



Tennessee Fire Department Needs Assessment Survey 2020

Dennis Wolf, MTAS Fire Management Consultant
Steven Cross, MTAS Fire Management Consultant
Frances Adams-O'Brien, MTAS Librarian

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Executive Summary

In 2015, the National Fire Protection Association (NFPA) conducted its fourth Fire Service Needs Assessment Survey, having conducted previous surveys in 2001, 2005, and 2010. Even though the United States Fire Administration (USFA) and the NFPA have conducted several national level fire services needs assessments, there had never been a comprehensive needs assessment conducted that focused solely on the Tennessee fire service until 2013. Based on individual fire studies conducted by the Municipal Technical Advisory Service (MTAS), these departments are keenly aware that Tennessee fire services have extensive needs in many areas, especially in smaller communities, but there is a lack of quantifiable data on these needs. The purpose of this survey was to collect reliable data on the needs of Tennessee fire departments as a whole.

Additionally, the response rate for Tennessee in national surveys has been low. In 2010 and 2015, for example, the NFPA surveyed 247 and 427 respectively of the 723 fire departments in Tennessee and of the departments surveyed only 80 and 81 fire departments responded, respectively. MTAS does not consider either of these examples a representative picture of the state's fire service. To get a better sample of data, MTAS theorized that a survey of Tennessee fire departments by a Tennessee organization, coupled with providing a way for participants to respond both electronically and manually, would result in an improved response rate. In fact, the response rate to MTAS' Tennessee Fire Needs Assessment Survey (TFNAS) in 2013 and 2020 was 23 percent and 28 percent respectively, which greatly exceeds the response rate to the national survey in both 2010 and 2015 (11 and 19 percent respectively).

This survey's major goal is to identify gaps or the needs of the Tennessee fire service by comparing what departments have, regarding efficient and effective firefighting practices, against consensus standards, government regulations, and other nationally recognized guidance.

The specific goals of the Tennessee Fire Service Needs Assessment Survey are:

1. To serve as a resource for fire departments at all jurisdictional levels.
2. To provide metrics or "yardsticks" to measure one fire department against the results for all fire departments.
3. To identify the need for possible legislation to address statewide needs.
4. To identify potential projects for state agencies and/or statewide professional associations, such as the Tennessee Fire Chiefs Association (TFCA), to focus on improving identified fire service deficiencies in Tennessee.

5. To identify training needs to assist the Tennessee Fire and Codes Academy in developing training programs and classes to better respond to the needs of its customers.
6. To assess compliance levels with national standards at the department level and statewide level.

The survey results indicate that the Tennessee fire service has made some substantial progress but still has many needs in many areas. Examples of significant needs as identified in this study include:

Formal training:

- 48 percent of firefighters lack formal training that meets NFPA standards
- 26 percent of firefighters in Tennessee do not have Fire Fighter I certification, the minimum level of certification deemed necessary by the NFPA for a firefighter to function as an integral member of a firefighting team under direct supervision in hazardous conditions

Staffing:

- 40 percent of all fire departments with volunteers do not have a recruitment and retention plan in place
- 76 percent of fire departments with career personnel do not meet the NFPA recommended staffing level of four (4) firefighters per engine company
- 56 percent of firefighters in Tennessee do not receive the minimum number of annual training hours (192) in structural firefighting recommended by the Insurance Services Office
- 38 percent of new fire apparatus drivers do not receive 60 hours of training in driving and operating fire apparatus as recommended by ISO.
- 47 percent of all fire officers have obtained the minimum certification level of Fire Officer I
- 82 percent of fire departments in Tennessee responding to wildland fires have personnel that lack formal training or certification in wildland firefighting

Programs offered to the community:

- 23 percent of fire departments in Tennessee have no smoke alarm education/distribution program

Facilities:

- 55 percent of fire departments in Tennessee have at least one fire station that is more than 40 years old

Equipment:

- Approximately 33 percent of volunteer fire departments do not have enough SCBA for responding firefighters
- 65 percent of all fire departments have SCBA that is 10 or more years old
- 31 percent of all fire departments have at least one engine that is more than 25 years old in front line service
- The numbers of fire departments with no personal protective clothing older than 10 years old has increased since 2013.

Department Type	2013	2020
Full Career	48%	68%
Mostly Career	56%	76%
Mostly Volunteer	30%	48%
Full Volunteer	16%	21%

Introduction

According to the Tennessee Department of Economic and Community Development's Certified Population of Tennessee Incorporated Municipalities and Counties 2020¹, most Tennessee cities (82.89%) have populations below 10,000, with 246 having less than 5,000 inhabitants. Furthermore, with a fire death rate per million population of 20.5 for 2019, Tennessee is among the top six states in the nation with the highest relative risk of dying by fire, according to the U.S. Fire Administration². This high risk may be attributed to many factors such as the high percentage of rural regions, poverty, and low education levels. This poses a unique challenge for the 700 fire departments in the state with limited resources to be able to meet the wide assortment of fire service needs.

To identify gaps in fire needs and services, MTAS created a survey and distributed it to fire departments across the state. The MTAS fire needs assessment study allows for a more accurate and up-to-date depiction of Tennessee fire services and illuminates areas in need of improvement and funding. The resulting information highlights gaps in fire service coverage and suggests which jurisdictions might benefit most from programs such as the distribution of smoke alarms and improvements in fire prevention services.

Important features related to the existing level of fire protection and prevention services provided by the fire departments in Tennessee will emerge in the analysis of the survey results. Areas of need have been identified by comparing the survey results to national standards and government regulations. The identification of these gaps will allow fire chiefs, elected officials, and legislators to make strategic decisions regarding resource allocation that will have the most impact in improving fire services and lowering the risk of fire for Tennesseans. Additionally, the summary report of the survey results will be an asset to interested parties who advocate for the fire service in the legislature, which may improve fire services in the state.

Survey Methodology

As in the two-part 2013-2014 MTAS Fire Needs Assessment Survey, the questions for the 2020 survey were derived from the NFPA Needs Assessment Survey questions.

¹ Certified Population of Tennessee Incorporated Municipalities and Counties. State of Tennessee. Department of Economic and Community Development, Division of Research. July 1, 2020.
<https://www.mtas.tennessee.edu/system/files/knowledgebase/original/CertPop-Annual-Report_-Jul-1-2020.pdf>

² U.S. Fire Deaths, Fire Death Rates and Risk of Dying in a Fire. U.S. Fire Administration. 2018.
<https://www.usfa.fema.gov/data/statistics/fire_death_rates.html?kbid=62750>

MTAS revised and expanded the questions to tailor the information gathered to Tennessee fire services. Survey questions were derived from the NFPA survey to allow for comparisons to national results.

The 96 questions in the survey address seven categories of information related to fire services. The results from the survey offer a comprehensive analysis and representation of Tennessee's current fire service needs.

The NFPA survey uses population groupings to compare data. Where it adds value, analysis by population is also provided in the MTAS report. Additionally, comparisons are provided to NFPA standards and national findings in some cases to determine how Tennessee compares to fire services across the country.

The scope of the MTAS survey comprises fire services provided throughout the state of Tennessee in 2020.

In 2020, the MTAS Fire Department Needs Assessment Survey was sent to a total of 607 departments with an email address contact. Contact information for the survey was sourced from several sources including the state fire marshal's office, TFIRS contacts, and the MTAS government mailing list database. Of this group of 607 contacts, 512 contacts were considered active once bounces and unsubscribed addresses were removed.

A total of 198 completed surveys were submitted in response to the 2020 invitation for a response rate of 38 percent. This is a higher response rate than we received in the 2013-2014 survey which was at 23 percent. Compare the current MTAS survey response rate to the NFPA overall survey response rate of 19 percent in their most recent survey (2015).³

Of the 700⁴ fire departments in the state, 198 participated in the 2020 MTAS survey, representing nearly 28% percent of all recognized Tennessee fire departments. The fire departments that responded to the survey serve 56 percent⁵ of the state's total population of 6,829,174⁶ individuals. As a result, MTAS can infer general conclusions about fire services in Tennessee.

The 2020 MTAS survey closely mirrors the 2013-2014 needs assessment survey in

³ Fourth Needs Assessment of the U.S. Fire Service. p. xxxiii.

⁴ Tennessee State Fire Marshal's Office. Department of Commerce and Insurance.

⁵ Departments responding provide services to approximately 3,826,637 individuals based on the populations of the jurisdictions/areas they report to serve.

⁶ United States Census Bureau, Quick Facts. Tennessee. Population estimates for July 1, 2019 (V2019)
<https://www.census.gov/quickfacts/fact/table/TN,US/PST045219>

terms of questions asked. This is to allow comparison between 2014 and 2020 to see if progress has been made in addressing the needs identified in 2014, and to see if there are any new gaps.

Like 2013-2014, in 2020, the MTAS Research and Information Center administered the survey electronically with follow-ups conducted via phone and email to increase response rate. MTAS fire management consultants, Dennis Wolf and Steve Cross were available to help with any questions from participants.

Overview of Results

I. Department Information, Budget, and Equipment Replacement

This section of the survey focuses on the structure of fire departments, apparatus policies in place, and funding. The answers to these questions may provide insight into areas of need regarding fire stations with assorted structures and funding.

55 percent of the departments responding classified themselves as full volunteer departments while 51 percent of all cities in the state have a population of fewer than 2,000 individuals. It is probable that cities with fewer than 2,000 residents would have fire services provided by a fully volunteer or mostly volunteer department and thus more than 50 percent of fire departments in the state would be operated by volunteer firefighters.

This educated assumption enables broad interpretation of the data to make conclusions about all fire services in the state.

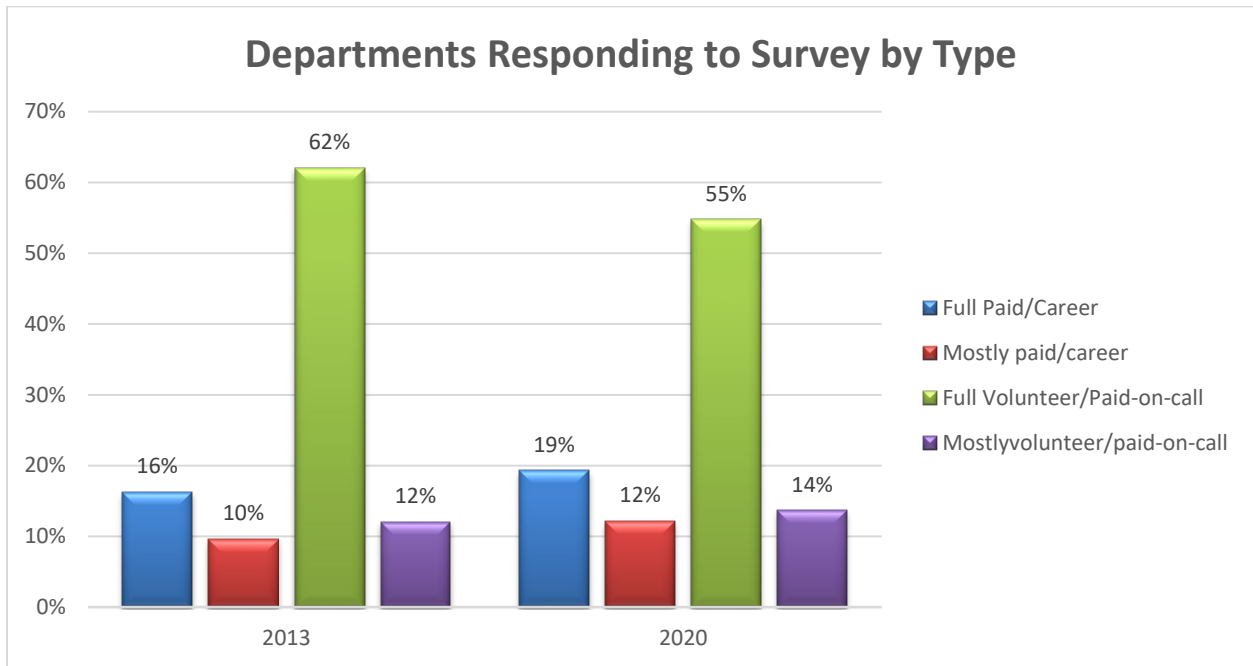


Fig. 1: Responding fire departments by type of department 2013 and 2020

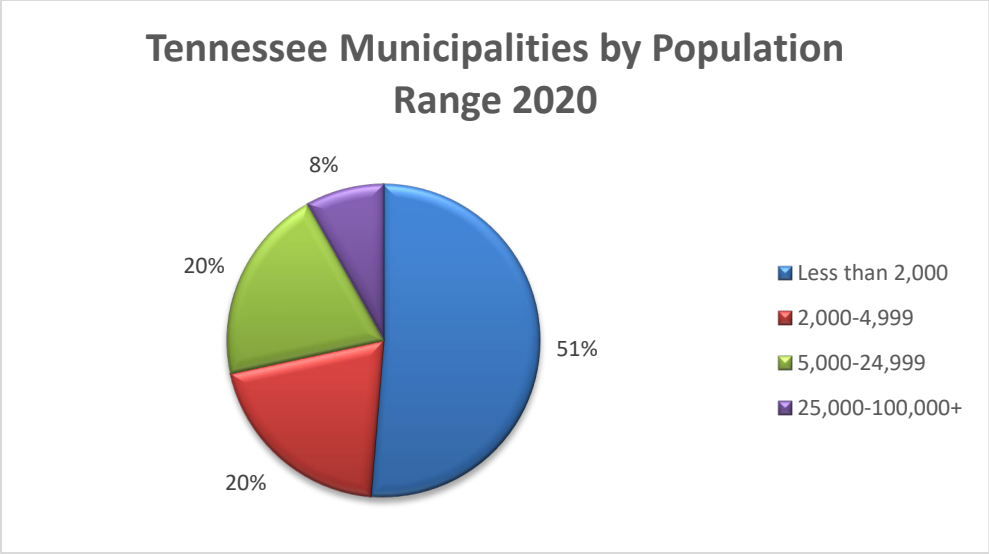


Fig. 2: Tennessee municipalities grouped by population range (based 2020 State Certified Populations)

ISO Ratings of All Departments in Tennessee

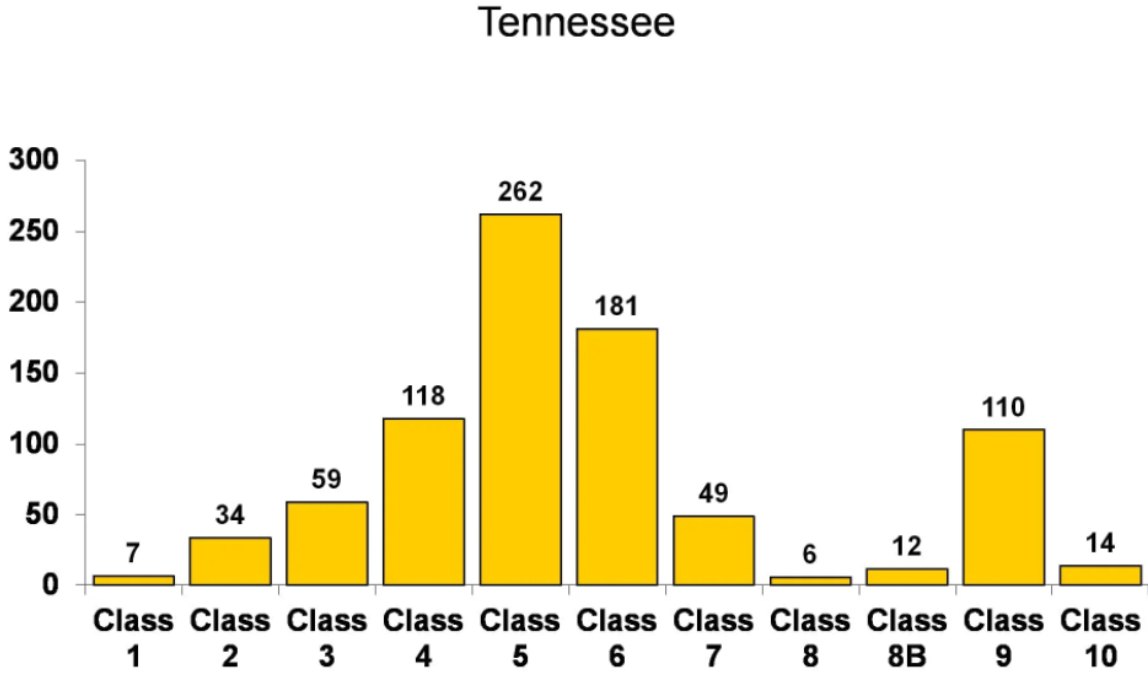


Fig. 3: ISO rating ranges of responding departments September 2021⁷

The Insurance Services Office (ISO) is a national company that collects information on municipal fire-protection efforts in communities across the county. Using the ISO Fire

⁷ Insurance Services Offices. Facts and Figures about PPC Codes Around the Country. 2021. <https://www.isomitigation.com/ppc/program-works/facts-and-figures-about-ppc-codes-around-the-country/>

Suppression Rating Schedule (FSRS), ISO assigns a Public Protection Classification, more commonly called the ISO Rating, from Class 1 to Class 10. Class 1 is the best rating, represents superior property fire protection, and Class 10 means the community's fire protection does not meet ISO's minimum criteria. A community can use the data from the community's rating to help the fire department plan for improvements in local fire protection. Insurance companies purchase the data from ISO and use it as one factor in setting property insurance rates.

The ISO Ratings of 852 communities across Tennessee are shown in Figure 3. This distribution closely mirrors the national distribution, with most communities falling in the Class 4 through Class 6 range. With adequate funding and support, MTAS considers Class 6 to be an achievable rating for even the smallest volunteer fire department, ~~with adequate funding and support~~, and this figure shows that there are at least 179 communities in Tennessee that have serious needs. Fourteen of these communities have no recognized level of fire protection.

Budget

Tennessee reflects the national trend with most fire departments not receiving budget increases due to a sustained economic recession. Even when the budget remained the same, this is essentially a budget cut since the supplies and expenses needed to provide the same level of fire service probably increased. When fire departments lack the necessary funding for proper training and equipment, there is an increased risk of firefighter and civilian injury and death, as well as increased property loss. This correlation poses a challenge for those fire chiefs who must effectively manage with inadequate budgets that may result in personnel and equipment shortages.

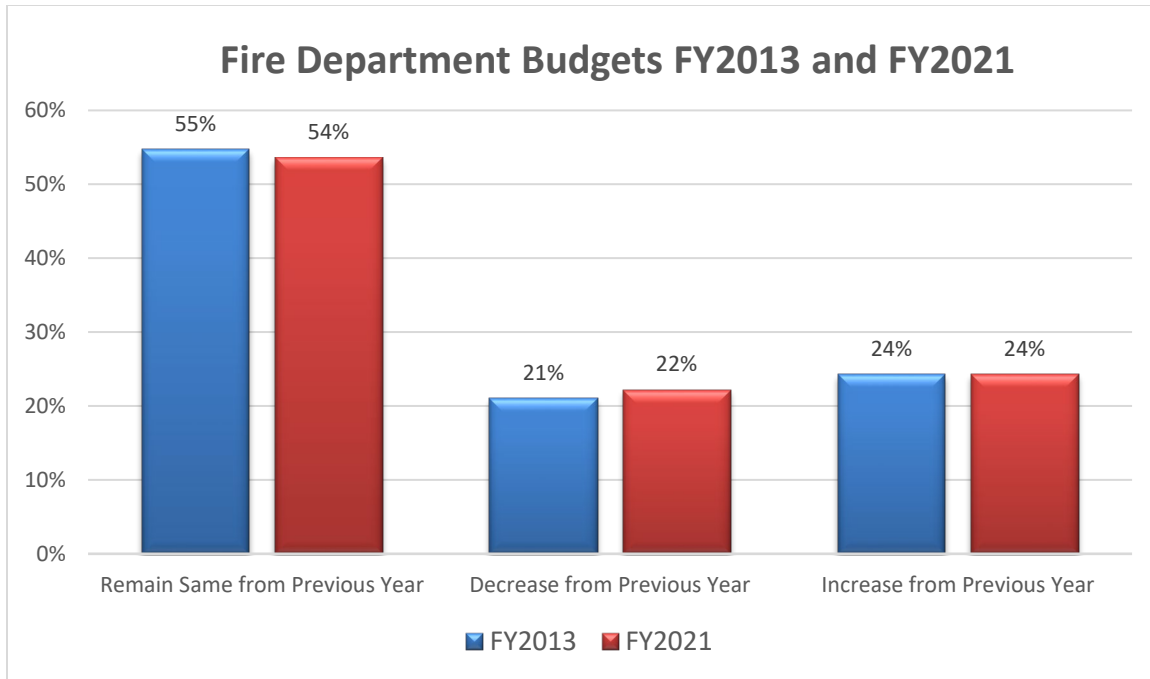


Fig. 4: Comparison of Tennessee fire departments budgets for FY2013 and FY2021

Between FY2013 and FY2021, department budgets showed no significant changes.

