to well over 100 (Skulmoski et al., 2007). A factor in determining the size of the panel is if the selection of panelists comes from a homogeneous or heterogeneous group. For a homogenous group, panelists from the same field, such as emergency services, 15-

30 participants may be the minimum. If the participants come from a heterogeneous group, such as experts familiar with and engaged in the Pennsylvania fire service, the sample size may be less, 5-10 panelists (Clayton, 1997; Skulmoski et al., 2007). Since this study utilizes panelists from a heterogeneous group, the number of panelists selected for this study is 10. The ten selected participants are from varying backgrounds and levels of responsibility and authority and proportioned appropriately to provide a cross-section of expertise in specific areas related to the study.

Table 1

Panelist selection

Position	Area of contribution	Percent of Distribution
Local-level practitioners, including Fire officers and emergency services directors	Direct responsibility for the delivery of emergency services within their communities	50%
Regional and state practitioners, including training coordinators, regulatory administrators, academics, and organization leaders	Oversight and involvement in the delivery of fire services within the commonwealth	30%
Municipal officials and regulators, including managers, council members, supervisors, and legislators	Indirect responsibility or governing authority for the delivery of emergency service within their communities or the commonwealth	20%

Note. Some panelists may have backgrounds related to multiple categories.

The selection process of panelists began by conducting several informal interviews with local and regional fire service stakeholders to develop a list of potential panelists. Next, 15 potential panelists were contacted and interviewed to determine their level of expertise and influence regarding fire service delivery within Pennsylvania. Of the 15 potential panelists, 12

were selected based on their level of expertise and if they directly or indirectly influenced how fire services are delivered throughout the commonwealth, local, regional, or statewide. The level of expertise was determined based on years of service, an increasing level of responsibility within the fire service, and academic backgrounds. While ten panelists would meet the needed participation level, due to the possibility of participant dropout, 12 were selected to ensure a minimum of ten panelists completed the process. Each participant was then emailed detailed information about the study and methodology being used. Additionally, each panelist received, completed, and returned the research participation consent form (see appendix C.).

Instrument(s)

Due to the broad topic of fire service delivery in Pennsylvania, participants had the opportunity to review several recommendations from the literature review. Then, using a five-point Likert scale, each participant scaled the recommendations by the level of importance, from least important to what they believe is the most important recommendation that could positively influence the Pennsylvania fire service. Finally, participants qualified their answers by explaining their decisions and adding any additional details or recommendations they feel are relevant to the research. This first-round survey attempted to have the participants reach a consensus on which initiatives they support and find most important, moving the recommendations from broad to narrow (Skulmoski et al., 2007). The participants written explanations for their choices and qualitative data from their narratives introduced additional solutions the panelists found important (see Appendix A).

One of the essential characteristics of the Delphi method is that the panelist must remain anonymous to prevent peer influence and individual dominance of a singular panelist (Avella, 2016; Skulmoski et al., 2007). Therefore, an online data collection and communication tool, Survey Monkey (www.surveymonkey.com), provided the platform for most of the Delphi

research process to maintain panelist anonymity. Additionally, the online tool provided the initial analysis of the panelist responses providing a ranking on the topics presented. Finally, the narrative data was reviewed, condensed, and thematically evaluated to discover common themes within the responses.

The data collected from this survey brought the central question back into focus and allowed the participants to see the initial survey results. Based on this feedback to the panelists, each had the opportunity to respond and change or modify their initial responses and provide a written narrative that provided details on the change in opinion, if one exists. For example, if a panelist decided to stay with their original opinion, additional details on why they chose to stay with their original opinion are provided. At the end of this round, the data was reviewed and thematically analyzed to identify if a consensus, defined as 55 percent agreement or better, of the panelists, was reached. (Avella, 2016; Brady, 2015).

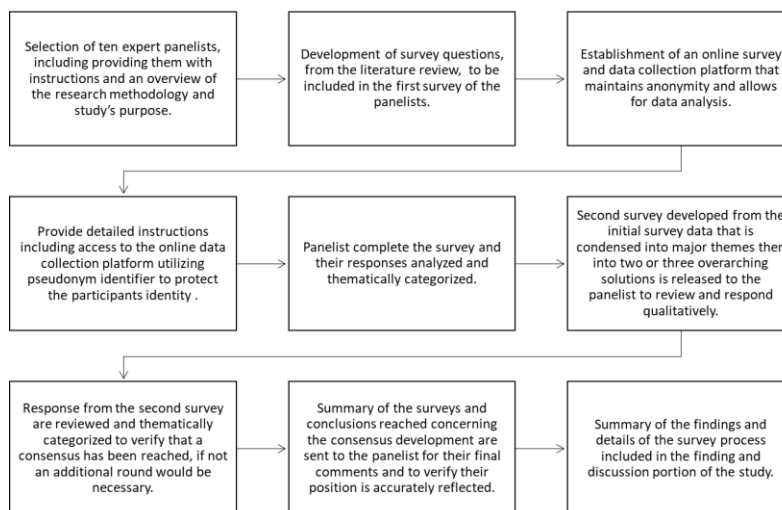
This methodology has provided reliable and informative data in studies related to information technology, healthcare, warfare, and public safety (Alder & Ziglio, 1996; Jensen et al., 2013; J. Skulmoski et al., 2007; Nasa et al., 2021). Baker et al., (2013) utilized the Delphi methodology and similar instruments to study fire safety management by assembling a panel of experts to evaluate fire categorization in the United Kingdom (U.K.). The results of this study were published in the Fire Safety Journal in May of 2013. By utilizing the Delphi method that assembles a cadre of U.K. fire service experts, the authors conclude that the "value of [their] conclusion lies in the fact that it has been deliberated on and accepted by a peer group of specialists" (Baker et al., 2013, p. 45). The Delphi method provides valuable data by limiting the research interviews to a panel of identified industry experts. It also may increase the probability that other industry professionals will utilize the findings for future work, including policy development, education, and further academic research.

Research Process

Using guidance from previous research that utilized the modified Delphi methodology, the process begins with selecting experts to serve as anonymous panelists to provide feedback and opinions on the research questions. Developing a questionnaire that allows the participants to rank the proposed solutions developed from the literature review while encouraging panelists to explain their ranking decision is the initial phase of the multi-round interview process. After receiving the responses, the second round of interviews includes semi-open-ended questions developed from the initial responses in round one. The process continues until a consensus is evident (Kaushal et al., 2022). Finally, the data collected and the panelists' consensus develops the study's findings, discussion, and conclusion (Figure 7).

Figure 7

Delphi survey process



The reliability and repeatability of the methodology were evaluated by conducting a pilot study utilizing volunteer panelists familiar with the Pennsylvania fire service. The pilot study panelists were selected from local fire service stakeholders, and the study was conducted over

two weeks. Each volunteer panelist was sent an anonymous link to the electronic survey tool along with instructions on completing the survey. Six pilot study panelists participated and provided feedback on the process and the methodology. Results of the pilot study indicated that two to three rounds of interviews should be sufficient, and the qualitative data provided during the process provided additional context to the choices that led to the consensus among the panelists.

Round 1, Initial Survey

A survey questionnaire was developed from the literature review that provided several common themes discovered throughout previous studies that formed the basis of the initial survey. Panelists had the opportunity to evaluate and rank, in order of importance, proposed solutions to help ensure adequate and sustainable fire protection in communities within the Commonwealth of Pennsylvania. Five proposed solutions, developed from the literature review, include mandatory training and certification, standards of cover, increased reporting requirements, agency licensure, and improved community leader education (see appendix A).