Replacement of Apparatus

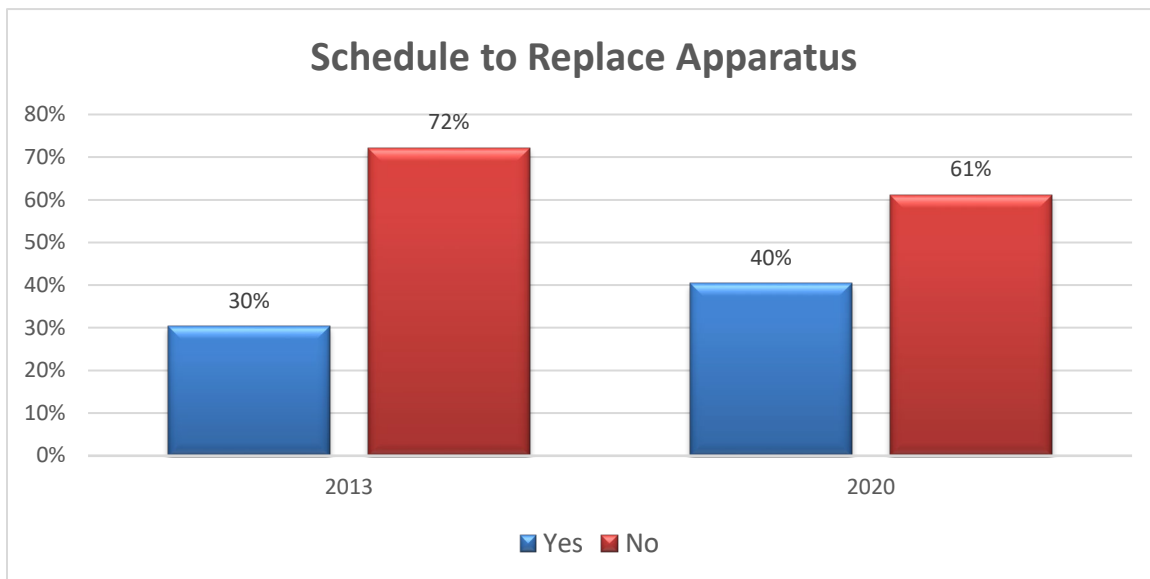


Fig. 5: Departments that have a plan to replace apparatus on a regular schedule

Lack of Success in Meeting Need

Schedule to Replace Apparatus: In 2013, 72 percent of the total respondents did not have policies in place for replacement of the required equipment and apparatuses.

The number of departments with policies in place for equipment replacement has decreased since 2013 by 11 percent. It is troubling that in 2020, 61 percent of responding departments report having no plan for apparatus replacement. Fire apparatus wears out, and NFPA recommends that an apparatus more than 25 years old not be used for emergency response.

The lack of an apparatus replacement plan, along with budgets staying the same or not keeping up with inflation, illustrates the need for more proactive replacement plans. To further illuminate the problem, the national cost of fire protection, including proper equipment, has risen 196 percent from 1980-2015.⁸

⁸ Evarts, Ben and Gary P. Stein. US Fire Department Profile 2018, p.5. (February 2020)
<<https://www.nfpa.org/News-and-Research/Data-research-and-tools/Emergency-Responders/US-fire-department-profile>>

II. Personnel

Recruitment and Retention Plans in Place

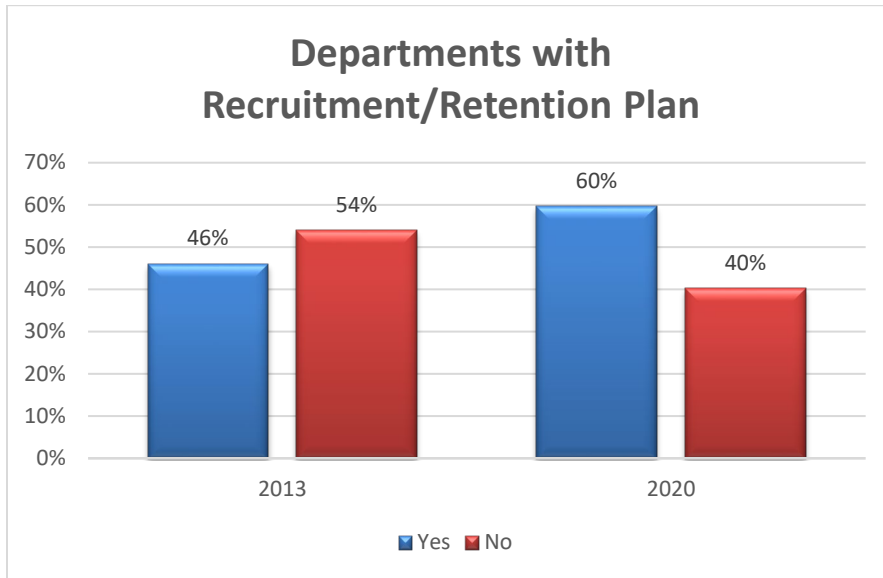


Fig. 6: Departments reporting having a plan for recruitment and retention of personnel for 2013 and 2020

Moderate Success in Meeting Need

Recruitment and Retention: There is a trend in the nation of declining volunteerism, which is evident in the fire service sector.⁹ In 2013, while 46 percent of fire departments in the state had a plan or policy in place for recruitment and retention of firefighters, the majority (54 percent) did not have such plans. Moreover, research by FEMA and the National Volunteer Fire Council from 2007 shows that the average annual national savings resulting from using volunteer firefighters is \$37.3 billion total or \$45,000 saved per firefighter.¹⁰ The monetary benefits to the community and the threats to service levels are too important to ignore the issue of retention and recruitment of trained firefighters.

An increase of 14 percent of departments reported having a recruitment/retention plan in place from 2013 to 2020. The Tennessee Fire Chiefs Association promotes the National Volunteer Fire Council (NVFC) recruitment and retention program “Make Me A Firefighter” and MTAS believes that this program is a factor in the increase in fire departments have such a program. However, fire departments still report having difficulty in getting new members to join despite having a recruitment program.

⁹ Retention and Recruitment for the Volunteer Emergency Services: Challenges and Solutions. (2007). Emmetsburg, MD: United States Fire Administration, FEMA. Retrieved from <http://www.usfa.fema.gov/downloads/pdf/publications/fa-310.pdf>

¹⁰ Dennis Wolf. Volunteer Firefighter Recruitment and Retention. 2021. Includes a calculator for the value of volunteer fire service value. <https://www.mtas.tennessee.edu/knowledgebase/volunteer-firefighter-recruitment-and-retention>

Volunteer vs. Career Fire Departments in Tennessee and the U.S.

An analysis of populations served by Tennessee fire departments creates a clear picture of fire service personnel needs in the state. Identifying the population protected by fire departments and classifying these departments as full volunteer, mostly volunteer, all career and mostly career allow for a better understanding of fire service needs. Furthermore, use of this data advances geographic deductions and allows for maximum comparability.

Most fire departments in the state are “full volunteer” (72 percent). The remainder is full career staff (6 percent), and a combination of volunteer and paid (16 percent). These findings are similar to national trends in which over two-thirds of U.S. fire departments are all volunteer (70 percent). Figure 7 compares the percentage of volunteer and career fire departments in Tennessee and nationally.¹¹

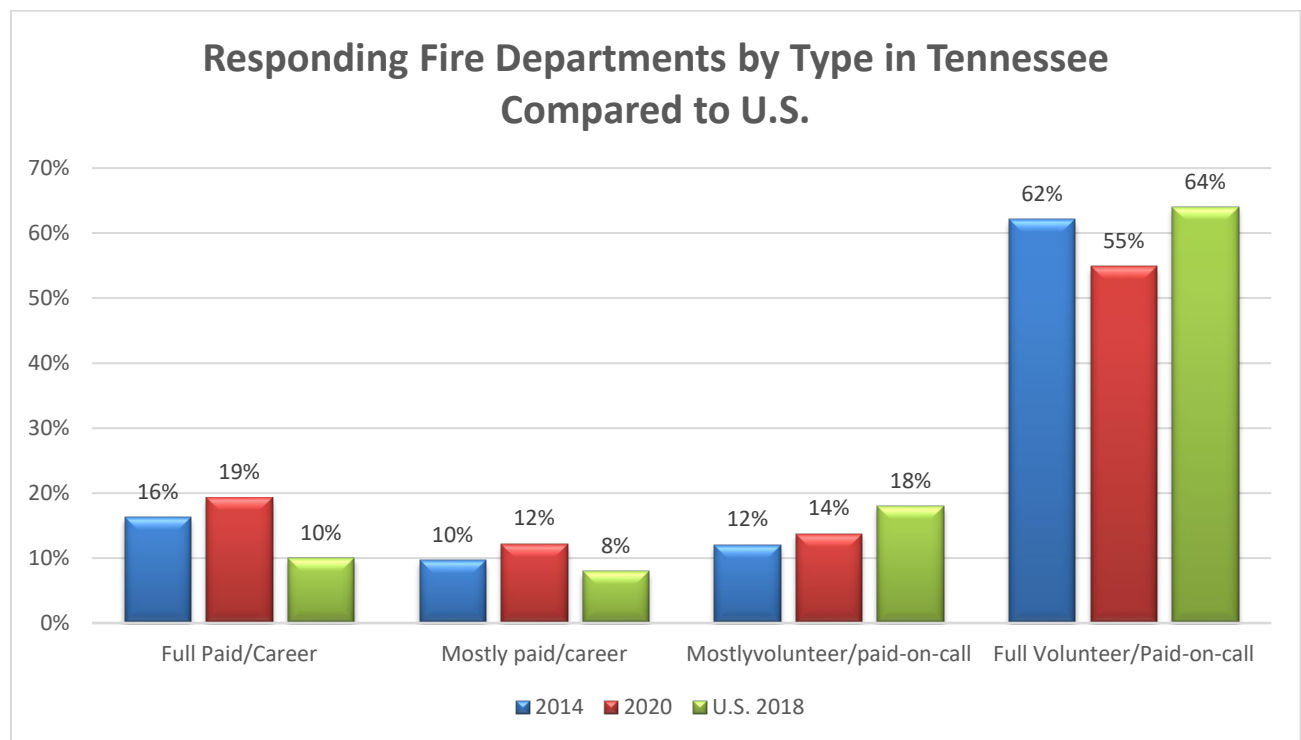


Fig. 7: Tennessee fire departments that responded to the 2013-14 and 2020 surveys compared to NFPA U.S. percentages

¹¹ U.S. Fire Department Profile-2018, Supporting Tables. National Fire Protection Association. (February 2020). Table 14, p. 14.

Responding Tennessee Departments by Population Group Compared to U.S.

When evaluating the makeup of fire departments nationally and in relation to the population of communities, Tennessee is similar to the national breakdown. Fire departments serving communities of less than 2,000 in population are predominately volunteer, while communities of more than 100,000 in population are predominately all career fire departments.

Table 1 below illustrates the responding Tennessee department type by the population of the jurisdiction protected compared to same breakdown of departments in the U.S.¹²

Population Protected	All Career		Mostly Career		Mostly Volunteer		All Volunteer	
	NFPA	Tenn.	NFPA	Tenn.	NFPA	Tenn.	NFPA	Tenn.
Less than 2,500	2%	0%	2%	2%	5%	5%	92%	93%
2,500-4,999	2%	9%	4%	6%	22%	15%	72%	71%
5,000-9,999	9%	14%	12%	17%	41%	26%	39%	43%
10,000-24,999	26%	30%	25%	27%	36%	18%	13%	24%
25,000-49,999	49%	57%	25%	14%	21%	14%	4%	14%
50,000-99,999	73%	67%	19%	33%	8%	0%	0%	0%
100,000-249,000	87%	80%	10%	20%	2%	0%	1%	0%
250,000-499,999	84%	0%	13%	0%	3%	0%	0%	0%
500,000-999,999	79%	100%	17%	0%	4%	0%	0%	0%

Table 1: Tennessee and national fire departments by department type and population protected 2020 compared to the U.S.¹³

¹² U.S. Fire Department Profile-2018, Supporting Tables. National Fire Protection Association. (February 2020). Table 14, p. 14.

¹³ Note that MTAS percentages are based on the departments responding to the 2020 Needs Assessment Survey. NFPA percentages are based on a projection

Personnel Assigned to Apparatus

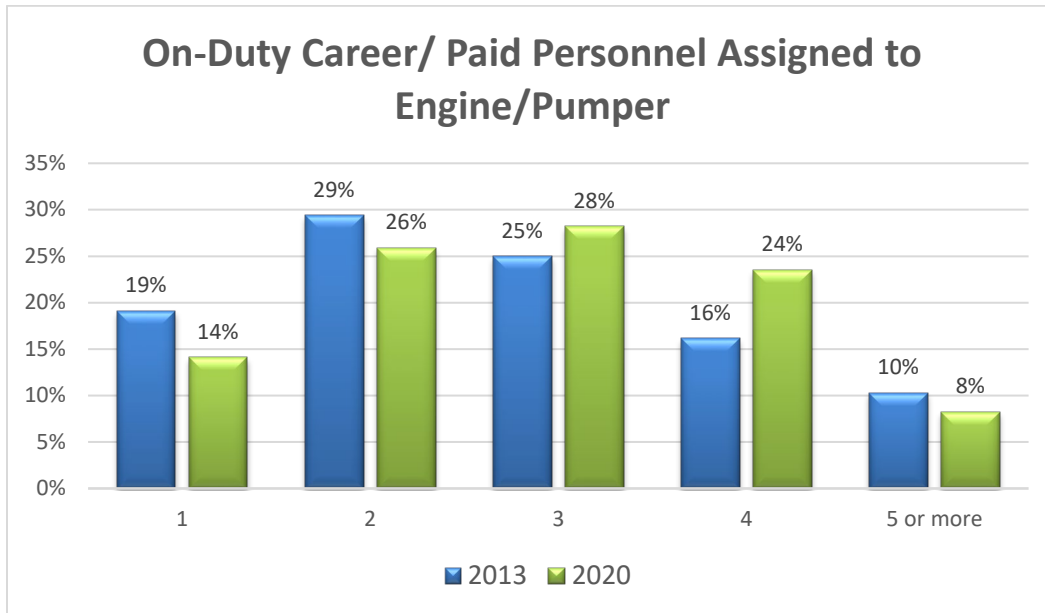


Fig. 8: On-Duty Career/Paid Personnel Assigned to Engine/Pumper for 2013 and 2020¹⁴

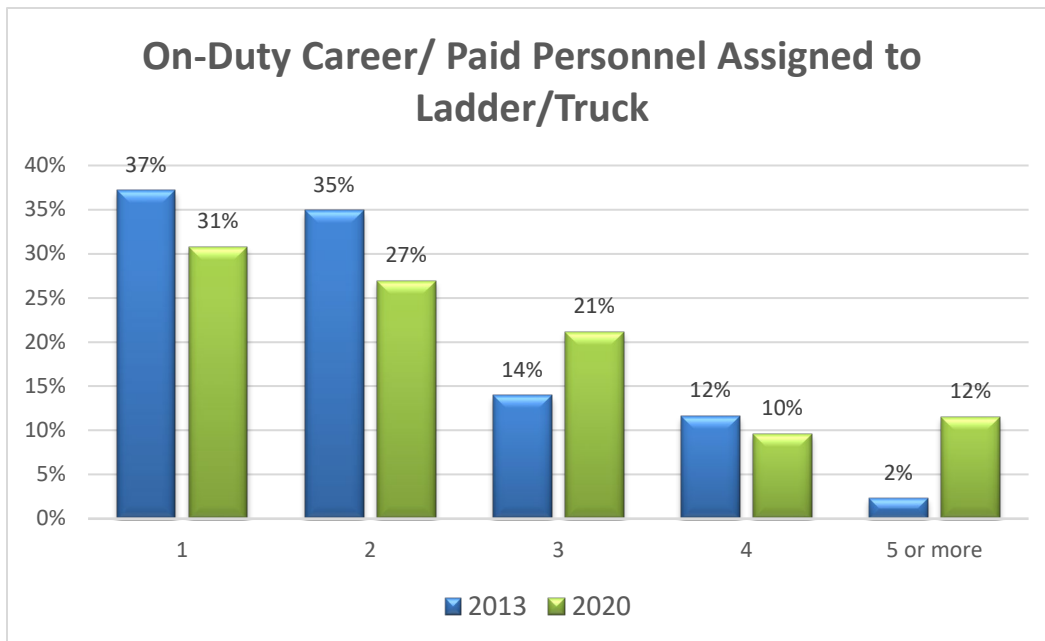


Fig. 9: On-Duty Career/Paid Personnel Assigned to Ladder/Truck for 2013 and 2020

¹⁴ N/A responses for 2013 and 2020 were not included in figures 8 and 9. N= only those responses that were not N/A.

Lack of Success in Meeting Need

Personnel Assigned to Engines: NFPA requires a minimum of four firefighters assigned to an engine or pumper in a career fire department. Of the career departments in Tennessee, based on the results of this study, we see that 75 percent of these departments fail to comply with NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*.¹⁵ Reduced/limited staffing on apparatus affects the ability of a fire department to fight a fire efficiently and effectively, as NFPA, the International City/County Management Association (ICMA)¹⁶, and the Insurance Services Office (ISO)¹⁷ all recommend a minimum of fifteen or sixteen firefighters on the scene of a low-risk structure fire. Additional fire engines will be required simply to transport firefighters to the scene when so few personnel are assigned to each engine.

A positive finding is that the percentage of departments with just one or two firefighters assigned to an engine decreased, while the percentage of engines with three and four firefighters assigned increased. This may indicate a trend towards increasing the number of firefighters on an engine company.

For ladder trucks, the percentage of trucks with one or two firefighters decreased, and the percentage of trucks with three firefighters increased. While the percentage of trucks staffed with four firefighters decreased slightly, the percentage of trucks staffed with five personnel increased significantly. Again, this may indicate a trend towards increased staffing levels.

¹⁵ NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments* (National Fire Protection Agency 2010).

¹⁶ Compton, D., & Granito, J. (Eds.). (2002). *Managing Fire and Rescue Services*. ICMA: Washington, DC.

¹⁷ ISO Fire Suppression Rating Schedule, 2012 edition.

III. Personnel. Structural Firefighting and Firefighter Certification

It is crucial for all firefighters to have the proper skills and knowledge for all scenarios of firefighting. Ongoing training and education enable firefighters to work together more effectively to save lives and property. This portion of the survey focuses on areas of need in structural firefighting training.

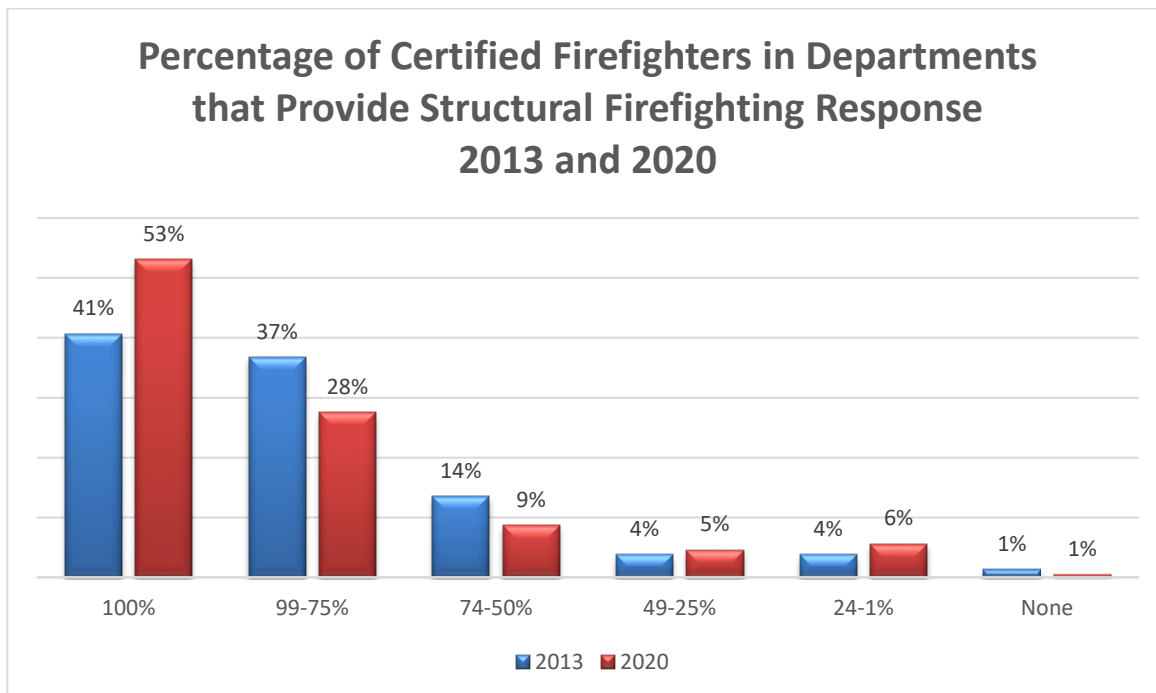


Fig. 10: Overall percentage of firefighters certified to fight structural fire for 2013 and 2020

Moderate Success in Meeting Need:

Firefighters Certified for Structural Firefighting: Fires are a leading cause of preventable death and injury in the U.S., with 75 percent of all fire deaths occurring in home fires in 2019.¹⁸ In 2020, 98 percent of the fire departments responding to the MTAS survey reported that they provide structural firefighting services. As illustrated in Figure 10 above, only 53 percent of the departments which respond to structural fires have 100 percent of their personnel certified in structural firefighting according to the standards of NFPA 1001, *Standard for Fire Fighter Professional Qualifications*. While these firefighters may have training, they lack certification through an independent third party, such as the Tennessee Commission on Firefighting and Personnel Standards.

¹⁸ Fire Loss in the United States During 2019. National Fire Protection Association. Marty Ahrens and Ben Everts. (2020) <https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/US-Fire-Problem/osFireLoss.pdf>

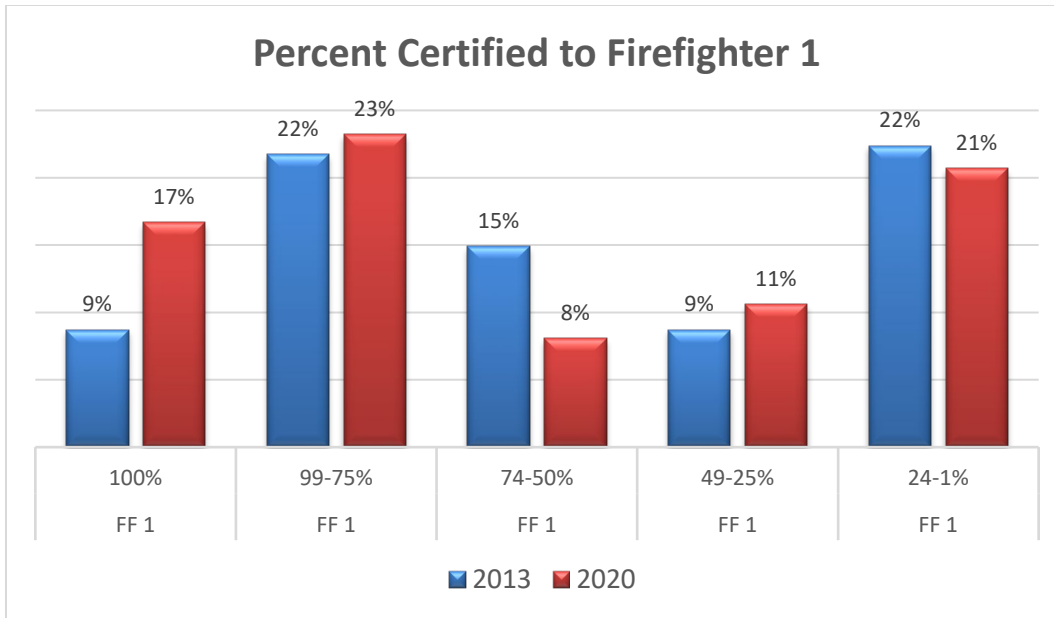


Fig. 10-1: Percentage of firefighters certified to Firefighter I for 2013 and 2020

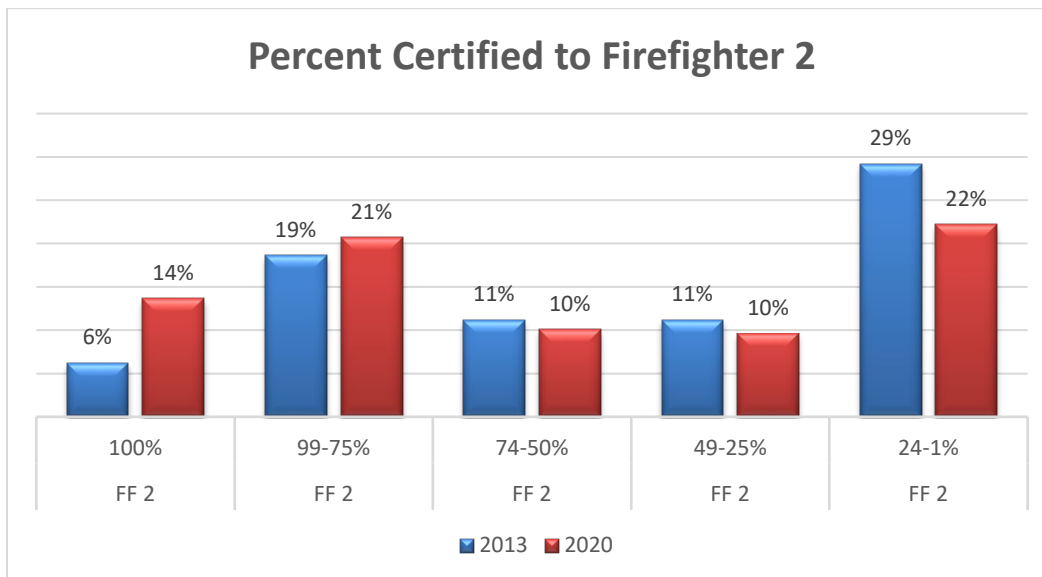


Fig. 10-2: Percentage of firefighters certified to Firefighter II for 2013 and 2020

Moderate Success in Meeting Need:

Firefighters Certified to Level I and II: The NFPA 1001 standard identifies the minimum professional qualifications for firefighters. Firefighter I certification is the minimum level of certification deemed necessary by the NFPA for a firefighter to function as an integral member of a firefighting team under direct supervision in hazardous conditions.

In 2020, 80 percent of Tennessee fire departments have been successful in certifying most firefighters to Level I and in certifying 77 percent to Level II, an improvement in

results from the 2013 survey. However, in 2020 there are still departments with no certified firefighters or a small percentage certified. Figures 10-1 and 10-2 above show the breakdown of firefighters with Level I and II certification in the departments that responded to the survey.

IV. Personnel. Annual Firefighter Training

Annual Training

Services that fire departments provide have broadened in recent years and encompass local, state, and federal standards. Firefighters must perform their required tasks and activities in a professional and competent manner, which requires continuous training in order to have the appropriate knowledge and skills for the job. Despite the importance of training, many departments do not have the funds to train all personnel to the highest possible level.

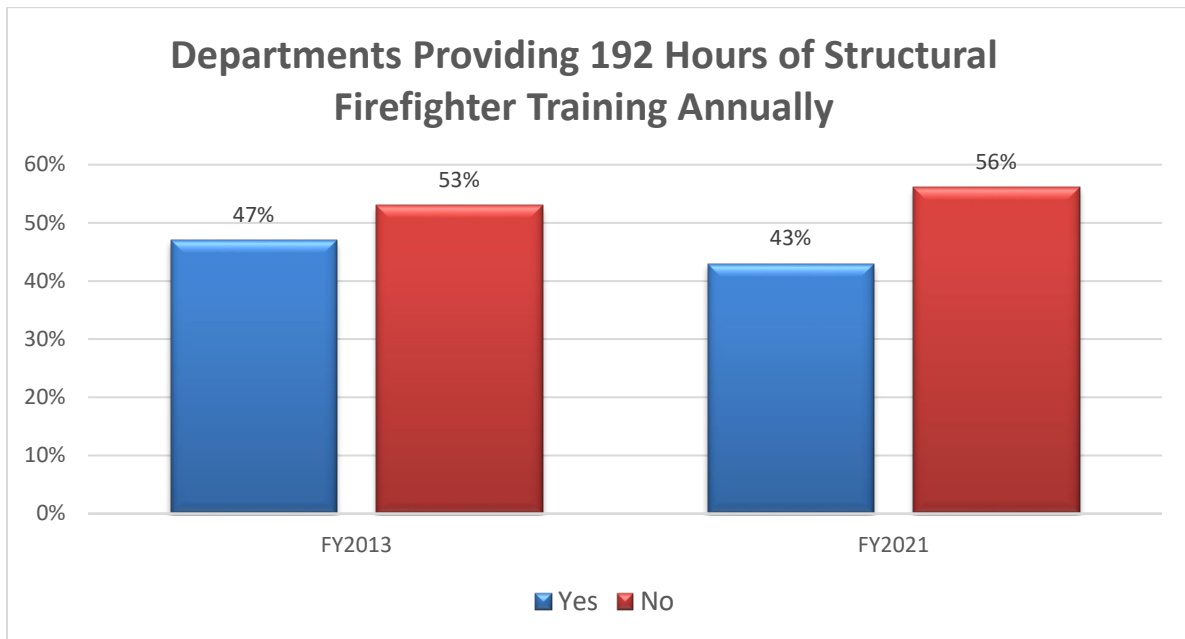


Fig. 11: Percent of fire departments in Tennessee that annually provide 192 hours of structural firefighting training for 2013 and 2020

Lack of Success in Meeting Need:

Training for Structural Firefighting: Training for structural firefighting is essential for proper execution in managing these fires and safe rescue. The Insurance Service Office (ISO) recommends that departments provide at least 192 hours of structural related firefighting training each year.

A significant number of departments in the state (56 percent) provide this amount of training. Despite this slight increase, there is still a need to train all staff that perform this dangerous task. Figure 11 above emphasizes the lack of success in structural firefighting training.

Structural fires are among the highest causes of fire deaths in the nation. Increased efforts to train all personnel who perform structural firefighting are imperative to save lives and property.

V. Personnel. Driver/Operator Training and Certification

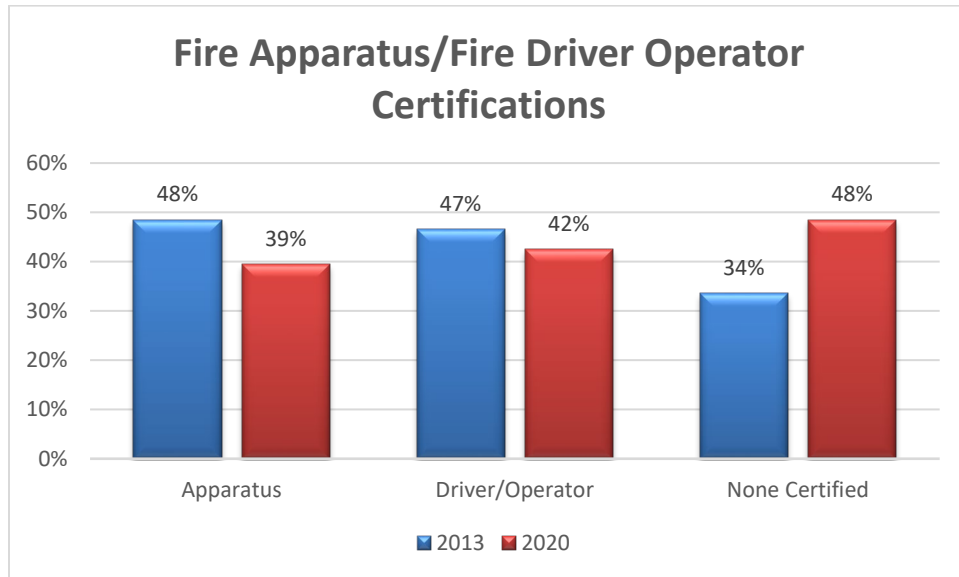


Fig. 12: Fire apparatus and driver certifications in 2013 and 2020

Lack of Success in Meeting Need

Driver/Operator Certification: The proper operation of fire apparatuses is vital to accomplishing the job safely and with no harm to firefighters or citizens. Just 48 percent of all driver and fire apparatus operators have been certified. This leaves over half of drivers having no certification. Furthermore, 38 percent of new drivers of fire apparatuses do not receive at least 60 hours of driver training in their first year. This is a major safety concern that can potentially cause increased safety issues in already dangerous situations.

VI. Personnel. Command/Staff Officer Training and Certification

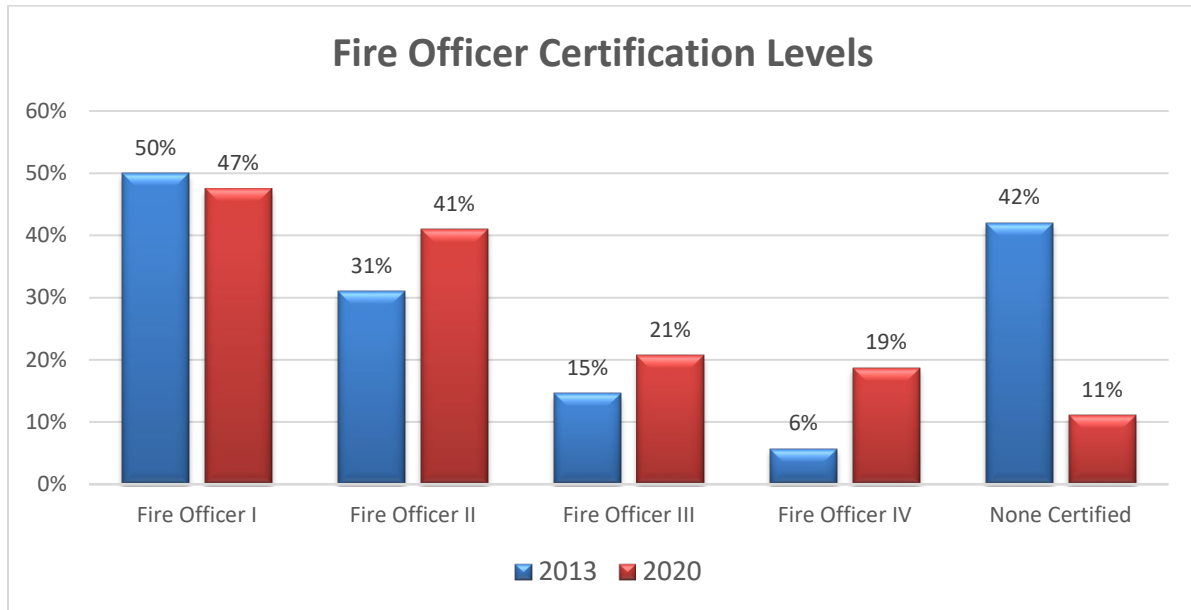


Fig. 13: Command Officer Certification Levels 2013 and 2020¹⁹

Some Success in Meeting Need

Officer Training: Firefighting is a team effort and proper leadership is essential for a team to work cohesively in the most productive and efficient manner. Strong and informed leadership fosters positive team building and success. Informed decision-making and leadership are best attained through education and training.

Regarding the certification of fire officers, in 2013, 42 percent of officers had no certification. This percentage decreased to eleven percent in 2020, a significant improvement.²⁰ (See Fig. 13)

²⁰ A higher percentage of full volunteer fire departments responded to the 2013/14 survey--62 percent in 2013 and 55 percent in 2020.

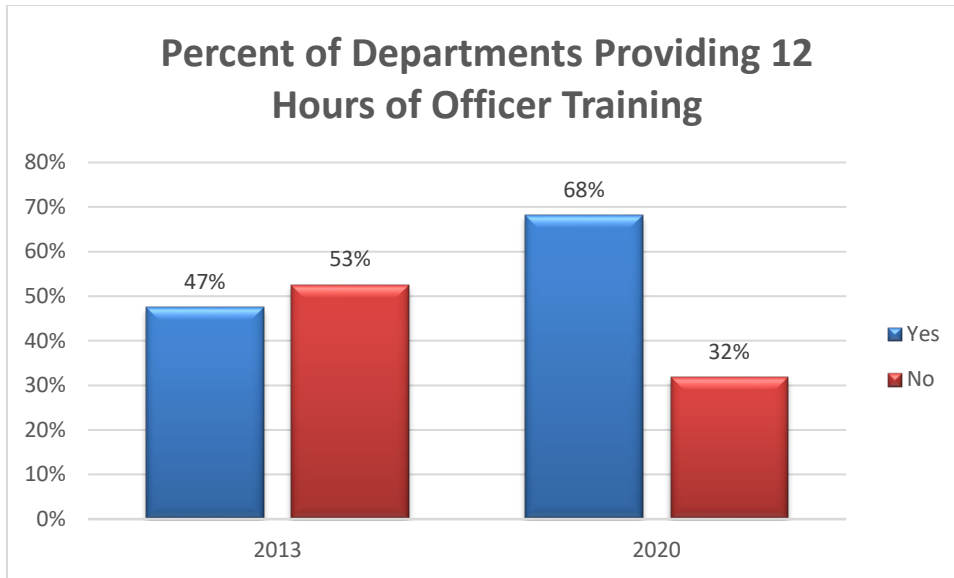


Fig. 14: Departments providing 12 hours of officer training

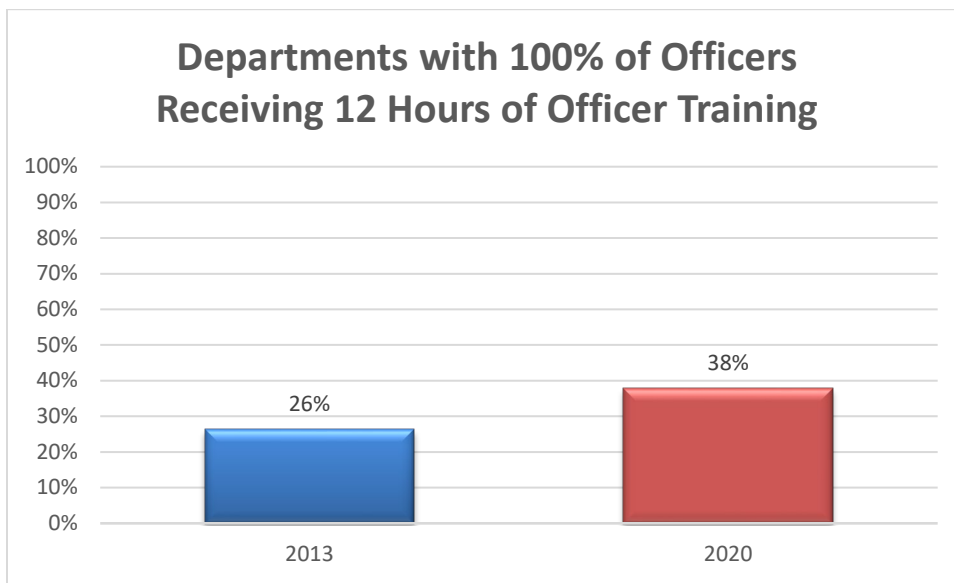


Fig. 15: Departments with 100% of officers receiving 12 hours of trainings

Annual officer training is just as important as certification. We saw a significant increase in the percent of fire departments providing at least 12 hours of officer training between 2013 and 2020. This is very good, but just 38 percent of all fire departments responding reported that 100% of their officers received all 12 hours of that training. There is still significant work to be done to improve the training of fire officers in Tennessee.