Once the panelists agreed to participate, an email containing a link to the anonymous online survey was sent to each panelist. In addition, a unique anonymous identifier was also assigned to each panelist for response tracking purposes. Each survey required this unique identifier to be entered before the panelist submitted their response. In the electronic online survey tool Survey Monkey, the panelists used a Likert scale to rank the five proposed solutions in order of importance, with one equaling the least important and five as the most important. Panelists were also asked to provide a narrative explaining their rationale for the ranking.

Additionally, panelists were encouraged to offer other solutions if different than those provided. The goal was to understand not only what a solution may be but why the panelists believed specific solutions were better than others. Once the surveys were completed and

submitted, the solutions were ranked in order of the panelists' responses, and the narrative data collected were thematically categorized to find common themes among the responses (see Appendix B.).

Round 2, Panel review and response

The next step involved presenting these findings to the panelists for further review. A second electronic online survey was emailed to the panelists that provided a summary of the data collected from the initial survey, including the proposed solution rankings. Each panelist was allowed to change, modify, or continue to build the case to justify their initial opinion after evaluating the responses from the other panelists. The responses from the second survey were thematically categorized and evaluated and showed that a consensus had not yet emerged. While the initial phase ranked the possible solutions, the qualitative analysis of panelists' responses from both surveys provided insight into how the panelists viewed the proposed solutions and the barriers that may prevent the solutions from implementing future reforms.

Round 3, Additional review and consensus development by the panelists

A summary of the findings was sent to each panelist through an additional anonymous electronic online survey providing round two results. Panelists were also asked to review the previous round's results and then rank the three solutions developed through the previous rounds. Finally, using the established 55% agreement by the panelists as the threshold for a consensus, the panelists reached a consensus on what solution they believed was most important and their rationale for why it should be prioritized.

From the qualitative data received during the surveys, three panelists were orally interviewed by phone or online video conferencing tool. The purpose of these supplemental interviews was to allow these panelists to expand on their positions from the surveys and provide a forum for them to discuss challenges facing the Pennsylvania fire service and potential barriers

that may prevent reforms, and the recommendations made from being realized. The interviews were recorded, transcribed, and thematically categorized, and the data collected was compared to the online survey results. While themes from the interviews closely reflected the ones found during the online surveys, essential details uncovered during the interviews enhanced the understanding of what the select panelists viewed as potential solutions and what they viewed as potential barriers that may impede the adoption of those solutions.

Finally, an independent peer review of the data and findings verified that the panelists' views were appropriately represented in the findings before finalizing the results. Once the results were finalized, each panelist was notified that their participation was no longer needed and thanked for their assistance.

Ethical Considerations

Delphi methodology relies on panelists' anonymity to allow the freedom needed for panelists to express their opinions and ideas without the pressure and influence of other panelists or even the researcher (Brady, 2015; Niederberger & Spranger, 2020). Therefore, the participant's identity remained anonymous throughout the study, and each participant was assigned a unique identifier for written communications, including electronic ones. In addition, each participant receives a detailed overview of the study's purpose, a description of the Delphi research process, and how their contributions will be analyzed. Furthermore, participants could remove themselves from the study at any time, and all data and contributions they provided will be destroyed, at their request, prior to the conclusion of the study. Finally, participants were provided an interview consent form to sign and return before formal individual interaction in the research process began.

Panelist selection and research question development are areas where the researcher's bias may impact the research's reliability and validity. Avlla (2016) points out that the

impartiality of the researcher in selecting panelists may add potential bias. However, it may also be unavoidable to select completely random participants since the subject of the research will require a certain level of expertise in an industry the researcher may be engaged. To minimize this possibility, an academic advisor familiar with the Pennsylvania fire service assisted in the identification and selection of qualified panelists by making independent recommendations of qualified panelists. The researchers' bias can also affect the research questions, responses, and coding. To minimize this, an academic advisor with research methodology experience provided academic review and oversight throughout the process.

Summary

The topic of studying ways to provide and ensure sustainable and adequate fire protection in the Commonwealth of Pennsylvania is well suited to receive input from experts currently serving in the field of this study. The Delphi methodology provided a forum for industry experts to provide an opinion that is absent of criticism or pressure from the other panelist (Avella, 2016). In addition, it can offer more diversity and inclusion of ideas from the participation of groups that are sometimes left out of traditional research (Brady, 2015). Finally, utilizing a modified Delphi methodology allowed the study to benefit from previous research and narrow the topic for experts to consider versus the time a rigor associated with more traditional qualitative studies. Starting with a list of topics developed from the literature review, each panelist had the opportunity to contribute their ideas in several rounds of surveys until a consensus was reached.

The benefit of the Delphi methodology can be quickly nullified if the panelists' identities are revealed during the study. Therefore, while panelists may be from the same field, it was essential to maintain anonymity throughout the study and keep all identifying information confidential. Utilizing anonymous identifiers for communication and surveys limited the chances

that the identity of the panelists would be revealed. Online data collection tools decreased the possibility of accidentally revealing the panelist's identities by allowing them to register individually without providing personal details about themselves. Additionally, panelists that agreed to participate in an oral interview were provided with written confidentiality agreements notifying them of their rights to protection from harm and that they could discontinue participation at any time.

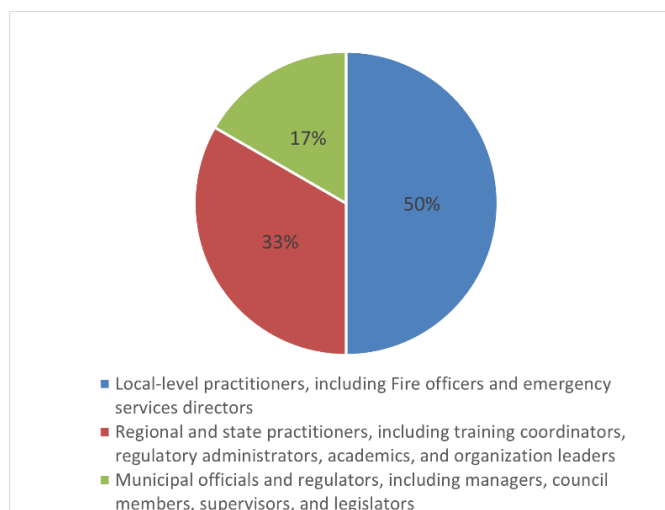
CHAPTER 4: STUDY RESULTS

Introduction – Demographics of the Participants

Three rounds of data collection occurred from January 2023 to February 2023 using a web-based data collection and survey tool. Additional interviews occurred with selected panelists at the conclusion of the web-based data collection to clarify or confirm the panelist's responses. The twelve selected panelists for the data collection had varying levels of responsibility and function, but all have some mid to high level of influence on fire service policy within a community, region, or state. Years of experience in the fire service or local and state government varied from a minimum of 22 years to over 50 years. The average experience of the group was 36 years. Panelists were asked to identify their current position as it relates to their level of influence or position within the fire service. The panelist responded by selecting from 1 of 5 categories and were also allowed to provide additional details if they did not identify with the provided choices. Their responses were categorized into three categories closest to their selections and information provided. These categories were kept broad to ensure panelist anonymity.

Figure 8

Panelist Demographics



Research Results

Round 1

The first round of data collection was completed using a web-based survey and data collection tool, Survey Monkey. The 12 panelists were asked to rank, by the level of importance, five recommended solutions that can assist communities in providing adequate and sustainable fire protection (Table 1). The five solutions presented were developed during an extensive literature review for this study and reviewed by a team of academic advisors assisting with the study. Next, the panelists were presented with the question, “Rank the recommended solutions for assisting communities in providing adequate and sustainable fire protection by order of importance. While there may be multiple solutions you believe to be equal in importance, it is essential to consider which ones, in order, would have the most significant impact.” Panelists could select the level of importance for each solution by choosing if the solution is most important, important, moderately important, slightly important, or least important (see Appendix A).

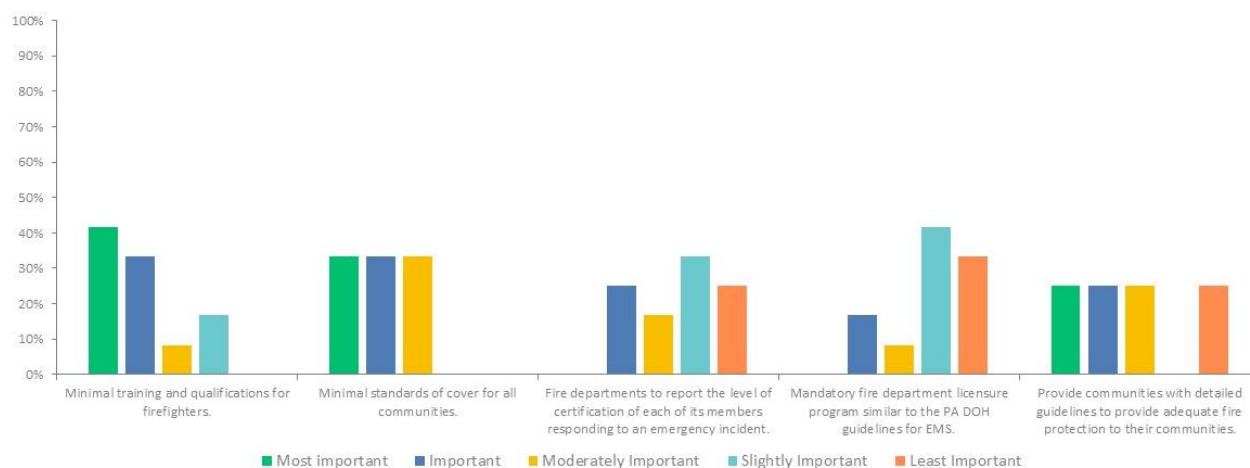
Table 2*Round 1 Data Table*

	Most Important	Important	Moderately Important	Slightly Important	Least Important
Minimal training and qualifications for firefighters	42%	33%	8%	17%	0%
Minimal standards of cover for all communities.	33%	33%	33%	0%	0%
Fire departments report the level of certification of each of its members responding to an emergency incident.	0%	25%	17%	33%	25%
Mandatory fire department licensure program similar to the PA DOH guidelines for EMS	0%	17%	8%	42%	33%
Provide communities with detailed guidelines to provide adequate fire protection to their communities.	25%	25%	25%	0%	25%

From the five choices, the panelist selected three solutions as most important, with 42% selecting minimum training and qualifications for firefighters, 33% choosing minimum standards of cover for all communities, and 25% choosing providing communities with detailed guidelines for adequate fire protection to their communities. (Table 2, Figure 9)

Figure 9

Round 1 survey results



Along with ranking the proposed solution, panelists were asked to explain their selections and provide details on any potential barriers to implementing the strategy they chose. This information was reviewed and thematically analyzed, and several themes were discovered. While the survey selections showed that most panelists saw training, certification, and standards of cover as being most important, the data collected from the comments revealed that the overwhelming majority of panelists felt that politics, education of communities, including the appointed fire leadership, was a barrier or should be part of a solution. Funding, training, and regulation changes were also themes discovered during the first round of qualitative review.

Table 3*Round 1 Solution Barrier Themes*

	Politics	Community/Fire Leader Education	Funding	Training/Certification	Regulations
Panelist Mentions	7	5	5	5	4

Panelists were also asked to provide details on their choices and provide any additional information on ways to provide adequate and sustainable fire protection to communities throughout the Commonwealth of Pennsylvania that they believe would be important. This information was also reviewed and thematically analyzed, and several themes were discovered that were similar to the barriers identified (Table 3). For example, several panelists recommended more regionalization of services, increased funding, training delivery changes, and fire service regulations. Regionalization and funding were the most predominant themes discovered, with over 60% of the panelists mentioning those topics in their comments.

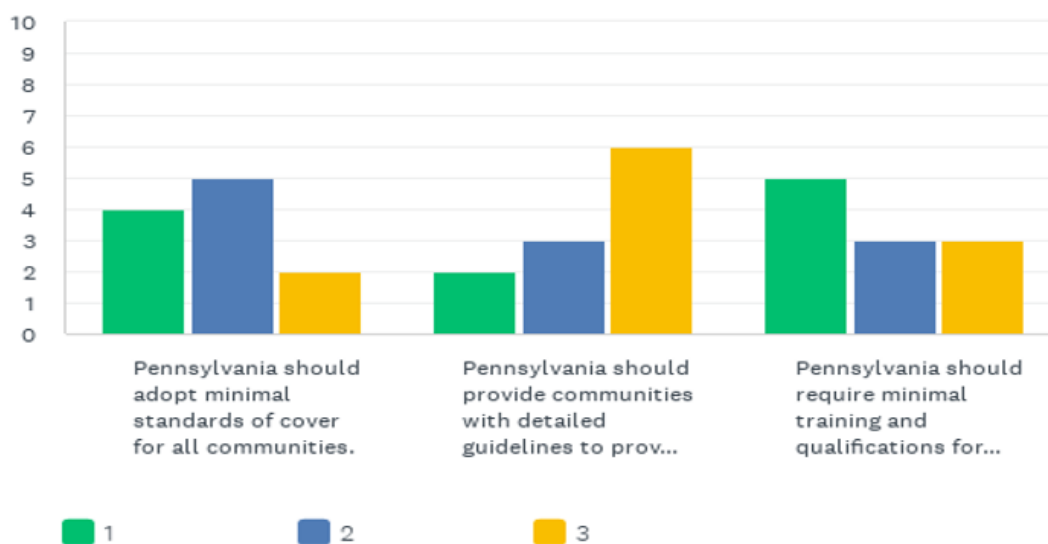
Round 2

With the first round failing to yield a consensus, the data were condensed, compiled, and presented to the panelists. For the second round, panelists were asked to review the results of round one and re-rank the top three solutions chosen by the panel. Along with the level of importance, panelists were also asked to consider the priority of implementation as a factor. Since the standards of cover and minimum training solutions were closely ranked in round one, the order of implementation could be considered in the ranking process. Results of the first round and the survey for round two were sent to all the panelists.