Certification of command officers is vital for these leaders to gain the proper knowledge and skills to not just fight fires effectively, but to lead personnel, manage budgets, administer daily operations, and perform strategic planning.

VII. Personnel. Emergency Medical Services (EMS)

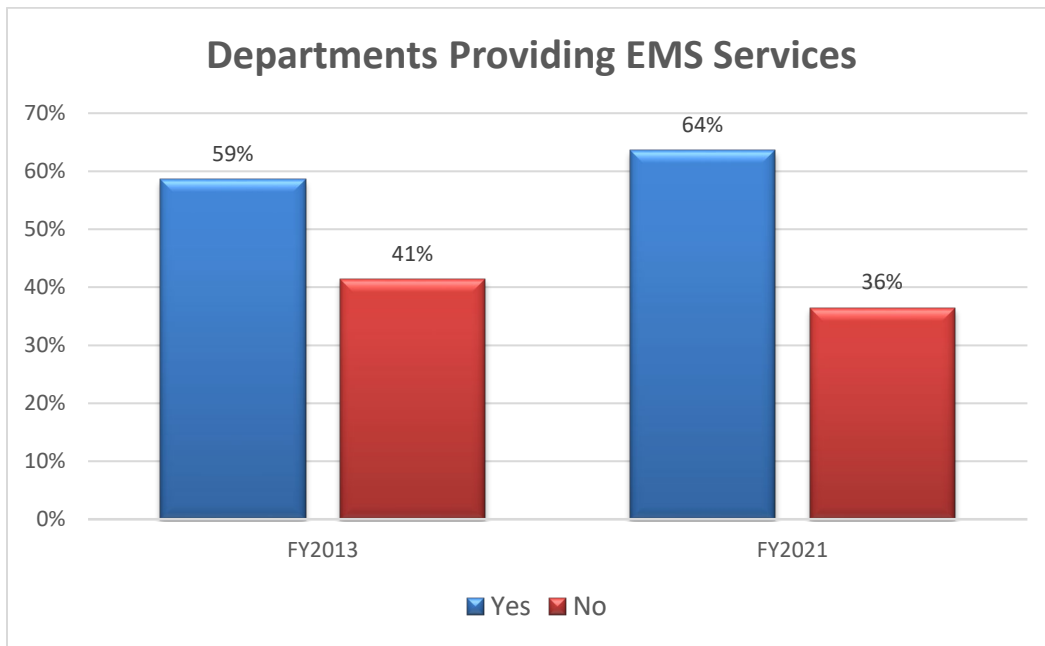


Fig. 16: Responding departments that provide emergency medical service response 2013 and 2020

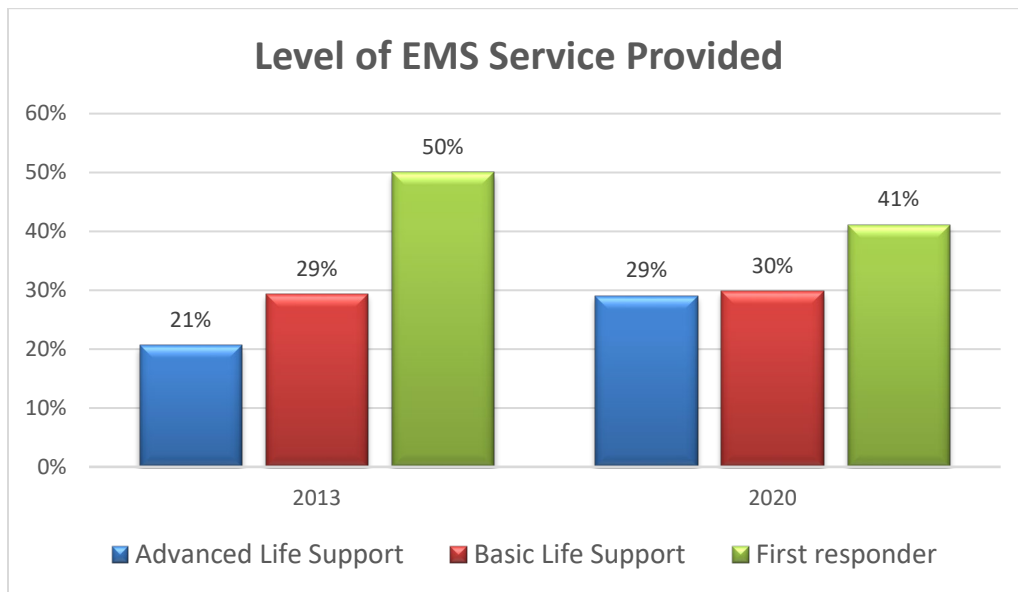


Fig. 17. Level of EMS response provided in 2013 and 2020

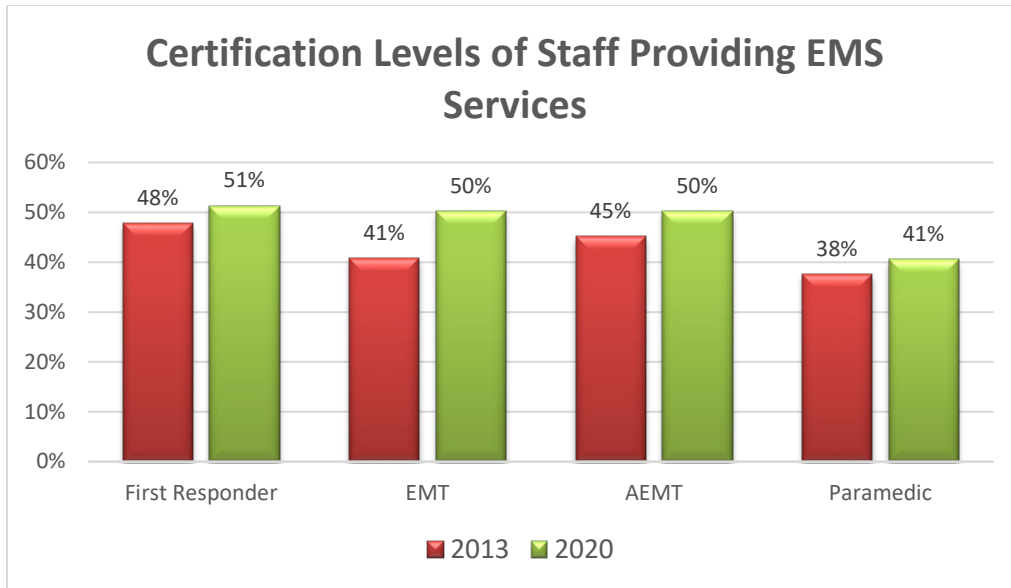


Fig. 18: Percentage of staff certified at the three levels for the departments reporting providing EMS services in 2013 and 2020

Patient Transport

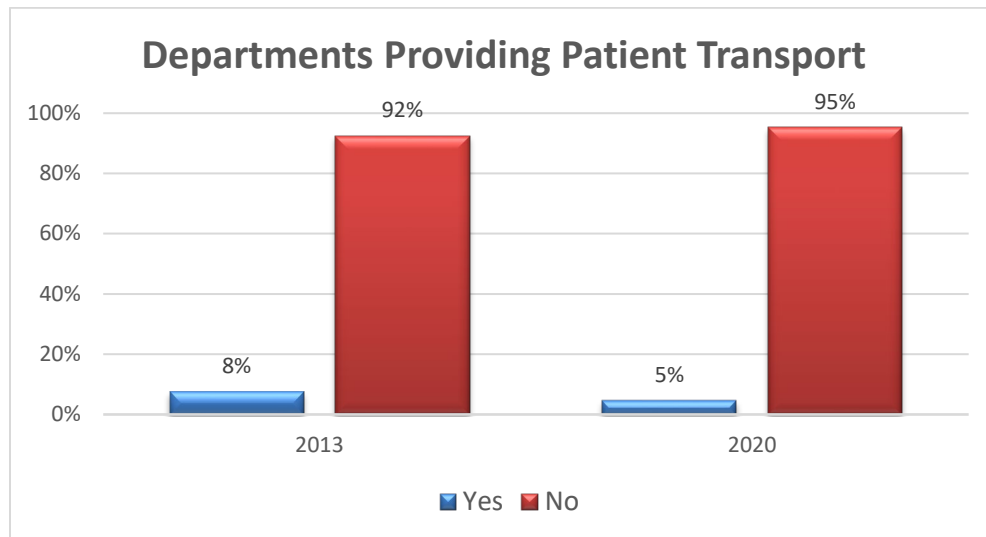


Fig. 19: Departments providing patient transport in 2013 and 2020

Moderate Success in Meeting Need

Emergency Medical Services: EMS is increasingly a duty of fire departments in the state. Currently, more than half of the fire departments (64 percent) provide this service to residents. Of those personnel who perform this duty, 70 percent have received formal training for this task. Although most personnel performing EMS have received training, there are still 30 percent of these firefighters who have not. The proportion of departments performing EMS nationally (69 percent) is similar to Tennessee (64 percent), but there is one significant difference. While Tennessee has 25 percent of untrained personnel performing EMS, nationally, 48 percent of

firefighters performing this task have no formal training. Although Tennessee is above the national average of trained EMS firefighters, there is still a need to have all personnel who perform EMS on residents trained for the task. Training is essential if patients are to receive the proper medical care and the fire department is to avoid potential liability for negligence on the part of its personnel.

The percentage of personnel with either Advanced Emergency Medical Technician (AEMT) or paramedic certification increased slightly from 2013. This means that the level of care provided improved, as paramedic level care is more advanced than AEMT care, which is more advanced than EMT or first responder care. While the level of basic life support remained unchanged, the level of advanced life support increased eight percentage points.

Patient transport is an expensive operation, and just a handful of Tennessee fire departments provide transport, so this number remained unchanged.

VIII. Personnel. Wildland Firefighting

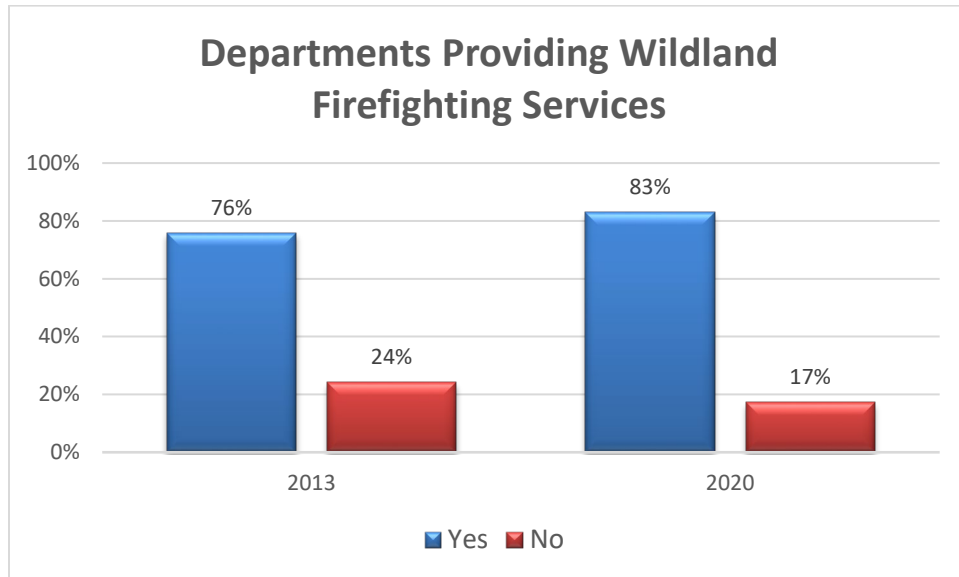


Fig. 20: Departments reporting that they provide wildland firefighting services in 2013 and 2020

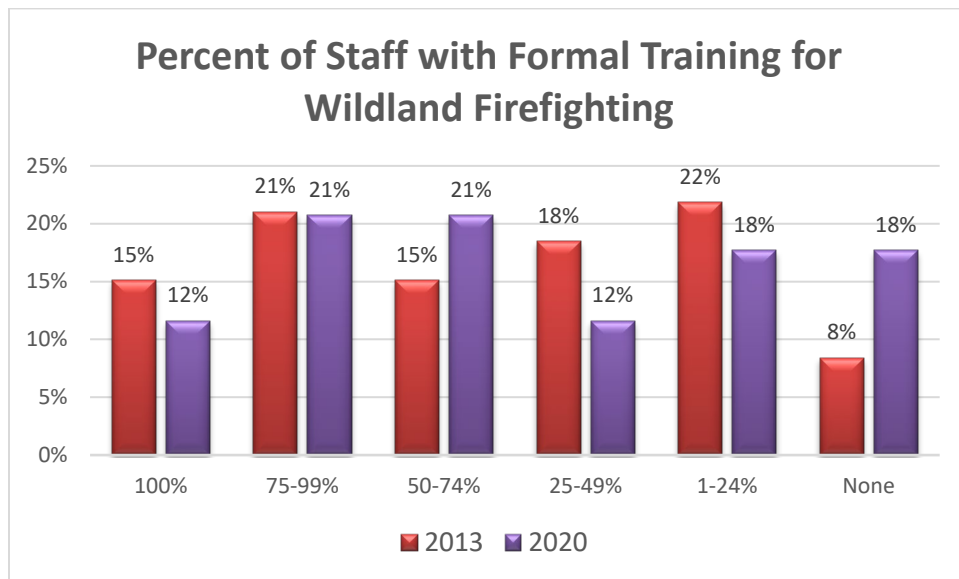


Fig. 21: The percentages of staff with formal training for wildland firefighting in the responding departments for 2013 and 2020

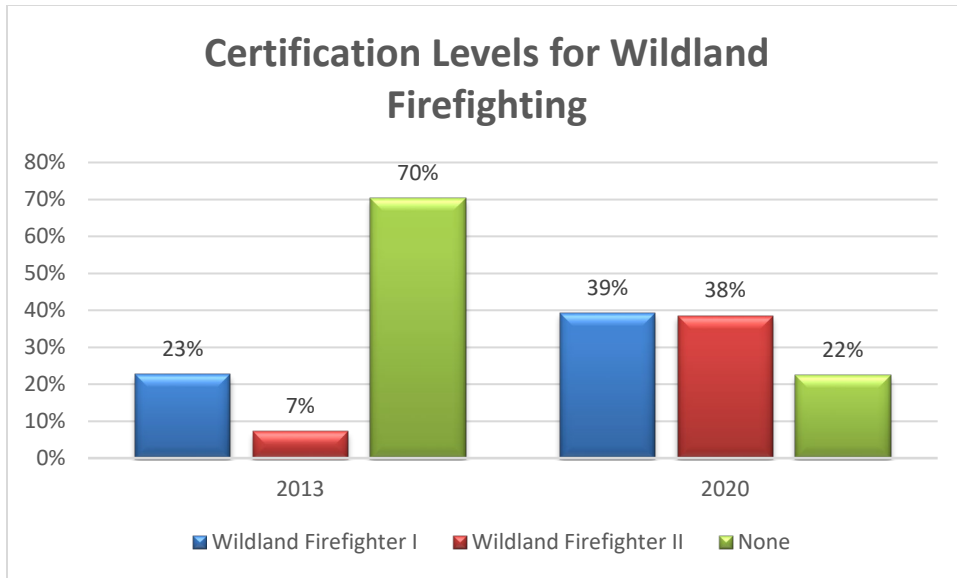


Fig. 22: Certification levels for departments providing wildland firefighting service in 2013 and 2020

In 2013 and 2020, many respondents who reported providing wildland firefighting service reported that some percentage of their staff had formal training yet did not answer the question about the levels of certification or selected the option for “none certified.”

Moderate Success in Meeting Need

Wildland Firefighting Training: Tennessee has vast rural regions throughout the state. Wildland fires are a common threat to the environment and our society, and 83 percent of all departments in the state report that they perform wildland firefighting. Over one-third (39 percent) of all departments in the state have personnel trained in wildland firefighting to at least Level 1. This leaves the majority (61 percent) of fire departments in Tennessee responding to these fires with personnel who have no formal training or certification.