All panelists responded, and the data collected showed that mandatory training and certification for firefighters was the highest ranked, with standards of cover being a close second and providing communities with detailed guidelines to provide adequate fire protection to their communities as the third. Although many chose training and certification for firefighters, a consensus was not reached, with 45% choosing training as the number one selection, 36% selecting standards of cover, and the remaining choosing providing communities with detailed guidelines. (Figure 10)

Figure 10

Round two survey results



Additionally, panelists were asked to provide additional details on their ranking selection. While the responses were similar to the first round, there were a few notable differences providing insight into the decisions made by the panelists. For instance, 6 panelists chose their solution but offered support for the other initiatives, including one that stated,

First identify and legislate the minimum training and qualifications for individual firefighters. You must be able to establish these requirements and ensure they are

affordable, accessible, and obtainable across the commonwealth.... then establish the minimum standards of cover for communities to follow along with providing them broader guidelines of protection.

However, panelist 3 offered:

“Standard of cover should be used to drive the training standards.” -P3

Similarly, from another panelist:

“The highest impact initiative would be to adopt minimum standards of cover for all communities, that would drive the minimum training and qualifications requirements.” -P4

The data showed that most of the panelists felt that one solution might be dependent on another to be successful, possibly contributing to the close rankings of the proposed solutions and preventing a consensus from being reached.

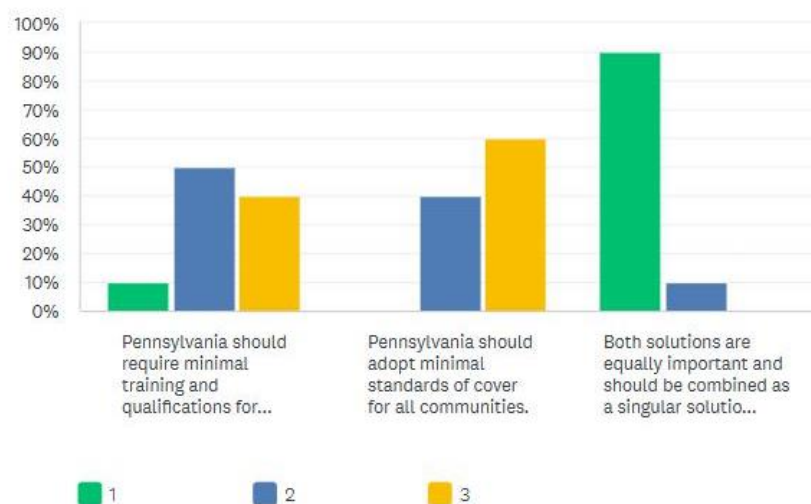
Round 3

Having not reached a consensus in round two, a third round was necessary. Utilizing data collected from the previous two rounds, including comments provided by the panelist, the third round brought three solutions back to the panelists for additional ranking. Round two provided details on how the panelists determined their selections, but more importantly, it showed that one solution might be dependent on another to be successful. Additionally, the data showed that many believed education, including detailed guidelines to provide adequate fire protection to their communities for community and fire service leaders, would be essential for any solution. With this in mind, the third-round survey offered three solutions to rank, the top two from the previous round and a third choice that states that both solutions are equally important and should be combined as a singular solution, standard of cover with minimum qualifications for firefighters. Results of the second round and the survey for round three were sent to all the panelists.

The panelists responded, and a consensus was reached. All but one panelist chose the combined solution as their number-one choice, with minimum firefighter training and certification as their second and, finally, the standard of cover as the third. (Figure 11)

Figure 11

Round three survey results



Additionally, panelists were asked to provide any comments that may assist in implementing the chosen selection and any additional comments relevant to the study. In this round, comments were relatively limited but reaffirmed the selections of many of the panelists. A few comments included:

“I cannot see a path forward where these two issues are separated,” “I do not feel these two proposed solutions can exist independently,”-P1

“It’s my professional and volunteer opinion these recommendations MUST occur immediately.”-P2

The overwhelming themes of the narrative data supported the idea that standard of cover, firefighter training, and certification requirements should be considered as one solution and the most important solution for assisting communities in providing adequate and sustainable fire

protection. The panelists that dissented maintained that minimum training and certification for firefighters is the most important solution. This panelist stated that:

“Establishing minimum training and qualification criteria for firefighters are needed to be the “jump-off point” for the remaining initiatives” -P5.

Potential barriers

While most of the panelists chose a solution that combines the requirement of mandatory training and qualifications for firefighters along with mandated standards of cover for communities, several panelists also identified several potential barriers to implementing this solution. For example, a potential barrier identified by several panelists is that current Pennsylvania regulations may not allow the implementation of a statewide mandate requiring a change in the current laws and regulations. In addition, the changes to these laws may be difficult to accomplish because of another potential barrier identified by several panelists, funding. As one panelist stated, communities may not support another unfunded mandate by the state. As pointed out by another panelist, adequate funding, including changes to the current funding system, is critical to implementing these solutions.

The overwhelming theme discovered as a potential barrier is that many panelists felt that a significant barrier to implementing this solution is politics and a general lack of support by fire and community leaders to change the current system. Panelists provided many comments to support this perspective, including:

“The locals know best philosophy is a deeply rooted mindset within elected officials at all levels.”-P5

Another panelist pointed out:

“A challenge with adopting minimal standards of cover statewide is that the balance of power in our form of state government lies at the local/municipal level, which has been historically difficult to change.”-P7

While the panelist did identify several potential barriers, the overwhelming consensus seemed to be that solutions could be implemented, but it would take local community and state leaders working together to solve the problem.

Summary

In summary, utilizing the Delphi research methodology, this portion of the research aimed to develop a consensus among subject matter experts through several rounds of data collection and interviews. Utilizing a web-based survey and data collection tool, Survey Monkey, twelve panelists were selected, participated, and reached a consensus. While the consensus was not precisely one of the proposed initial solutions but a combination of two, the process allowed the most important solution to emerge from the collective work of the panelists. A final consensus of 90% of panelists chose the singular solution of adopting a minimum standard of cover for communities and requiring minimum training and certification standards for firefighters.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

Summary of the Results

The study and accompanying review of the literature uncovered many issues facing communities in providing adequate and sustainable fire protection. The continuing decline of volunteer staffing, increased demand for services, and lack of affirmative guidance from the Commonwealth have created a crisis for many communities that are required, by statute, to provide adequate fire protection for their communities (Commonwealth of Pennsylvania, 2004; Legislative reference bureau, 2021; PA Township News, 2022). Additionally, the data showed that the awareness of the problems facing Pennsylvania communities has existed for many decades. With studies from the 1970s up to the release of Pennsylvania S.R. 6 (2018), the evidence is clear that the state legislature is aware that the current way of delivering fire protection in Pennsylvania is unsustainable (Commonwealth of Pennsylvania, 2004; Governor's commission on fire prevention and control, 1975). The study and literature review also revealed that many proposed solutions exist to assist communities, but there seems to be a reluctance to change the status quo and pursue new methods of providing these essential services. Some studies indicate that this reluctance may be related to the fact that Pennsylvania has relegated most of its decision-making power to delivering emergency services to locally controlled jurisdictions, including cities, townships, and boroughs. (PA, 2005; Miller, 2015; DCED, 2022; PEMA, 2002) With 2,560 separate governmental jurisdictions within Pennsylvania served by over 2,000 separate fire departments operating under different guidelines, reforming a system that started almost three hundred years ago with minimal reform may seem insurmountable.