IX. Personnel. Hazardous Materials Response (Hazmat)

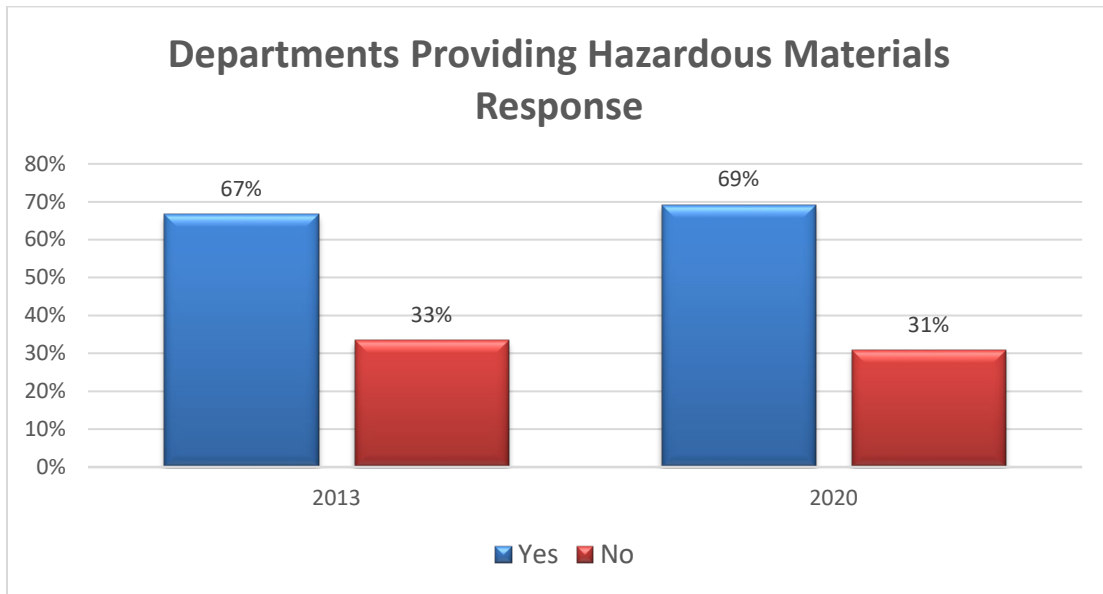


Fig. 23: Departments responding to survey that provide hazardous materials response in 2013 and 2020

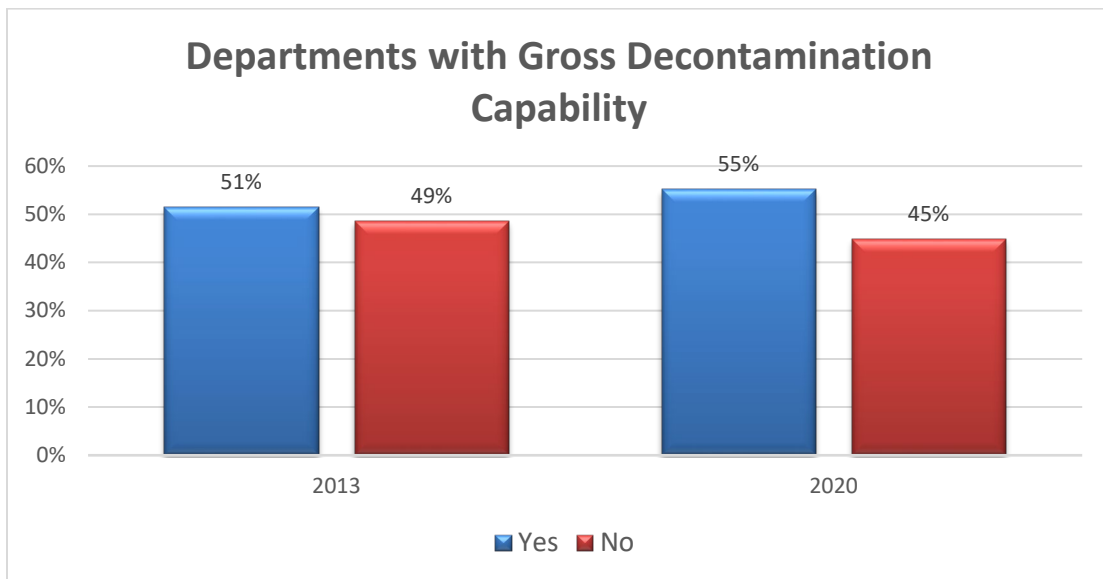


Fig. 24: Departments responding to survey that have gross decontamination capability for 2013 and 2020

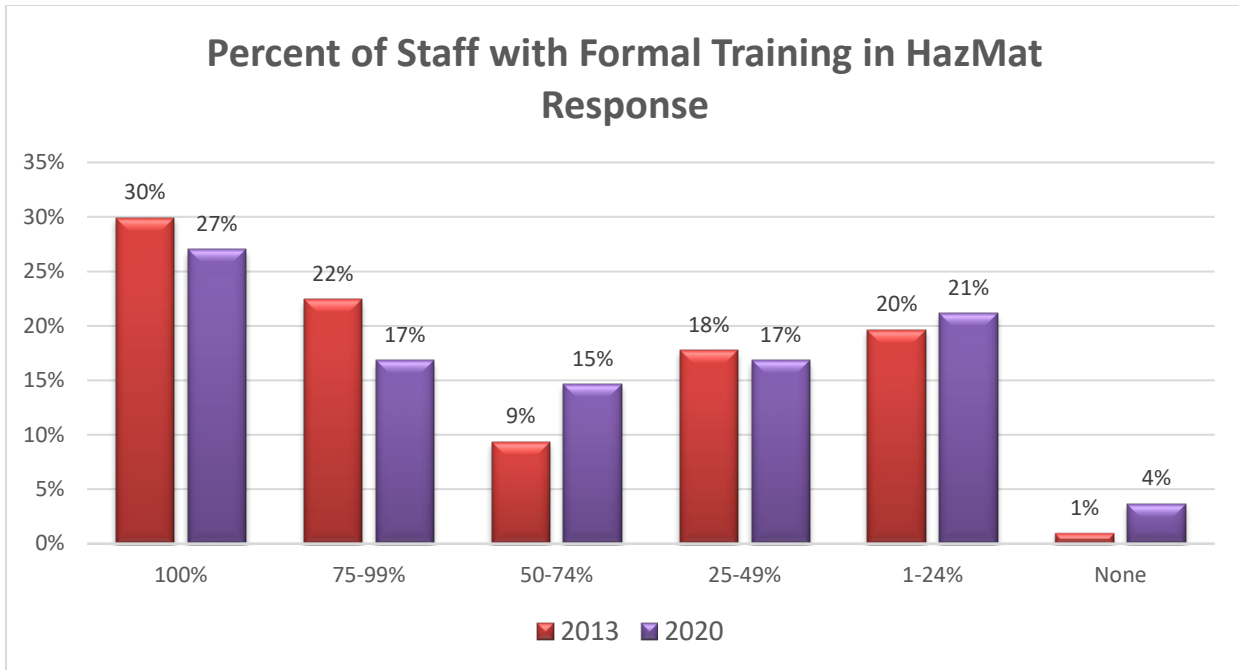


Fig. 25: Percent of staff with some formal training in hazardous materials response for 2013 and 2020

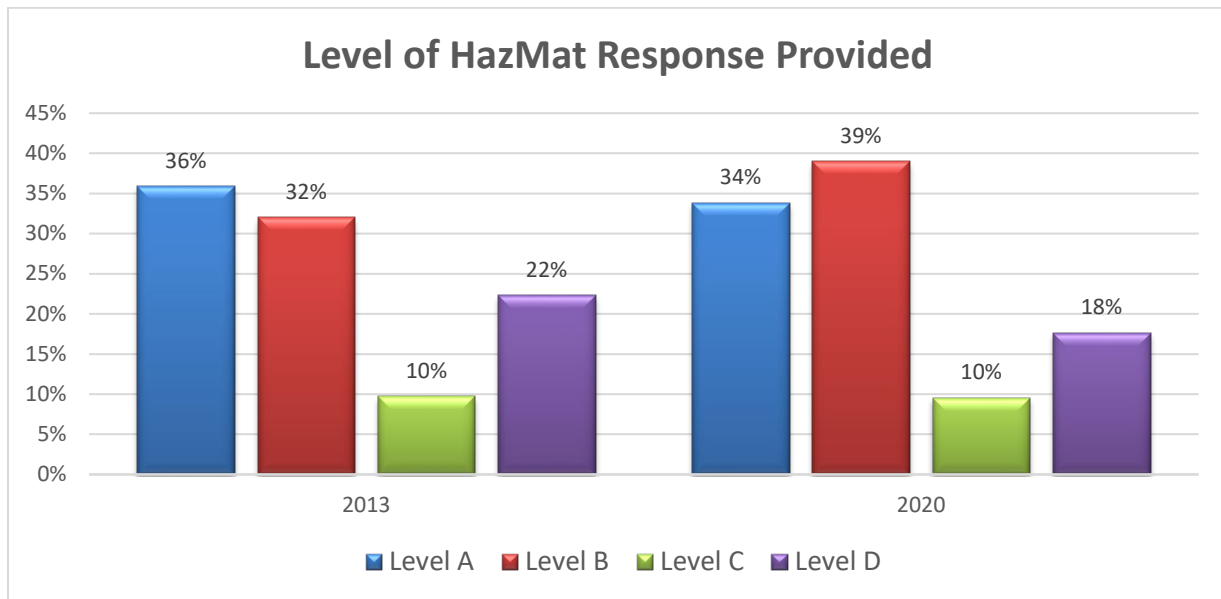


Fig. 26: Level of hazardous materials response provided by departments providing this service for 2013 and 2020

The threat of a hazardous materials incident exists in every community. Even if a community does not have a chemical plant, the community will be visited by gasoline and/or diesel fuel delivery trucks, may have a dry-cleaning establishment, or swimming pools that have chlorinators. Every water treatment plant uses chlorine, and school science labs contain chemicals used for teaching students. Many

communities have railroad tracks, and trains regularly transport hazardous materials. Because of the possibility of terrorism incidents, communities need mass decontamination capability, which is where having hazardous materials response capability comes in. In a terrorism incident, gross decontamination is the process of immediately reducing contamination on persons exposed to chemicals, poisons, or other hazardous agents in potentially life-threatening situations.

The percentage of fire departments with hazardous materials response capability is essentially unchanged from 2013, as is the capability for gross decontamination.

The percentage of staff with formal training in hazardous materials response decreased.

Level A hazardous materials response capability is the highest level possible, and the percentage of fire departments with this capability decreased slightly, while the second highest level, Level B, increased slightly. This may indicate that fire departments are dropping Level A capability because it is very expensive to purchase and maintain the equipment, training, and certification required for Level A response.

X. Personnel. Technical Rescue

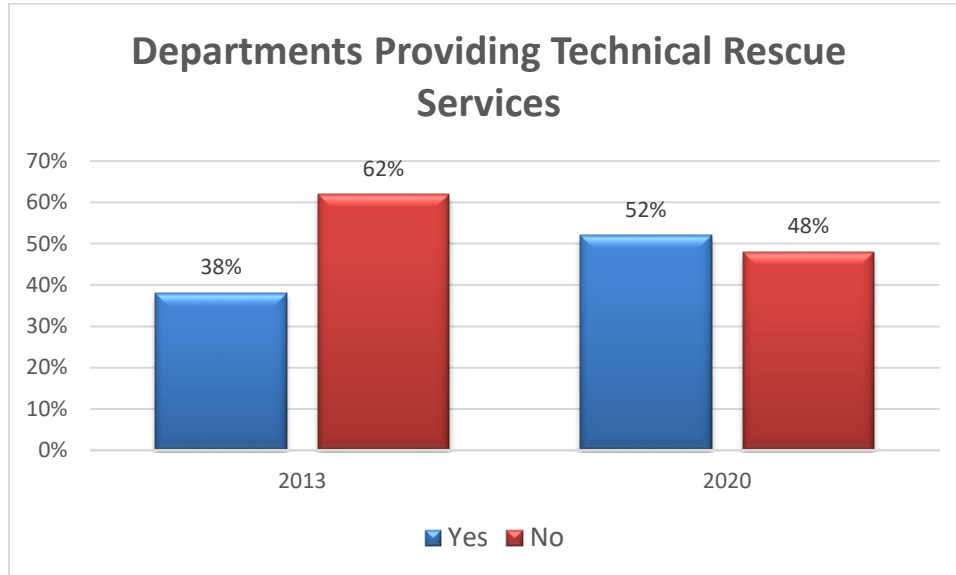


Fig. 27: Departments that provide technical rescue services for 2013 and 2020

Service Provided	2013 ²¹ Certifications	2020 ²² Certifications
Confined space rescue	66%	52%
Trench rescue	53%	48%
High angle rescue	56%	59%
Rope rescue	83%	78%
Water (lakes, ponds, etc.) rescue	73%	56%
Swift water (rivers, creeks, etc.) rescue	54%	57%
Search and rescue (non-collapse)	85%	65%
Structural collapse (USAR)	51%	35%
Other (see lists below for specifics)	15%	22%

Table 2: Departments that provide technical rescue and certifications for the specific discipline for 2013 and 2020

Technical rescue is where specially trained and equipped personnel perform complex rescue operations of persons trapped in a dangerous situation or inaccessible location. For example, when a person is trapped on a cell tower (a high angle rescue situation), it takes personnel with specialized technical training and special equipment to rescue that person safely. The local fire department is usually called on

²¹ 2013 other certifications reported: vehicle extrication, farm extrication, wide area canine SAR.

²² 2020 other certifications reported: vehicle extrication, behavior wellness, TARS, UAS, NASAR, low angle rope, dive team, grain bin collapse by TARS, operations and tech, MD.

in such situations, and those departments that elect to provide this service need to train and equip their rescue personnel appropriately.

XI. Personnel. General Questions

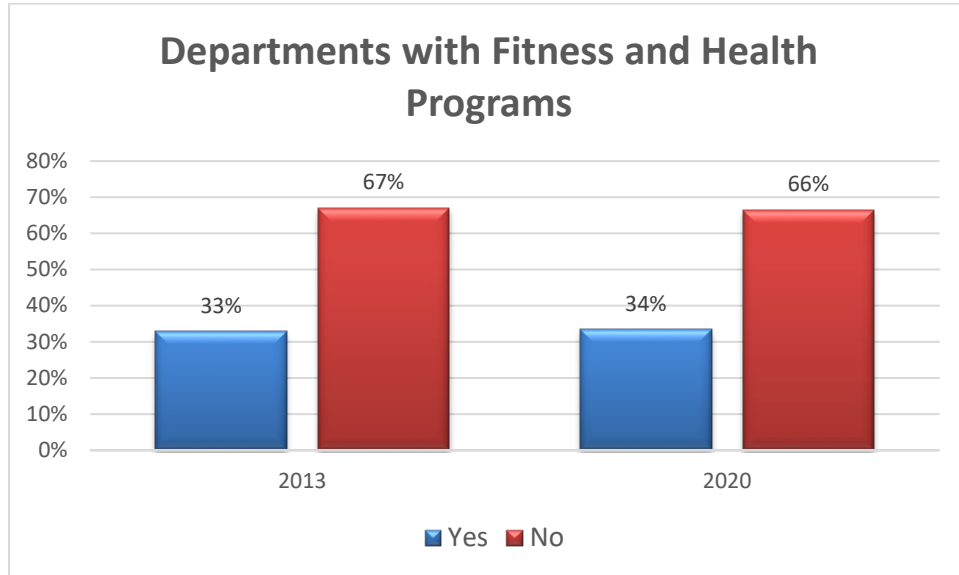


Fig. 28: Departments with fitness and health programs 2013 and 2020

There is no significant change in the provision of fitness and health programs between 2013 and 2020. The health and wellness of firefighters is important in preventing heart disease. Coronary artery disease, an enlarged heart (cardiomegaly), and increased heart wall thickness (hypertrophy) of the left ventricle, are all leading causes of on-duty firefighter fatalities.²³ A formal fitness and health program can help reduce the incidence of cardiac related deaths.

²³ Heart disease common among firefighters who die of cardiac arrest. (2018, September 23). Heart Disease Weekly, 30. https://link.gale.com/apps/doc/A554411930/AONE?u=tel_a_utl&sid=bookmark-AONE&xid=cc5330e0

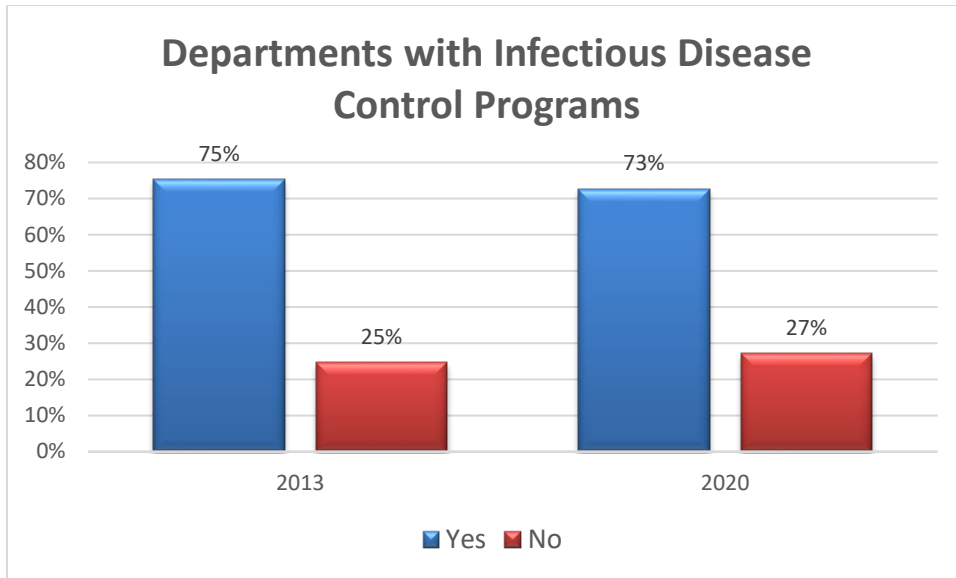


Fig. 29: Departments with infectious disease control programs 2013 and 2020

There is no significant change between 2013 and 2020. Firefighters responding to any incident may encounter patients with transmittable diseases, such as HIV, Hepatitis B, Hepatitis C, and COVID-19. It has long been recognized that using universal precautions against blood and body fluids can reduce exposure, and OSHA regulation 29 CFR 1910.1030 requires employers to protect workers against the health hazards from exposure to blood and other potentially infectious materials, and to reduce their risk from this exposure. Every fire department should have an infection control program.

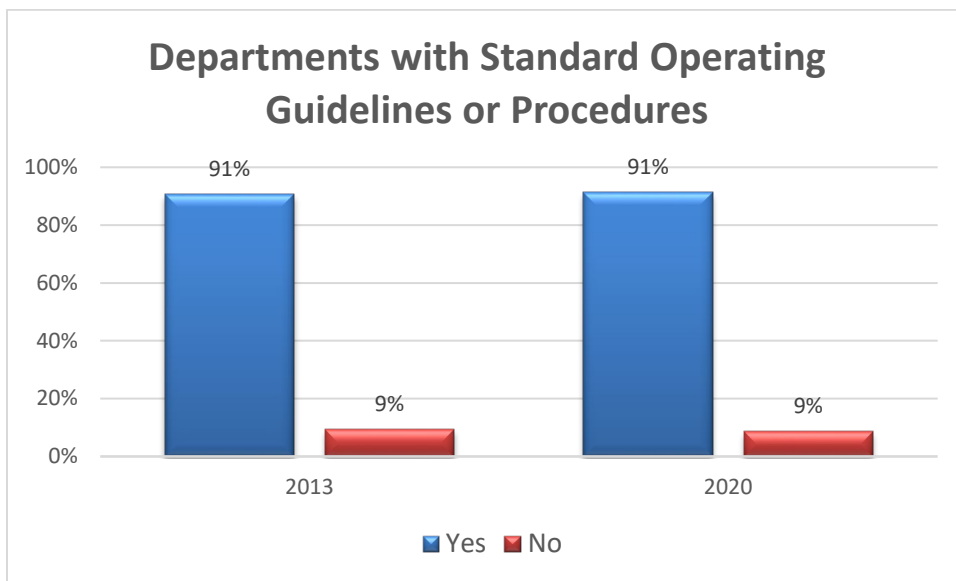


Fig. 30: Departments with either standard operating guidelines or standard operating procedures 2013 and 2020

Regarding standard operating guidelines, there is no change between 2013 and 2020. Every fire department should have a written SOG manual. ISO recognizes the importance of having current SOGs and awards credit for that in the community's ISO Rating.

XII. Fire Prevention and Code Enforcement

Fire prevention is a central concern and duty of fire departments. Increasingly, fire departments are taking on new roles and responsibilities, such as facilitating home fire safety inspection programs, educational programs, plans review and permit approval. Table 2 depicts the common programs and services offered by Tennessee fire departments. Currently, 90 percent of fire departments in the state conduct at least one of the fire prevention and code enforcement activities listed in Table 2. These programs illustrate some activities that help prevent fires and moderate the effects when fires do occur.

Programs	2013	2020
Plans review	13%	13%
Permit approval	6%	8%
Routine testing of active systems (e.g., fire sprinkler, detection/alarm, smoke control)	8%	8%
Free distribution of home smoke alarms	21%	25%
Juvenile fire setter program	5%	4%
School fire safety education program based on a national model curriculum	18%	17%
Home fire safety inspection program	10%	8%
Participation in Tennessee’s annual Fire Prevention Poster Contest	6%	5%
Speakers’ bureau (regularly speak to civic/public groups)	8%	10%
Other (please specify)	5%	2%

Table 2. Fire prevention and code enforcement programs conducted by responding departments for 2013 and 2020

Limited Success in Meeting Need

Fire Prevention and Code Enforcement: While the MTAS survey results do not reflect this percentage, according to the Tennessee state fire marshal’s office, 77 percent of Tennessee fire departments participate in the fire marshal’s free “Get Alarmed, TN” program, which has resulted in 314 documented saves from the activation of smoke alarms installed by firefighters through this program. While a free smoke alarm distribution program has reduced fire fatalities, the survey does show that fire service leaders in the state need to increase their efforts of fire prevention and community risk reduction programs for all departments.