Even with three blue ribbon panel studies commissioned by the Commonwealth, Pennsylvania Burning (1975), S.R. 60 report (2004), and S.R. 6 report (2018), over the last four

decades making many recommendations for reform, the problem remains and appears to be getting worse (Bacha et al., 2019). As communities face the loss of volunteers, rising costs of apparatus and equipment, and the increased demand for service, many communities must decide how to provide adequate fire protection without the help of minimum firefighter training standards or guidelines on what defines a fire department from the commonwealth. While some communities have implemented reforms through initiatives such as regionalization and adopting standards and policies to regulate their communities' fire protection, the fact remains, much like 1736, a group of people can assemble, create a charter and, with approval of the local government, become a fire department. In already established fire departments, the requirements of minimal training and qualifications are generally left to the agency itself, meaning that anyone with the desire to be a firefighter may already meet the requirements to be one with desire alone. In the 1975 Commonwealth study titled *Pennsylvania Burning*, a notable quote was found:

For a century now, anyone who wants to call himself a fireman simply signs up, and he's so designated. On the day he is voted in, he can don equipment, ride out to fires, and help put them out – and to a stranger, he's indistinguishable from the man with twenty years of experience. He is a firefighter, so long as he pays his dues, whether or not he ever learns anything about fire. (p. 68)

The unfortunate reality is in 2015 when then State Fire Commissioner Solobay was challenged by a news reporter during an interview who asked, “so I could hop on your firetruck right now and go to fire?” Commissioner Solobay responded, “in essence, yes” (Osdol, 2015). Since that interview in 2015, the basic requirements to be a firefighter in Pennsylvania have not changed.

The lack of regulation and adopted standards has proven to be a challenge not only to a community required to provide fire services but to communities that may need to share resources during large fire events. The lack of continuity of training and qualifications across neighboring

agencies can create a challenge for those that rely on the service of their neighboring fire departments. In some cases, the closest fire department may not be called to a fire because local community or fire service leaders may not believe that the agency closest possesses the proper training and qualifications to respond. Meanwhile, that agency will continue to operate and serve as a fire department to whoever requests their services. In essence, a fire department may be adequate for one community but not for the other, often strictly based on opinion.

The variation of service across the Commonwealth varies from fire departments in name only, providing little to no emergency services to well-trained and staffed all hazard response agencies. The determining factor for who receives what level of service remains in the local government's control, and in many cases, community leaders may not be adequately informed, educated, or aware of what level of service they should be providing. Many states, including the bordering states of New Jersey, Ohio, and West Virginia, mandate minimal training and qualifications for firefighters, the level of service to be provided, and even, in some cases, the readiness of fire stations and equipment (Ohio legislative service commission, 2021a; West Virginia Secretary of State, 2015). Even though many states have adopted regulations for providing adequate fire protection, Pennsylvania still lacks formal requirements for those agencies tasked with such a vital role. Additionally, the lack of standards for regulating fire departments creates a financial disparity for many communities. With current guidelines regulating the disbursement of state and federal funding, agencies that do not provide direct emergency services may still be eligible to solicit and receive tax-funded financial support, diverting financial resources away from those who may need it to provide these services (Lenau, 2019).

Along with the literature revealing the challenges facing Pennsylvania communities, there are also many common recommendations to assist communities in providing adequate fire

protection found in many of these studies. Several resounding themes across many studies recommended minimum training and qualifications for firefighters, level of services to be provided by communities, financial reforms, consolidation of resources, and the education of community leaders about providing adequate fire protection. Volunteer recruitment and retention was also a resounding theme discovered during the literature review, but this study does not address this topic due to the extensive amount of research and regulatory efforts by others, including the state legislature. Finally, although many of these studies had several common recommendations for reforming the Pennsylvania fire service, very few were adopted or even proposed at the state level.

A panel of Pennsylvania fire service experts came together to assist in this study to develop recommendations that could help communities provide sustainable and adequate fire protection. Through a modified Delphi research methodology, these experts would serve as anonymous panelists to evaluate several recommended solutions or offer new ones until a consensus of more than half of the panelists emerged. The panelists selected for the study ranged from active fire officers to academics and local and state officials with some level of state or local influence within the Pennsylvania fire service. As a note, two municipal officials declined to serve as expert panelists during the recruitment process because they felt they lacked sufficient knowledge or expertise on how fire services should be delivered. However, the municipal officials who agreed to serve had some first-hand experience in the Pennsylvania fire service.

Panelists assembled for this study were provided with five solutions, developed from the literature review, to rank in order of importance using a Likert scale ranking system, five being the most important and one being the least important solution. Additionally, panelists could offer their solutions and be allowed to expand on their ranking decision. After the first round of data collection, the panelist's decisions were divided between three proposed solutions—(a)

mandatory training and qualifications for firefighters; (b) requiring communities to adopt minimum standards of cover; and (c) and providing communities with detailed guidelines to provide adequate fire protection to their communities. The lowest-ranked solution during this first round was a solution that adopts a similar agency certification framework currently utilized by the Pennsylvania Department of Health (PADOH) for EMS agencies.

With the panelist's opinions of the most important solution divided between three solutions, the interviews and surveys continued through two more rounds of data collection. Round two would present the results of round one to the panelists and ask them to review the results, consider the solutions presented, rank their importance, and consider the order of implementation as a factor in their selection process. All but three of the panelists' response narratives indicated that community leader education would be essential to any solution. However, without defined regulations and guidance from the state, there is a lack of specific guidance and information available to begin educating communities; essentially, as one panelist stated, "with a lack of adopted standards, what information is even available to educate communities?" Round two resulted in 45% of the panelists choosing training as the number one selection, 36% minimum training and qualifications for firefighters, and minimum standards of cover for communities, with the remaining panelists choosing community education as the most important solution. For the third round, the panelists were presented with the results from round two and asked to rank the top two chosen solutions and a solution that combines the panelists' highest-ranked recommendations. The consensus that emerged from round three would be a recommendation that requires minimum training and qualifications for firefighters and minimum standards of cover for communities to adopt. While this recommendation began as two separate solutions, 90% of the panelists believed both would be needed for one or the other to succeed.

Conclusions

Several conclusions were reached throughout this study and the literature review. The first is that the Pennsylvania fire system is fragmented, with over 2,000 separate fire departments serving over 2,500 individually governed municipalities operating with little to no oversight, creating a significant variation in services provided. Pennsylvania has more individual fire departments than any other state, with North Carolina having the second most with just over 1,000. This vast number of individual agencies operating without statewide regulation and oversight creates challenges for many communities when determining the needs and adequacy of their fire protection services. Additionally, as fire departments continue to see a decline in volunteer staffing, increased demand for service, and the cost of operations continue to rise as traditional funding sources are no longer sufficient, community leaders are faced with deciding the best way to provide fire protection service with truly little guidance from the Commonwealth.

Inaccurate and inconsistent data

This study showed a significant lack of data concerning the demographics of the Pennsylvania fire service. Even basic information, such as the number of fire departments operating within the commonwealth, varies depending on the source. Numbers vary from around 2,000 to almost 2,500 from sources, including the Pennsylvania State Fire Commissioner's office, PA DCED, and USFA, which all report differing numbers. This discrepancy is rooted in a lack of a consistent definition of a "fire department." As a result, some agencies are chartered and operate as independent agencies that are also part of a larger organization sharing a state-issued fire department identification number (FDID).

There is also a lack of data concerning the number of firefighters serving within the Commonwealth. When reviewing the literature for this study, other studies refer to numbers

derived from research done decades ago and only provide estimates. Adding to the complexity of determining the number of active firefighters in Pennsylvania is that similar to defining fire departments, there is no universally accepted definition of what defines a “firefighter” within the commonwealth. Therefore, there was no way to determine if the numbers of reported firefighters were trained active firefighters or just simply members of a fire department. Even if we were to base our data on the number of firefighters that hold a certain level of certification provided by the OSFC, the data varies, and there is no way to know if those certified personnel are still actively serving as a firefighters. Additionally, firefighters that receive certification from agencies other than the OSFC may not be included in the data.

Fire loss and civilian fire-related fatalities are other areas where data varied or was inconclusive. For example, while Pennsylvania communities are required to report civilian fire fatalities to OSFC, there was evidence discovered during this study that this might not be the case. This observation was confirmed during a state-wide advisory board meeting (SWAB) in June of 2022, when then-Fire Commissioner McGarvey stated that data collection is a challenge for the OSFC, lamenting that he cannot even accurately report the number of civilian fire deaths due to poor reporting by the municipalities. He gave an example of one county reporting two civilian fatalities but being personally aware of several more than the reports showed.

Variations in funding

A dominant theme throughout this study is that many journals, reports, and other literature reviewed identified the need for increased funding for Pennsylvania’s fire services. Funding for equipment, better training, and the recruitment and retention of volunteers remain the topic of many discussions and initiatives, even at the state level. Interestingly, even with the call for more funding, there remains evidence that millions of dollars may be sitting idle due to antiquated regulations that prevent communities from using those funds. Pennsylvania laws that

regulate the use of tax-funded firefighters' relief money have not only limited the ability of leaders in some communities to use the funds as needed to serve the community.

Many state regulations were meant to help the community provide fire protection but, in some cases, resulted in agencies that no longer provide direct emergency services utilizing the money for efforts that do not directly benefit the safety and welfare of the community. In areas of funding where regulation is limited, inconsistencies or disparities in fundraising and grant allotment were also discovered during the research. For example, due to the inconsistencies or limited requirements in who is eligible to fundraise or apply for grants, some communities received significantly larger amounts of OSFC grant money strictly based on the number of fire departments in that community.

Varying levels of service and training

As many previous studies have shown, including many of those reviewed for this study, the need to provide communities with education and guidance on providing adequate fire protection is essential. Unfortunately, even with regulations in place since 2008 that require most municipalities to meet with their fire service providers annually, there remains significant variation in fire protection services that are being provided by many communities. This study and literature review provided insight into why this may be. The lack of definitive regulations and guidance from the state leaves the decision-making process up to the local community officials and fire service leaders to decide what is best for the community.

Some may view this as the best way since those locals know the community needs best. However, this view relies on community and fire officials working together and both parties being educated on best practices and standards to provide fire services, which according to the data, does not seem to be occurring consistently throughout the state. Additionally, this view relies heavily on trust and cooperation between independent fire departments and their municipal

governments. Even in cases where these relationships seem to have thrived, a change in either party's leadership can affect the relationship. Essentially, without firm guidance and regulation from the state, community leaders need to rely on the opinions of others for the best way to provide fire service, which can vary greatly. Reaching back once again to the 1975 Pennsylvania Burning Report, a quote from the report is still relevant today:

[T]he main problem confronting a community is determining just what level of protection it wants – and that figure could vary from none, in which case anything that catches fire can be written off – to total, which is [an] impossibility. Each community administrator must ask himself first, what do the people want; then, what do they need; third, can they afford it: and finally (when the answer is no), what are the alternatives? (Governor's commission on fire prevention and control, 1975, p. 57).

Similar sentiments were echoed in two subsequent Pennsylvania studies, S.R. 60 (2004) and S.R. 6 (2018). This results in some communities having well-trained and staffed fire departments, while a community of similar demographics may only have minimal services.

This variation in service extends well beyond the community and the agency itself. Many communities rely on neighboring agencies for support during larger or more complex incidents. The issue that plagues many community and fire service leaders is the variation in service competencies among Pennsylvania fire departments, making some of these neighboring resources impractical or not prudent for use. Again, without clear guidance, the decision to utilize a resource becomes subjective and may rely on opinions versus best practices if an agency is utilized or not. The lack of minimal training and qualifications for firefighters exacerbates this issue since agencies cannot be assured that the assistance they request may be prepared for the firefighting task.

Standards of cover and minimum qualifications

This study and the literature reviewed offered many solutions to help solve the crisis in the Pennsylvania fire service. While there may be many recommendations, the panel in this study provided a solution that can help bring order to a system that is beginning to fail. As shown previously, the lack of standards of cover and minimum training standards has created an environment where many community leaders must rely strictly on the opinions of others to make decisions that can impact a community's ability to provide adequate fire protection services. While existing efforts, including volunteer recruitment and retention, financial reforms, and improved education, should continue, the data collected in this study shows that efforts should be made to develop state-wide standards of cover and minimum training and qualification standards for firefighters.

Without a baseline that defines the level of service a community should provide and the minimum qualifications of those providing the services, the problem will most likely continue, and the status quo will remain. This baseline does not need to be a singular solution for all communities and should provide options for communities based on their needs and financial resources. The S.R. 6 (2018) report, recommendation #3, provides details on utilizing a standard of cover system similar to the one used in the state of West Virginia that allows communities to decide on the level of protection they desire and then certify their fire protection agencies to that minimum desired level. Developing minimum standards of cover and minimum training and qualifications for firefighters, and adopting a system that requires independent certification, will provide state, community, and fire service leaders with verifiable information and guidelines that can inform better decision-making to provide adequate and sustainable fire protection to communities throughout the Commonwealth.

Limitations

While the results of this study were concluded from an extensive review of literature, interviews, and the collective work of a Delphi research panel, several limitations must be considered. First, this study focused on collecting the opinions of Pennsylvania fire service experts and did not include the opinions of a wide range of local government officials or state regulators. Local government officials and state regulators may view the issue of providing fire protection differently than those having experience in providing it. Secondly, the lack of data left many areas of the research limited, including the current level of volunteer staffing, training, and fire loss throughout the Commonwealth. A better understanding of the status of staffing and training levels of those providing fire protection services would have provided additional insight during this study. Finally, the data used and collected during this study is limited, and additional research should be done to verify that the recommendations made by this study can be implemented without causing undo harm to those that rely daily on their local fire departments.

Implications and Recommendations to the Field

The implications of this research help validate previous studies that recommended the adoption of minimum standards of cover and minimum training standards and qualifications for firefighters. Since 1975, many peer-reviewed studies have been published, including state-sponsored studies that recommended the adoption of minimum standards of cover and minimum training qualifications for fighters. This study also reiterated that issues facing communities in providing adequate fire protection have existed for many decades. While the problem of providing fire protection and recommended solutions to these problems may have existed for decades, this study also shows that adopting these recommendations may help communities provide adequate and sustainable fire protection.

This study also looked at the Pennsylvania system and reviewed how other states manage fire protection. States like West Virginia, Ohio, North Carolina, and others provided comparisons that showed a correlation between adopting minimum standards for fire departments and firefighters and their agency's effectiveness. In addition, data from peer-reviewed journals and reports from agencies such as ISO and NFPA showed that the states reviewed in this study with adopted standards tended to have lower ISO ratings and, in many cases, lower firefighter injuries and line-of-duty deaths. However, further research is needed to verify the correlation between adopted standards and increased fire department effectiveness, including lower firefighter death rates. Unfortunately, data discovered during this study indicates that Pennsylvania remains one of the least effective states in providing fire protection and consistently loses more firefighters to line-of-duty deaths than most other states.