XIII. Fire Department Facilities and Equipment

Fire Department Facilities

The facilities that a fire department utilizes are an important factor in operating efficiently in both emergency and non-emergency responses. Adequate facilities and accessible equipment are necessary for preparedness and reduction of life and property loss.

Nationally, 43 percent of fire departments in the country have at least one station that is 40 years old, in contrast to Tennessee where 55 percent of departments have at least one station that is more than 40 years old. The need for increased numbers of stations in a community is a trend in both the nation and Tennessee, which is driven by coverage area, ISO guidance, and modeled response distances. Table 3 shows that Tennessee is substantially behind in having the proper facilities (including having facilities less than 40 years old), and in having sufficient backup power and exhaust emission controls in stations.

Further analysis of the data shows that communities of less than 25,000 are more prone to lack sufficient facilities and equipment in the nation and the state. Volunteer fire departments can attribute this lower level of resources and response capability in part to *NFPA 1720 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public*. NFPA 1720 has less restrictive response time and staffing standards than are found in *NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*, which means that fire departments serving smaller communities have longer response times than departments serving urban and suburban communities. The low population density in these areas means that the number of people exposed to longer response times is small. However, the longer response times means that the firefighters typically face larger fires when they arrive because the fire has had additional time to grow. This results in greater property loss and increases the chance for injury or death for both the public and firefighters.

Tennessee Fire Department Facilities Comparison to U.S. 2020						
Population Protected	Departments with at least one station that is over 40 years old		Departments with no backup power supply		Departments with no exhaust emission control	
	NFPA	Tenn.	NFPA	Tenn.	NFPA	Tenn.
Less than 2,500	46%	25%	51%	34%	85%	37%
2,500-4,999	41%	13%	36%	24%	73%	22%
5,000-9,999	44%	22%	29%	30%	62%	22%
10,000-24,999	47%	17%	30%	11%	41%	13%
25,000-49,999	38%	11%	18%	0%	35%	2%
50,000-99,999	34%	5%	15%	0%	29%	2%
100,000-249,000	36%	5%	13%	0%	23%	1%
250,000-499,999	41%	0%	14%	0%	24%	0%
500,000-999,999	48%	2%	24%	1%	23%	1%
Total percentage in each category	43%	55%	35%	46%	59%	68%

Table 3: Selected Facilities Characteristics by Population Protected 2020 compared to U.S. ²⁴

²⁴ Fourth Needs Assessment of the U.S. Fire Service (2015). Figures 2-1, 2-2, 2-3. p. 116-118.

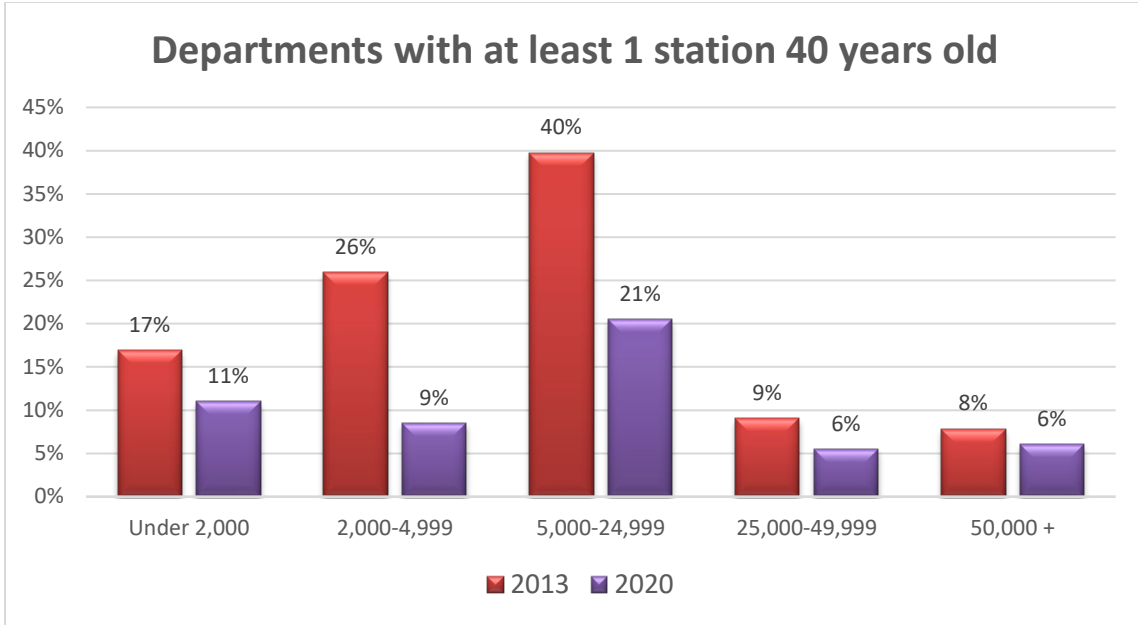


Fig. 31. Departments with at least one station over 40 years old by population comparing 2013 and 2020

Overall, out of the total responses to the question about facilities, 42 percent report having no stations over 40 years old.

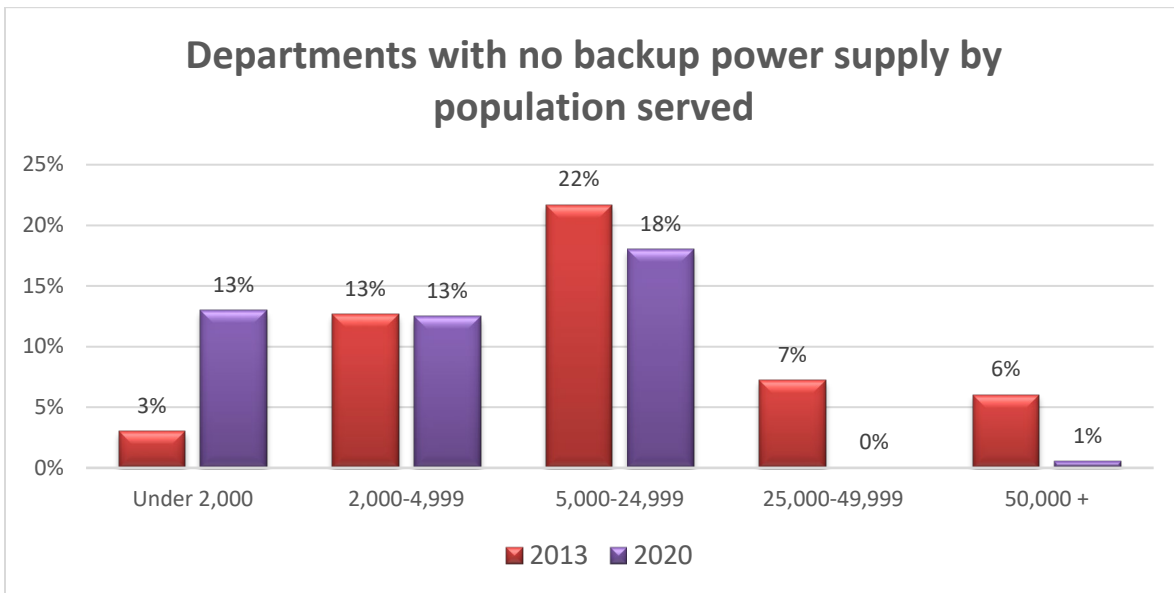


Fig. 32. Departments with no station backup power supply by population comparing 2013 and 2020

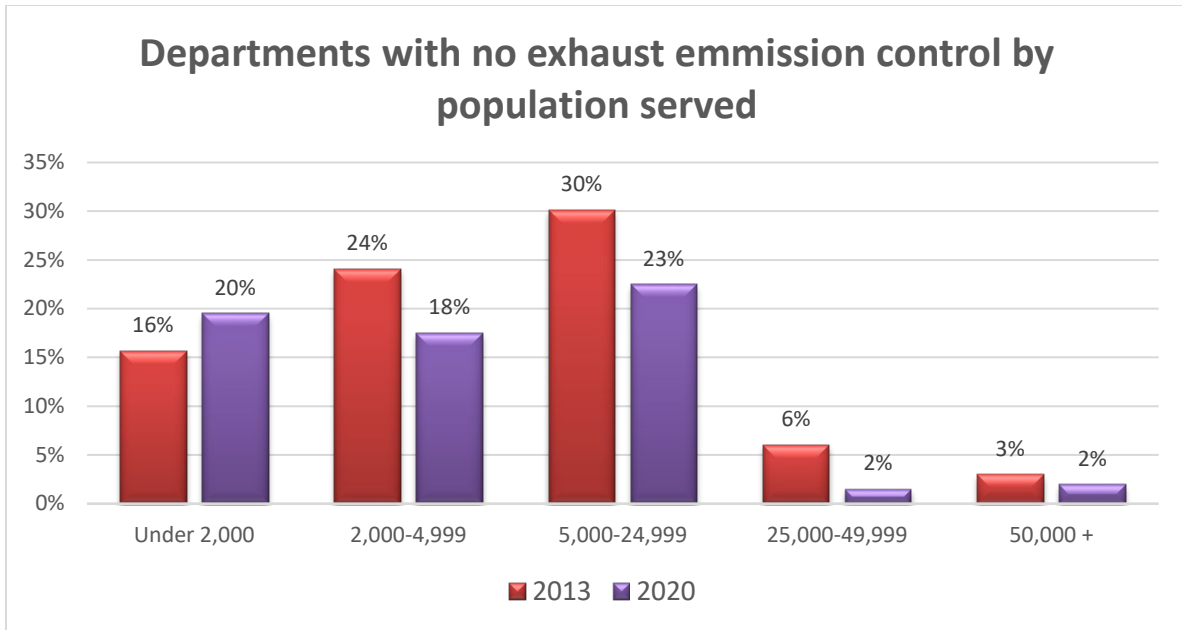


Fig. 33. Departments with no exhaust emission control by population comparing 2013 and 2020

Lack of Success in Meeting Need

Fire Department Facilities: All locations in Tennessee are subject to fires, severe weather, and various natural and manmade disasters. It is possible for portions of a community to go without power for days or weeks following a disaster. Many geographical areas of Tennessee are at risk for seismic events, yet most fire stations were constructed before building codes required even minimal seismic design. The collapse of a fire station could render apparatus unusable and injure or kill the occupants. Carbon monoxide and vehicle exhaust emissions pose health risks, yet most fire stations do not have the means to mitigate these risks. Fire stations should be useable 24/7, especially in times of emergency or disaster. Figures 31-33 illustrate that a high percentage of Tennessee’s fire stations are older, lack emergency power systems to keep them functioning during a disaster, and lack vehicle exhaust mitigation systems to protect the health of firefighters.

A fire station is a significant investment for any community, but fire stations do reach a point where they need to be replaced or extensively renovated. In addition to the deficiencies listed above, older stations may lack separate facilities for female firefighters, lack sufficient storage space, lack space for exercise equipment for a health and safety program, lack the capability to decontaminate tools, PPE, and equipment, lack the ability to store clean PPE away from exposure to diesel exhaust, and may have ventilation and/or mold problems. Fire service leaders should assess current fire stations and develop a long-range plan to evaluate the usefulness of current stations, project an anticipated useful life and replacement date for existing fire stations, and present this plan to local officials so funding sources can be identified.

Diesel exhaust is a recognized human carcinogen, and firefighters and visitors to fire

stations will be exposed to this carcinogen in the apparatus bay unless there is a system in place to capture and remove it. Firefighters are more at risk, as they are repeatedly exposed to diesel exhaust during their work at the fire station. The majority of Tennessee fire stations lack a vehicle exhaust removal system, which is detrimental to the health of the firefighters.

Fire Department Engines and Pumpers

A community needs reliable and safe fire apparatus to respond to fires and other emergencies. The role of the fire department has expanded from a department that just fights fires to an all-hazards department that responds to many types of emergencies in the community. This expanded role requires fire apparatus to carry additional tools and equipment, which requires compartment space. Federal motor vehicle laws, new technology, and safety concerns cause the design of fire apparatus to change and improve over time, and it is important that apparatus have the latest safety features and operating capabilities. NFPA recommends in Annex D of Standard 1901, *Standard for Automotive Fire Apparatus*, that once a fire apparatus reaches 15 years of age the fire department should place the apparatus in reserve service, provided the apparatus has been properly maintained and is in good working order. NFPA recommends that any apparatus that is more than 25 years old not be used for emergency response and be replaced.

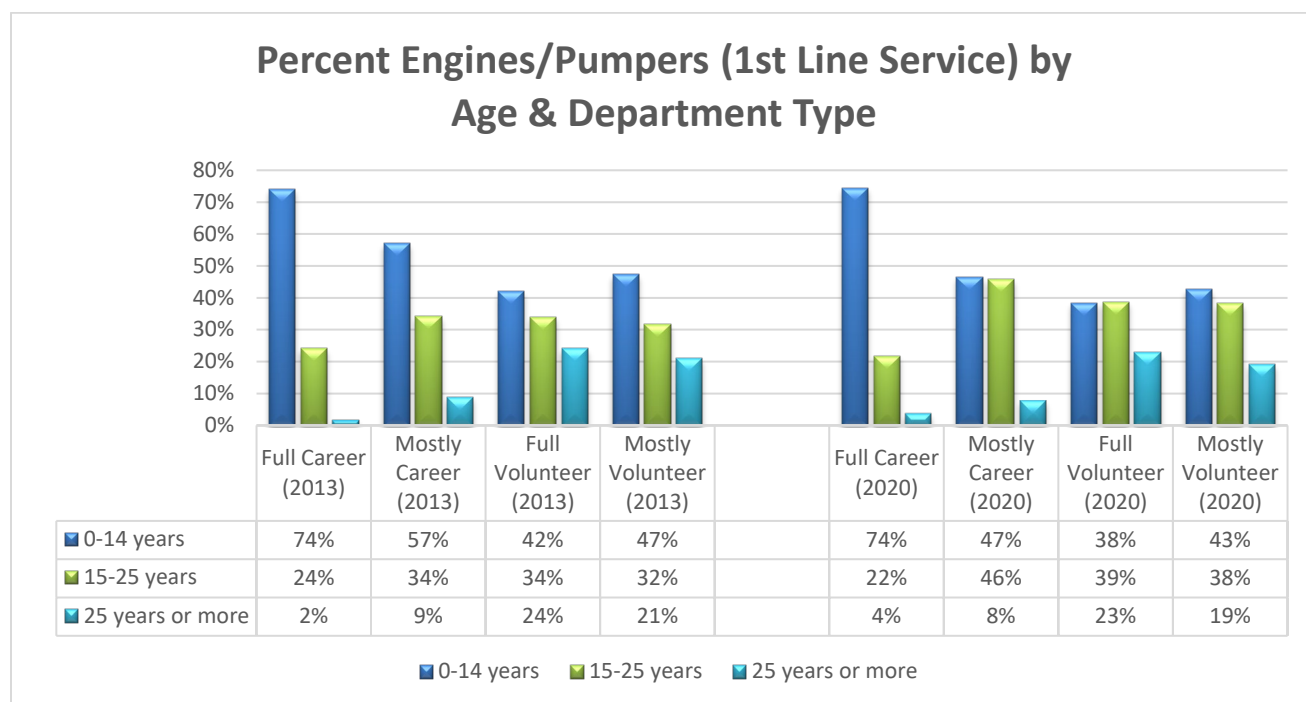


Fig. 34. Percent of Engine/Pumpers in First Line Service by Age and Department Type 2013 and 2020 ²⁵

Figure 34 displays the age of Tennessee’s fire engines and pumpers that are in first-

²⁵ Percentages are calculated on the total number of trucks reported in each department type sorted by age.

line service. Overall, we see most of the departments with close to 70 percent of their engines and pumpers less than 15 years old in both 2013 and 2020. The largest percentage of apparatus that are more than 25 years old reside in mostly volunteer or full volunteer departments. Conversely, we also see that the highest percentages of newer equipment are in the full career and mostly career departments.

Lack of Success in Meeting Need

Fire Engines/Pumper Trucks: The fire engine is the backbone of fire protection in a community and needs to be safe and reliable. The survey results show that most career departments could fund apparatus replacement programs, but that this capability decreases as the type of department moves toward all volunteers. Smaller communities and fire departments struggle to meet annual operating expenses, which leaves little to no money for an apparatus replacement program.

Fire Department Ladders/Trucks

Lack of Success in Meeting Need

Fire Department Ladder Trucks: Ladder trucks are specialized apparatus that carry additional forcible entry and rescue tools, salvage equipment to lessen fire loss, and additional ground ladders to reach upper stories. The most specialized part of a ladder truck is the aerial ladder that ranges in height from 55 to 105 feet. Aerial ladders are complex machines that require constant and careful maintenance and annual testing to verify that the aerial ladder is safe to use. Ladder trucks are more expensive than fire engines, and some smaller communities cannot afford to purchase an aerial ladder truck or, if they have an aerial ladder truck, it is kept in service long past the recommended 25-year life because the community cannot afford to replace it as we see in Figure 34.

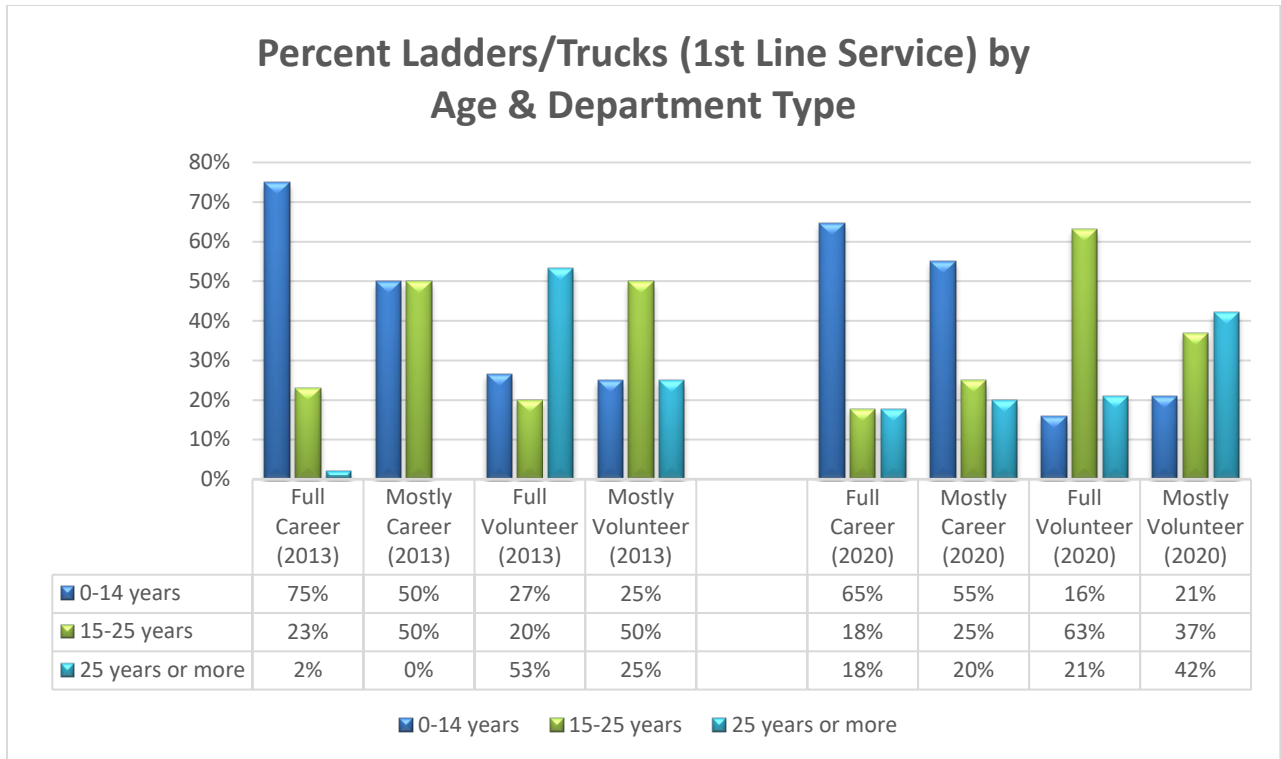


Fig. 35. Percent of Ladders/Trucks in First Line Service by Age and Department Type 2013 and 2020 ²⁶

Provision of Ambulance Services

Pre-hospital emergency medical care is an essential service provided by America's fire service. While providing first responder emergency medical service is very common for a fire department, providing transport ambulance service is not. The expense of providing, equipping, maintaining, and staffing an ambulance is considerable, and the ability to completely recover operating costs from transport fees is limited. The ability to fund and staff an ambulance 24/7 can be a challenge for smaller communities that struggle to find an adequate number of volunteers to respond to fires.