This study also shows that community and fire service leaders need to continue working together to serve their communities' citizens. While the recommendations for adopting minimum standards of cover and minimum training and qualifications for firefighters is the overwhelming consensus of this study's expert panelists, the reality is that many barriers exist in adopting these at the state level. Changes in Pennsylvania laws and regulations and creating systems to implement these changes could take decades. As state and fire service leaders continue to pursue improving the overall system, local community, and fire service leaders can work to develop local-level solutions. While there may not be mandated policies that communities must abide by, there are resources available to help communities, including the Office of the Pennsylvania State Fire Commissioner, NFPA, the U.S. Fire Administration, and other communities or agencies that have already adopted minimum standards of cover and minimum qualifications for firefighters for their communities.

Finally, one of the most significant implications of this study is the need for additional support and resources for the Office of the Pennsylvania State Fire Commissioner. As a result of the 1975 Pennsylvania Burning Report, the office of the State Fire Commissioner was established, and over the years, there have been few changes. From its inception, the Fire Commissioner lacked the authority to implement the initiatives that were part of the recommendations that created the office. For instance, the Pennsylvania Burning report (1974) made many recommendations to empower the newly created fire commissioner to regulate many aspects of the delivery of fire protection services. Two significant recommendations found in this report were, “to become a certified firefighter, a candidate must pass a basic course in firefighting (to be developed by the State Fire Commissions), and that to maintain his status, he must be recertified every two years” and “before a firefighter is eligible to become a line officer, he must have been certified so by tests developed and administered through the State Fire Commissioner” (Governor's commission on fire prevention and control, 1975, pp. 4–5). Based on the information reviewed for this study, these recommendations remain unadopted.

The Pennsylvania Burning Report (1975) would not be the last state-sponsored study to recommend increasing the responsibility and authority of the State Fire Commissioner. The S.R. 6 report (2018) points out that “[a]lthough the Office of the State Fire Commissioner (OSFC) has been helpful to the fire service; its impact and effectiveness remains limited at best. This is due to the limited authority of the State Fire Commissioner” (PA, 2018, p. 23). In this same report, the recommendation is made to empower the fire commissioner to set minimum standards to be followed by all fire departments in the commonwealth, take actions to correct deficiencies related to statewide minimum standards of cover and conduct reviews and inspections of all fire departments to ensure compliance with state standards provided by the fire commissioners office. Essentially the solutions identified by this study that could assist communities in

providing adequate and sustainable fire protection could be implemented through the office of the State Fire Commissioner if the state legislature would expand the Fire Commissioner's authority to the level it was initially intended to have.

Recommendations for Future Research

There are several areas of needed research discovered during this study. One area mentioned in the study but has limited research is the increasing demand for EMS services, the lack of EMS resources, and the burden this places on some fire service agencies. In some areas of Pennsylvania, fire protection and EMS are provided by the same agency; in other areas, EMS may be provided by a hospital-based or completely independent private entity. Research is needed to understand better the relationship between the fire service and EMS delivery within the Commonwealth and if a joint state-wide system could increase the effectiveness and efficiency of both systems.

Additionally, further research is needed to understand better the relationship between the level of training of firefighters, apparatus operators, and fire officers and the line-of-duty death and injury rates throughout the country. While NIOSH, NFFF, NFPA, and USFA provide some insight, and many studies correlate training with line-of-duty death rates, a review of the literature for this study revealed a lack of comprehensive research that thoroughly looks at this relationship, including the levels and types (suppression, safety, physical and mental health) of training that could help reduce line-of-duty deaths.

Summary

While this study discovered that problems facing many communities within Pennsylvania have existed for many decades, it also showed that many solutions are available to help address the needs of communities for adequate and sustainable fire protection. Through an extensive literature review and collecting the opinions of Pennsylvania fire service experts, the study also provided that adopting minimum standards of cover and requiring minimum training and qualifications for firefighters may be the best place to start. In addition, having state-wide adopted policies through state legislation provides community and fire service leaders with a foundation to evaluate and implement the level of service needed and the training and qualifications for those that provide the services in their communities. Additionally, consideration should be given, by the legislator, to empowering the office of the State Fire Commissioner to develop, implement, and maintain policies that govern the delivery of fire protection throughout the commonwealth, including firefighter qualifications and standards of cover.

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APPENDICES

Appendix A, Initial Delphi Survey

Pennsylvania Fire Service Delivery

Pennsylvania fire protection in rural and suburban communities

This research aims to discover what effective strategies can assist rural and suburban communities within the Commonwealth of Pennsylvania in ensuring adequate and sustainable fire protection.

This survey is round 1 of a Delphi study being completed as part of an academic research project for the National Fire Academy Executive Officer Program. Your participation is valuable but completely voluntary. Your identity will be kept confidential, and you can discontinue participation anytime. If you have any questions, please contact the author of the study at curvin.wolfgang@gmail.com

*** 1. Please select the most appropriate choice that best describes your current role/occupation.**

☐ Fire Officer, Fire Chief, Battalion Chief, Assistant Chief
☐ Municipal official, Manger, Director, Supervisor
☐ Elected official, Mayor, Council Person, Commitee Appointee
☐ Academic professional, Professor, Director, Dean, Administrator
☐ Other (please specify)

*** 2. Years of experience in the field of fire and emergency services**

1
50

* 3. Rank the recommended solutions for assisting communities in providing adequate and sustainable fire protection by order of importance. While there may be multiple solutions you believe to be equal in importance, it is essential to consider which ones, in order, would have the most significant impact.

	Most important	Important	Moderately Important	Slightly Important	Least Important
Pennsylvania should require minimal training and qualifications for firefighters.	☐	☐	☐	☐	☐
Pennsylvania should adopt minimal standards of cover for all communities.	☐	☐	☐	☐	☐
Pennsylvania should require all fire departments to report the level of certification of each of its members responding to an emergency incident.	☐	☐	☐	☐	☐
Pennsylvania should adopt a mandatory fire department licensure program similar to the PA DOH guidelines for EMS.	☐	☐	☐	☐	☐
Pennsylvania should provide communities with detailed guidelines to provide adequate fire protection to their communities.	☐	☐	☐	☐	☐

Please explain your selections and provide details on any potential barriers to implementing this strategy

* 4. Please provide any additional information on ways to provide adequate and sustainable fire protection to communities throughout the Commonwealth of Pennsylvania

5. Please enter your unique identifier.

Appendix B, Initial Delphi Analysis Worksheet

What effective strategies can assist communities within the Commonwealth of Pennsylvania in ensuring adequate and sustainable fire protection?			
Proposal	Ranking	Pattern/Theme	Key Quotes/Evidence
Pennsylvania should require minimal training and qualifications for firefighters.			
Pennsylvania should adopt minimal standards of coverage for all communities.			
Pennsylvania should require all fire departments to report the level of certification of each of its members responding to an emergency incident.			
Pennsylvania should adopt a mandatory fire department licensure program similar to the PA DOH guidelines for EMS.			
Pennsylvania should provide communities with detailed guidelines to provide adequate fire protection to their communities.			
Panelists feedback			

Appendix C, Round Two Delphi Survey

Pennsylvania Fire Service Study, Round Two Survey

Follow up survey based on your initial responses.