Figure 36 illustrates that most fire departments in the state do not provide ambulance services. The departments that do provide this service are staffed with all career or mostly career firefighters. Furthermore, all nine²⁷ departments providing ambulance services have ambulances that are 14 years old or less. Two of the nine departments also have one vehicle each that is between 15 and 25 years old. Ambulances are expensive to purchase and to operate, and they do not last as long as fire apparatus, so ambulances must be replaced more often.

²⁶ Percentages are calculated on the total number of trucks reported in each department type sorted by age.

²⁷ As of October 2021, according to the Tennessee Office of Emergency Medical Services' office there are now 12 departments that provide ambulance services.

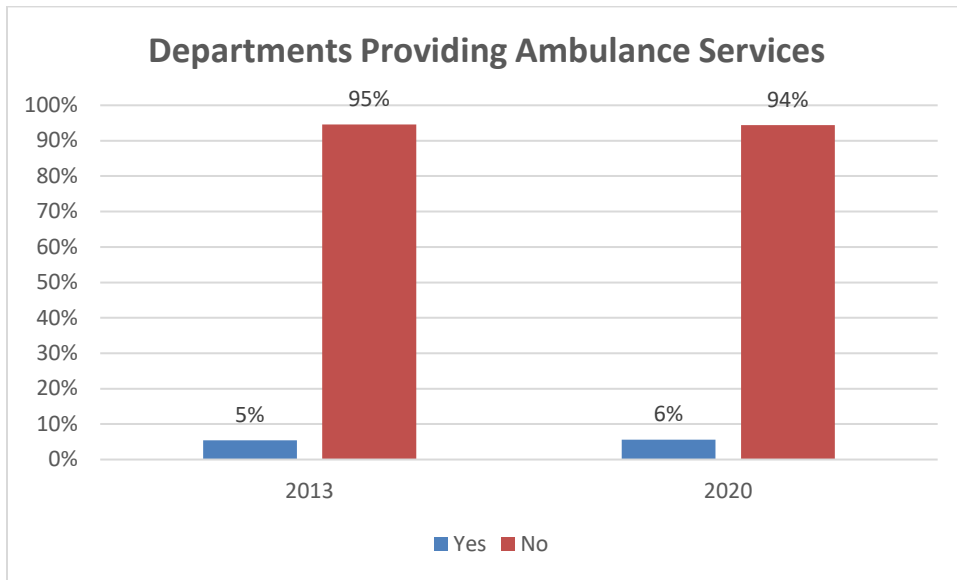


Fig.36: Departments providing ambulance services 2013 and 2020

Self-contained Breathing Apparatus (SCBA)

The Occupational Safety and Health Administration (OSHA) requires the use of self-contained breathing apparatus (SCBA) for anyone entering an atmosphere that is immediately dangerous to life and health (IDLH). Despite these OSHA regulations being in place for decades, many fire departments do not have enough SCBA to equip on-duty or on-scene firefighters as we see in Figure 36. Firefighters operating without SCBA at a structure fire are ineffective, as they cannot enter the burning building and are at a substantial risk when operating near the fire.

The lack of SCBA can also affect the ISO Rating for a community, as ISO expects every on-duty and on-scene firefighter to have a complete set of personal protective equipment, including SCBA. A fire department will not receive full credit for personnel response and equipment if the department cannot provide SCBA for all on-scene firefighters.

In looking at all responding departments, the information shows that in 2020, 62 percent of departments are 100 percent equipped with SCBA. This is an increase of 7 percent from 2013 where 55 percent of departments were 100 percent equipped with SCBA (Fig. 37). The remaining departments have less than 100 percent of their staff equipped with SCBA.

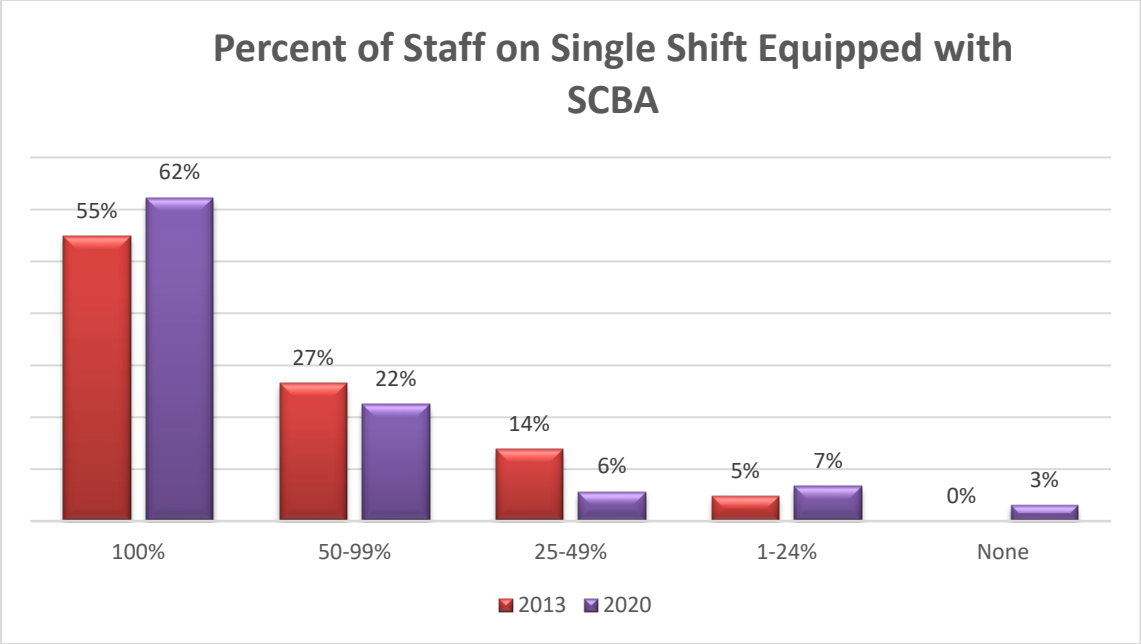


Fig. 37: Percent of staff on a single shift with self-contained breathing apparatus

Figure 38 looks at the provision of SCBA to firefighters and shows which type of departments report having 100 percent of their staff provisioned with SCBA. The illustration indicates that the full career, mostly career and mostly volunteer have the highest percentages of their staff equipped with SCBA.

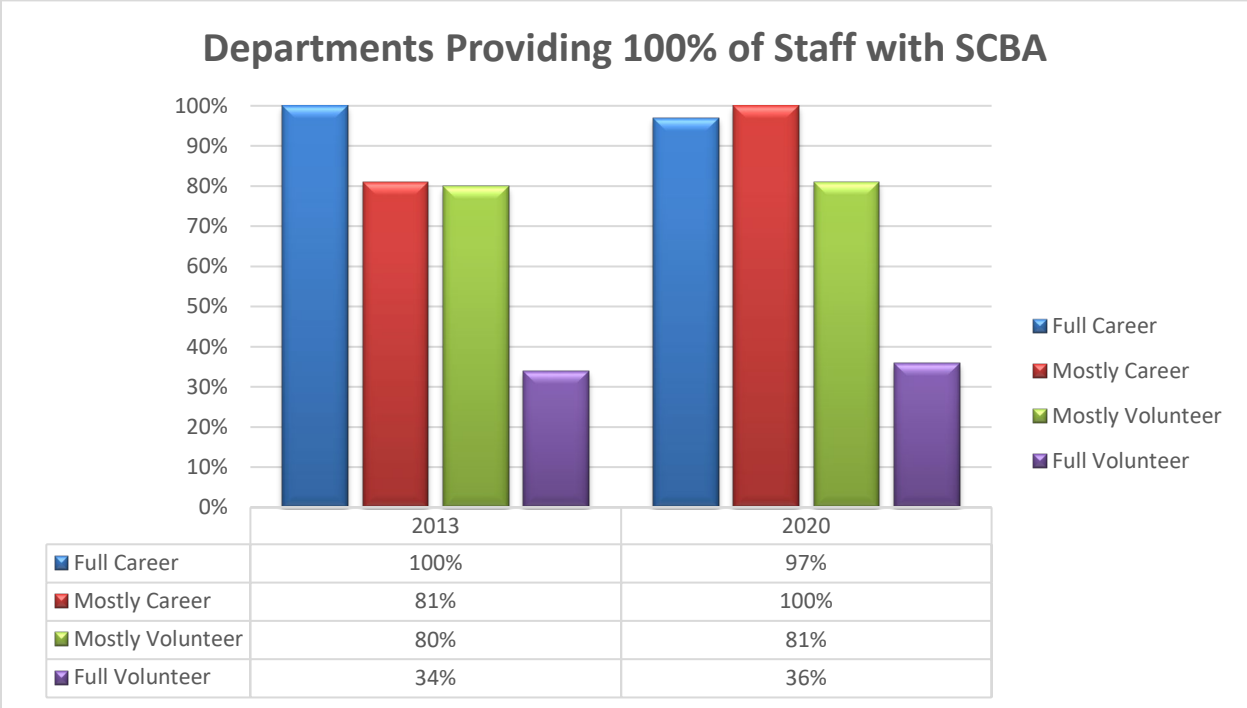


Fig. 38: Departments equipping 100 percent of staff with SCBA by department type

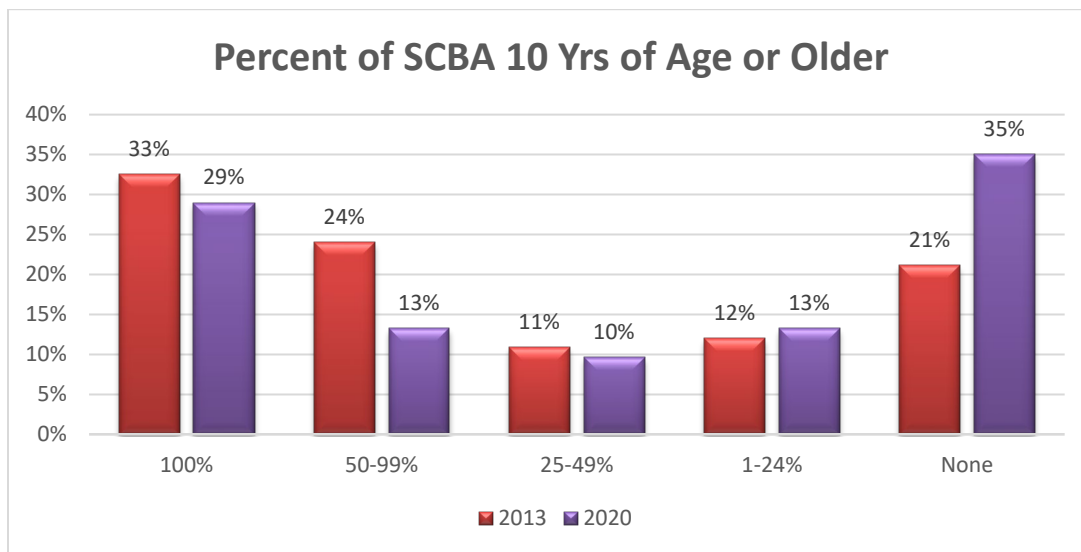


Fig. 38-1: Percent of responding departments with self-contained breathing apparatus 10 years old or older.

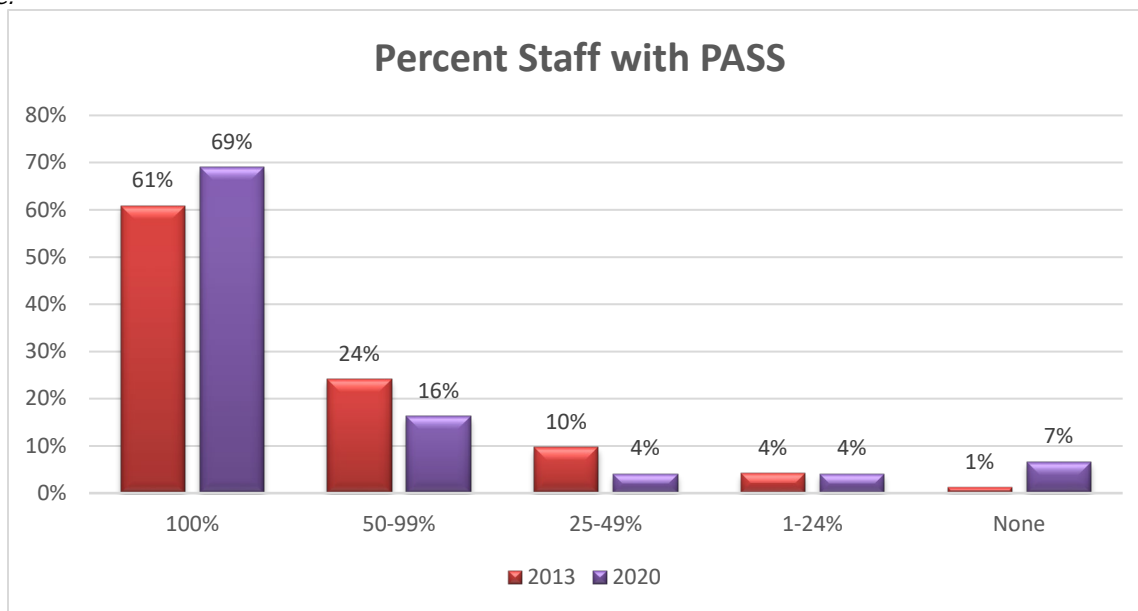


Fig. 38-2: Percent of staff with personal alert safety systems in responding departments

XIV. Communications and Communications Equipment

Portable Radios

This report provides a comparison of Tennessee fire departments to the NFPA national average regarding the equipping of staff with portable radios. Overall, Tennessee is equal to or better than the national average. The NFPA studies report that nationally, departments went from “need” to “no-need” over the three surveys conducted. Perhaps a study of these data over time in Tennessee will also reveal similar information.

Good Success in Meeting Need:

Portable Radios: For 2020, Tennessee is better than the national average in seven population ranges and mirrors the national average in one range. While Tennessee is significantly better than the national average, there is still a significant need for radios in cities with a population of 100,000 to 249,999 and in cities of 24,999 or fewer. In the 50,000 and up population range, which includes roughly 51 percent of the total state population, Tennessee is much better than the national average, and has made significant progress in equipping all firefighters with a portable radio.

Firefighter safety is increased when each firefighter has a radio, and all firefighters will hear vital information and can call for help (i.e., call for a MAYDAY) if they get in trouble while fighting the fire.

Population of Community	Departments where less than 100% of emergency responders have portable radios			
	TN 2013 ²⁸	NFPA 2010 ²⁹	TN 2020	NFPA 2015 ³⁰
Less than 2,500	48%	61%	30%	63%
2,500-4,999	50%	55%	29%	54%
5,000-9,999	45%	45%	29%	42%
10,000-24,999	46%	25%	15%	25%
25,999-49,999	20%	18%	0%	12%
50,000-99,999	25%	11%	0%	8%
100,000-249,999	67%	12%	40%	10%
250,000-499,999	0%	0%	0%	5%
500,000 or more	0%	9%	0%	0%

Table 4. Departments where less than 100% of emergency responders have portable radios by population of community compared to NFPA U.S. percentage

Table key: **Green** - Tennessee is better than the national average; **Yellow** - Tennessee mirrors the national average **Red** - Tennessee is worse than the national average

²⁸ In this category all blanks and “don’t know” responses were excluded from counts. Responses of “none” are included.

²⁹ Third Needs Assessment of the U.S. Fire Service (2010). Table 3-1 and Figure 3-1. p. 87-88.

³⁰ Fourth Needs Assessment of the US Fire Service (2015). Section 3. Personal Protective Equipment. Table 3-A. p.137

Personal Protective Clothing

Personal protective equipment, commonly called PPE or “turnouts,” is required for interior and proximity firefighting operations. OSHA Standard 1910.120 requires that employers provide employees with all proper protective equipment for the nature of the work performed at no cost to the employee. ISO requires that all firefighters on the fire ground have their own set of personal protective clothing for ISO to award credit for their response.

Provision of Personal Protective Clothing by Department Type						
Staff Equipped	100%		50-99%		1-49%	
	2013	2020	2013	2020	2013	2020
Full Career	96%	100%	4%	0%	0%	0%
Mostly Career	75%	100%	25%	0%	0%	0%
Mostly Volunteer	100%	92%	0%	8%	0%	0%
Full Volunteer	71%	77%	24%	18%	5%	4%

Table 5: Percentage of staff provided protective clothing by department type for 2013 and 2020

Success in Meeting Need

Provision of Personal Protective Clothing: Table 5 provides a look at which types of departments are the most successful at providing protective clothing to firefighters. Overall, more departments are equipping a high percentage (75 to 100 percent) of their staff with protective clothing than those that are outfitting a lower percentage (74 percent and less) of their staff.

NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*, provides specifications for the design and manufacture of personal protection clothing used for firefighting. Personal protective clothing is exposed routinely to high heat and chemicals and is subject to stress, abrasion, and tearing; therefore, departments should clean and inspect personal protective clothing regularly, and repair or replace any defective clothing found. NFPA 1851, *Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*, recommends retirement of personal protective clothing when the clothing reaches ten years of age.