Thank you for the great feedback on the first round of questions. The data provided by your selections and your extensive comments provided insight into how experts like yourself are passionate and committed to improving the Pennsylvania fire service. Common themes discovered from the review of your written responses included a few overarching topics: *the need for regionalization, increased funding, and changes in fire service regulations*. I have provided a summary of your round-one survey responses below.

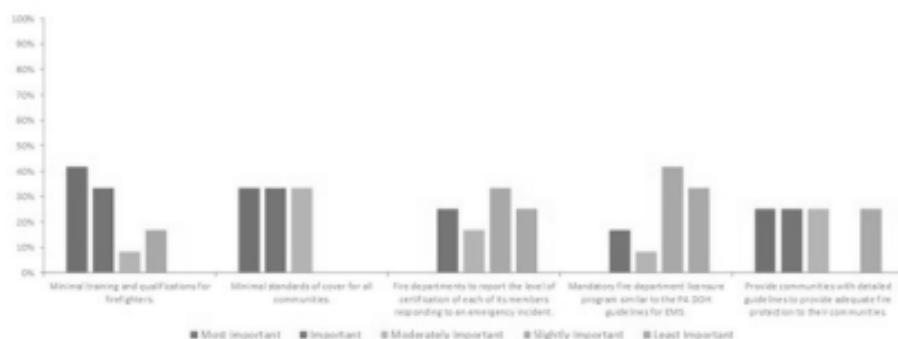
The purpose of this second round of questions is to continue to narrow down the initial choices to develop a consensus. In the first survey, you ranked the proposed solutions by importance. From the five solutions presented, this panel was able to select three of the solutions as the most important:

- **Require minimum training and certification requirements for firefighters.**
- **Adoption of minimum standards of coverage for communities.**
- **Provide communities with detailed guidelines to provide adequate fire protection to their communities.**

In this round, reconsider the three solutions identified by this panel. In addition, consider if one solution may need to be implemented first or should be a higher priority to help achieve additional solutions, if necessary. Consideration for funding, regulation, and cultural limitations may also be considered. In essence, what is the first solution that fire service and municipal leaders can advocate for to help ensure sustainable and adequate fire protection in their communities?

Please rank your choices from 1 to 3, with 1 being your preferred solution and 3 being your least preferred.

Response Graph



* 1. Please rank the proposed solution based on a combination of importance and priority of implementation.

-   Pennsylvania should require minimal training and qualifications for firefighters.
-   Pennsylvania should adopt minimal standards of cover for all communities.
-   Pennsylvania should provide communities with detailed guidelines to provide adequate fire protection to their communities.

2. Please provide any additional details of your ranking selection.

* 3. Please enter your unique identifier

Appendix D, Round Three Delphi Survey

Pennsylvania Fire Service Round Three Survey

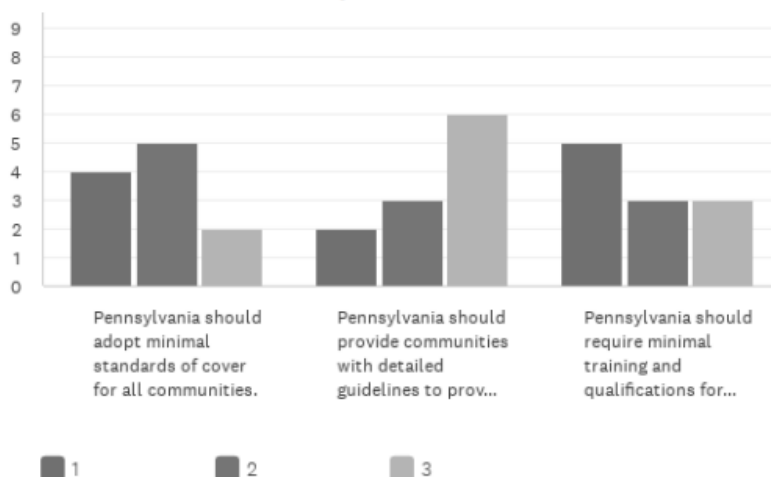
Third round survey based on round two results

Thank you for the great feedback and responses to the previous surveys. While we did not see one overwhelming solution chosen by all, there is a clear trend. While most of you selected the “require minimum training and certification requirements for firefighters,” the “adoption of minimum standards of coverage for communities” is a close second. However, this is not to say that community education is not essential; as many of you pointed out, any solution will require extensive community education.

Considering that community education must be part of any solution, this final round will allow you to select from the top two solutions ranked by this panel. Additionally, the qualitative data has shown that the final three solutions chosen by this panel may not be exclusive of each other. For instance, there may be a case that minimum standards of cover and minimum training standards should be part of the same solution. Since this may be the case, you will also be asked if the final two solutions should be combined into one proposed solution.

I want to thank all of you for your time and terrific input. From your responses, I know you are passionate about continuing to improve the Pennsylvania fire service. I am truly grateful.

Results from the second survey



1. Please rank the proposed solution based on a combination of importance and priority of implementation.

- ☐ ☐ Pennsylvania should require minimal training and qualifications for firefighters.
- ☐ ☐ Pennsylvania should adopt minimal standards of cover for all communities.
- ☐ ☐ Both solutions are equally important and should be combined as a singular solution, standards of cover with minimum qualifications for firefighters.

2. Please provide any comments that may assist in implementing the chosen selection or any final comments you would like to provide.

Appendix E, Research Participation Interview Consent Form

Academic Research Participation Consent Form

Identification of Investigators & Purpose of Study

You are being asked to participate in a research study conducted by Curvin Wolfgang from the National Fire Academy. This study aims to develop a better understanding of Pennsylvania emergency services. This study will contribute to the researcher's completion of their final project.

Time required

Participation in this study will require approximately 50-60 minutes per week of your time for approximately 4-6 weeks.

Risks

The investigator does not perceive more than minimal risks from your involvement in this study (that is, no risks beyond the risks associated with everyday life).

Benefits

There are no direct benefits to the participant. However, this study's information may benefit Pennsylvania communities that maintain the responsibility to provide adequate emergency services.

No incentives (financial or otherwise) are associated with participation in this study.

Confidentiality

The results of this research will be presented to NFA program faculty and students. The results of this project will be coded in such a way that the respondent's identity will not be attached to the final form of this study. The researcher retains the right to use and publish non-identifiable data. While individual responses are confidential, aggregate data will be presented, representing averages or generalizations about the responses as a whole. All data will be stored in a secure location accessible only to the researcher. Upon completion of the study, all information that matches up individual respondents with their answers (including audio recordings) will be destroyed. Final aggregate results will be made available to participants upon request.

Participation & Withdrawal

Your participation is entirely voluntary. You are free to choose not to participate. Should you choose to participate, you can withdraw at any time without consequences of any kind.

Questions about the Study

If you have questions or concerns during the time of your participation in this study or after its completion, or you would like to receive a copy of the final aggregate results of this study, please contact:

Curvin Wolfgang

Student

National Fire Academy

Curvin.wolfgang@gmail.com**Christine Spangler**

Branch Chief

National Fire Academy

christine.spangler@fema.dhs.gov

Giving of Consent

I have read this consent form, and I understand what is being requested of me as a participant in this study. I freely consent to participate. I have been given satisfactory answers to my questions. The investigator provided me with a copy of this form. I certify that I am at least 18 years of age.

☐ I give consent to be audio recorded during my interview. _____ (interviewee initials)

Interviewer Signature		Date:	
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Interviewee Signature		Date:	
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