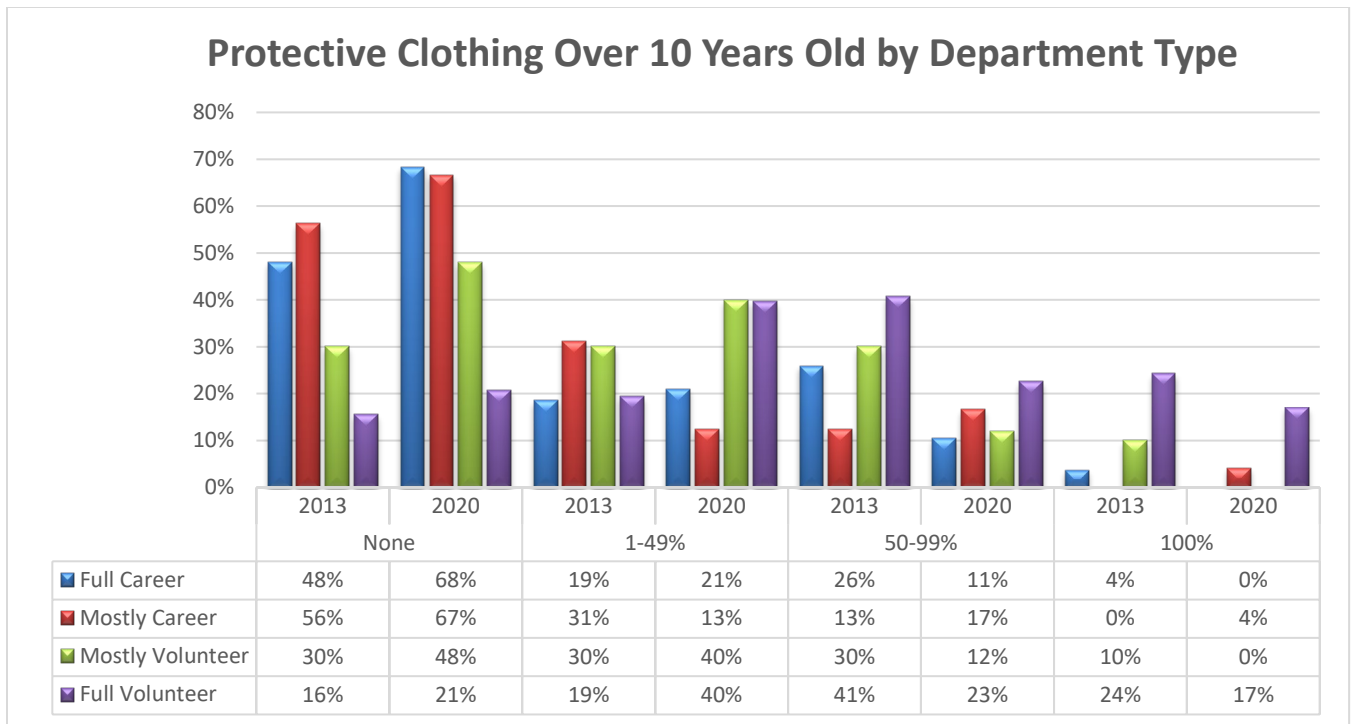


Fig. 39: Department with protective clothing over 10 years old by department in 2013 and 2020

Limited Success in Meeting Need

Age of Personal Protective Clothing: Figure 39 illustrates the age of turnout gear by type of fire department. Data indicate that full volunteer departments have the highest percentage of turnouts older than 10 years old.

XV. Technology

Communications with Partners at the Scene

The response to, and management of, a large-scale emergency or disaster involves multiple agencies and organizations from the federal, state, and private sectors. Fire departments provide essential services and resources to respond to and mitigate emergencies, and fire personnel need the ability for real-time communication with incident command and control. Interoperability, defined as the ability to communicate effectively when needed at all levels of activity and with all public safety agencies on the scene of an emergency incident, is a key component of the National Incident Management System (NIMS).

Limited Success in Meeting Need

Communicate With Partners: It is surprising that after more than eighteen years of emphasis from the federal government on improving interoperability through the establishment of the National Incident Management System and considering the availability of grant programs to foster improved interoperability, there are still fire departments in Tennessee that do not have interoperability capability. Additionally, four percent of reporting departments do not know if they have that capability. The cost of needed equipment is undoubtedly part of the explanation for this lack of equipment. Furthermore, the lack of use of a national mapping system at the local level will hinder the response of outside agencies in a disaster.

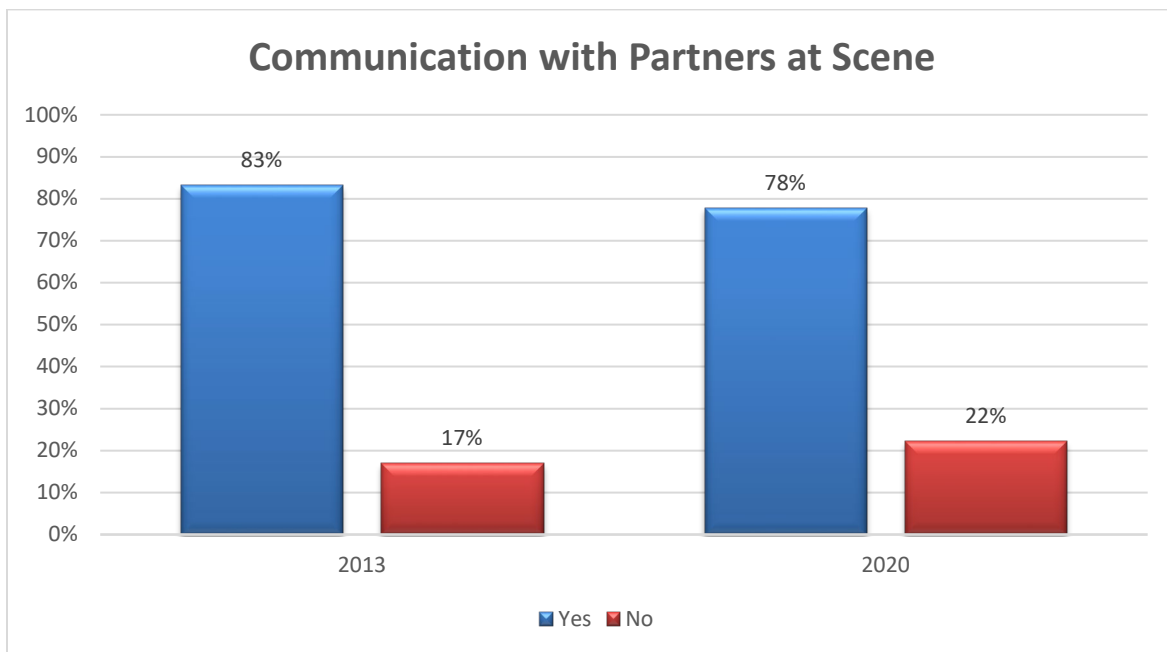


Fig. 40: Communications with federal, state, and local partners

As depicted in Figure 40, in 2020, 78 percent of responding fire departments reported that they can communicate with partners at an emergency scene.

Figure 41 illustrates the breakdown of that 78 percent positive response by department type. According to this illustration, it appears that full career and mostly career departments can communicate with a higher percentage of response partners on the scene.

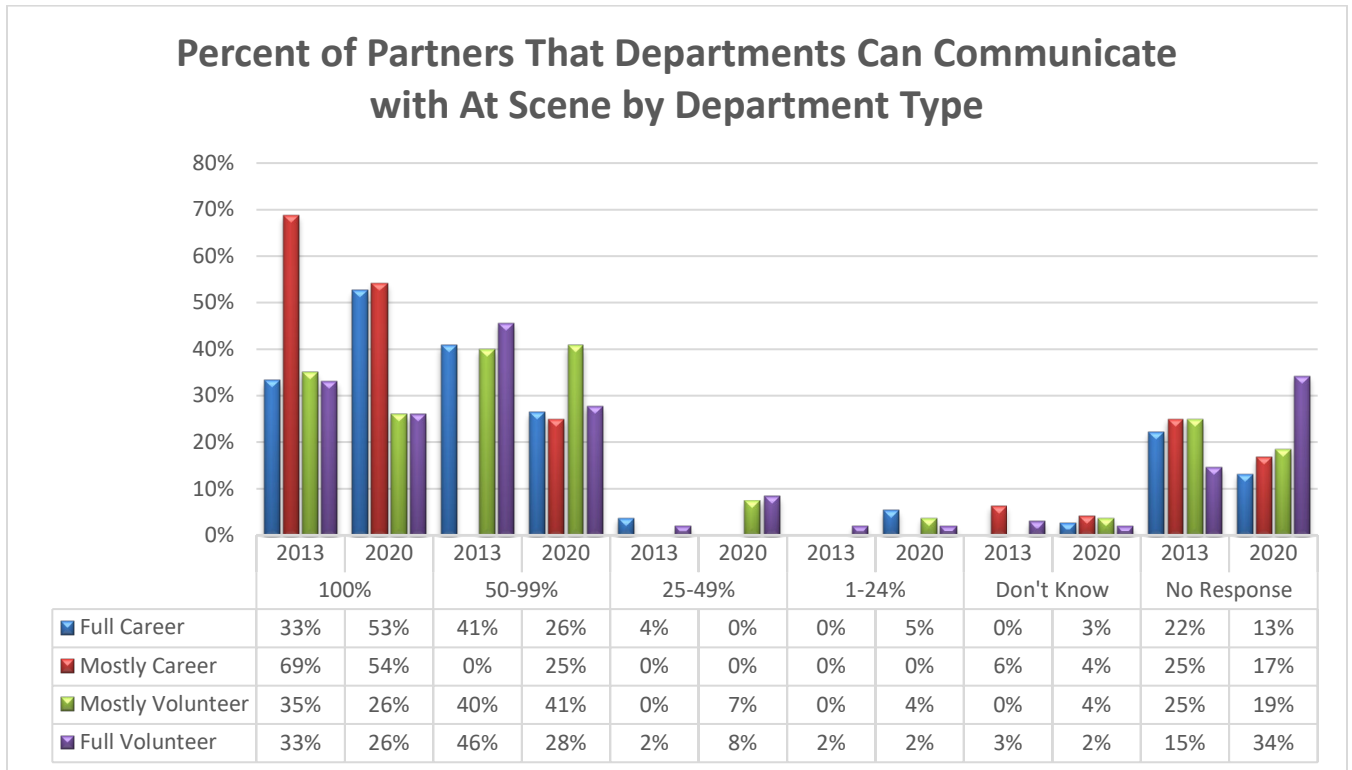


Fig. 41: Percent of partners that departments can communicate with at the scene in 2013 and 2020

Communication at Scene in Tennessee Compared to NFPA National Findings 2015						
NFPA Population Category	Can Communicate with Partners at Scene			Cannot Communicate with Partners at Scene		
	Tenn. 2013	Tenn. 2020	NFPA 2015	Tenn. 2013	Tenn. 2020	NFPA 2015
500,000 or more	100%	100%	97.8%	0%	0%	0%
250,000-499,999	0%	0%	97.7%	100%	0%	2.3%
100,000-249,999	67%	100%	95.1%	33%	0%	4.3%
50,000-99,999	63%	83%	93.6%	38%	17%	5.4%
25,000-49,999	93%	86%	91.5%	7%	14%	7.5%
10,000-24,999	92%	83%	87.6%	8%	13%	10.7%
5,000-9,999	84%	83%	88.6%	16%	17%	8.7%
2,500-4,999	81%	68%	85.8%	19%	32%	11.2%
Less than 2,500	82%	72%	88.5%	18%	28%	8.0%

Table 6: Tennessee department communication with partners at the scene by NFPA population categories and compared to NFPA percentages

Table 6 shows the percentage of departments, by the size of the community, with the capability to communicate by radio with local, state, or federal agencies. This is known as interoperability and is essential for efficient operations in large scale incidents, and in disasters such as flooding, severe weather, and wildfires. There was improvement in interoperability capability in Tennessee between 2013 and 2020, especially in larger communities. There is still work to be done in smaller communities, especially those with fewer than 5,000 people.

Dispatch Communications

All firefighters, fire engines, ladder trucks, and other resources of the fire department can only be effective when dispatched in a timely fashion. The ability to receive a call for emergency assistance, process that call quickly and correctly, identify the resources that need to respond, alert those resources to respond to the emergency, and then communicate with those resources throughout the incident is essential for a good outcome.

Limited Success in Meeting Need

Primary Responsibility for Dispatch: The arrival of the nationwide 9-1-1 system led to the creation of 9-1-1 districts and the establishment of public safety answering points (PSAPs) that have the needed primary and backup dispatch circuit(s) (radios), backup power systems, and redundancy to help ensure reliable operation. Many communities have abandoned local dispatch offices in favor of call receiving and

dispatching through combined or countywide 9-1-1 PSAPs. For maximum success, fire service leaders and communications/dispatch office leaders must work together to ensure that requests for fire department emergency response receive the appropriate dispatch priority and that the communications/dispatch center uses current dispatch protocols for fire department responses.

Figures 42-43 confirm the trend towards county dispatch as the primary dispatch method for all department types in Tennessee. It is disconcerting to see that 45 percent of departments do not have provisions for backup dispatch (Fig. 44), as dispatch equipment can fail.

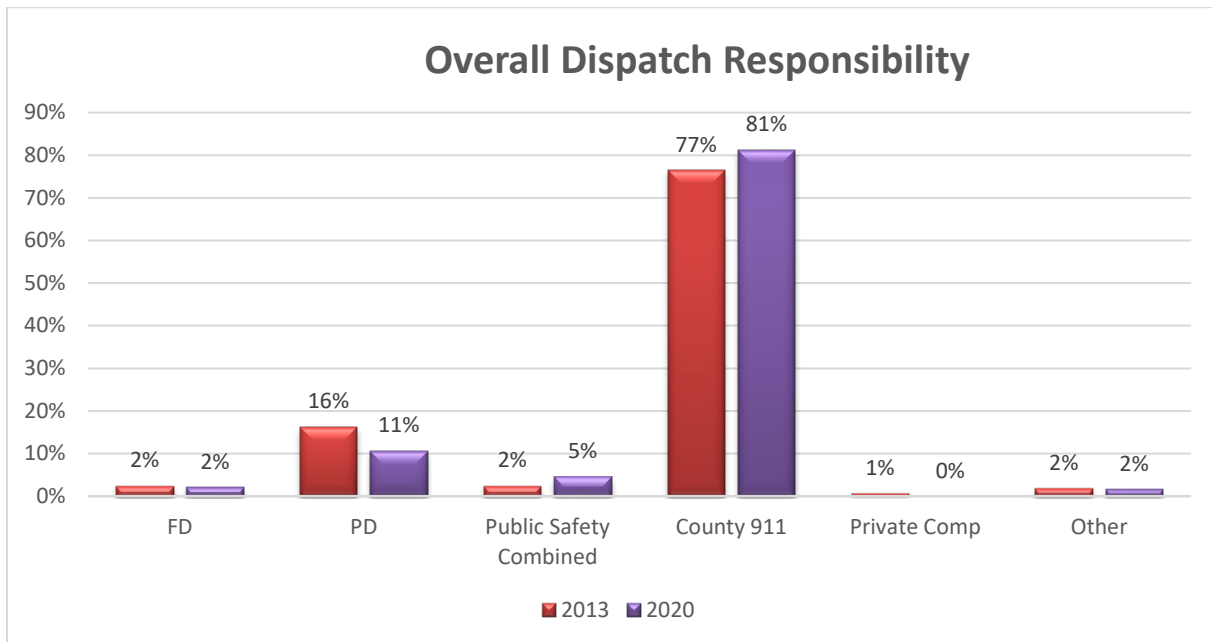


Fig. 42. Overall responsibility for fire department dispatch in 2013 and 2020

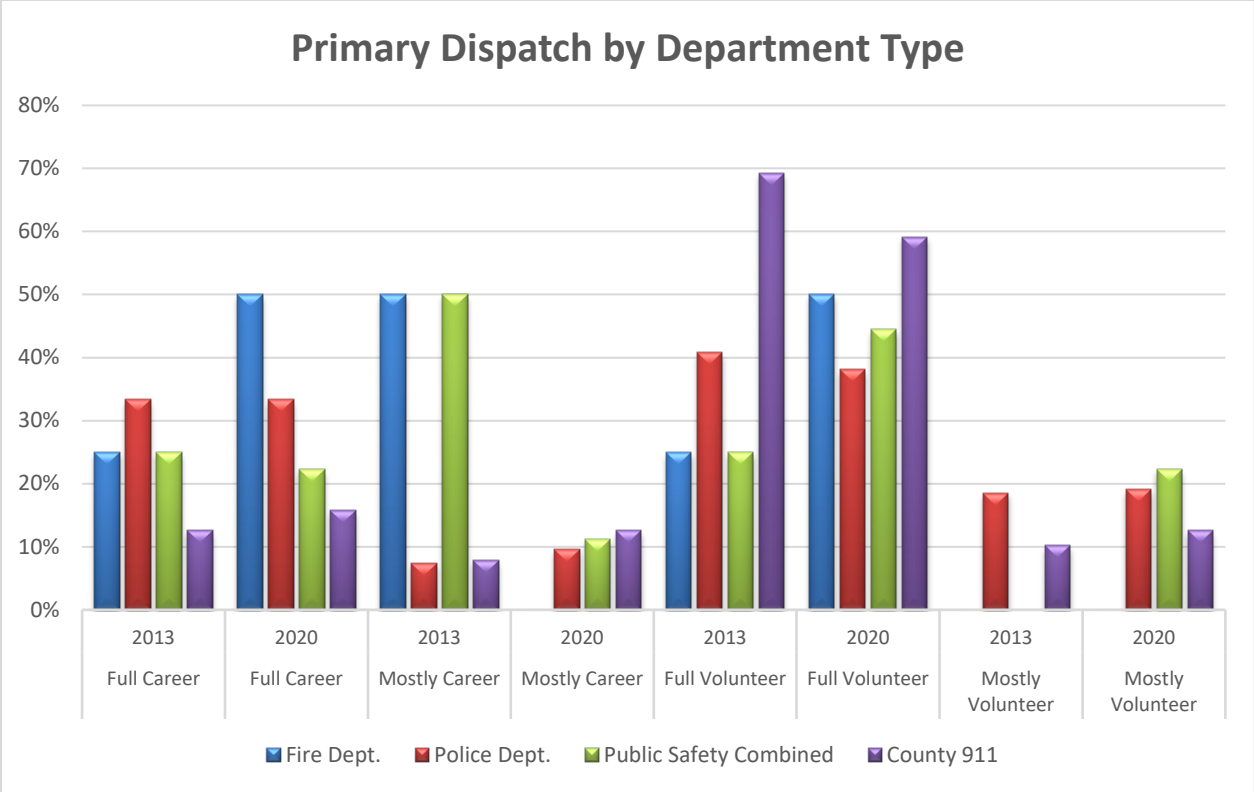


Fig. 43: Primary dispatch responsibility by department type for 2013 and 2020

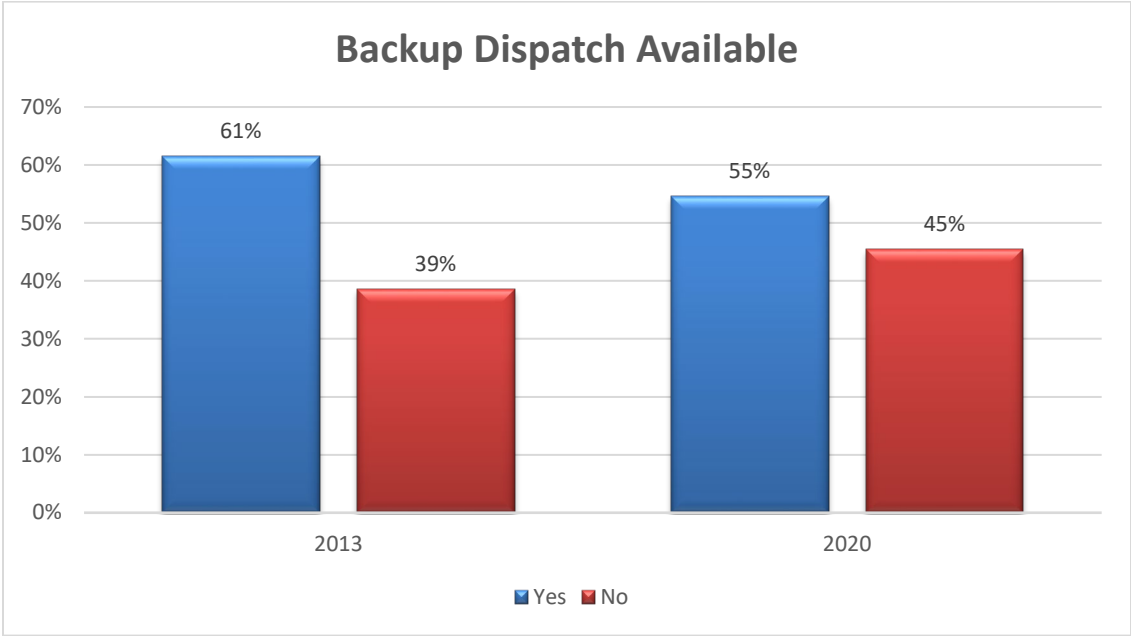


Fig. 44: Departments with backup dispatch provisions

NIOSH-Certified CBRN Respirators

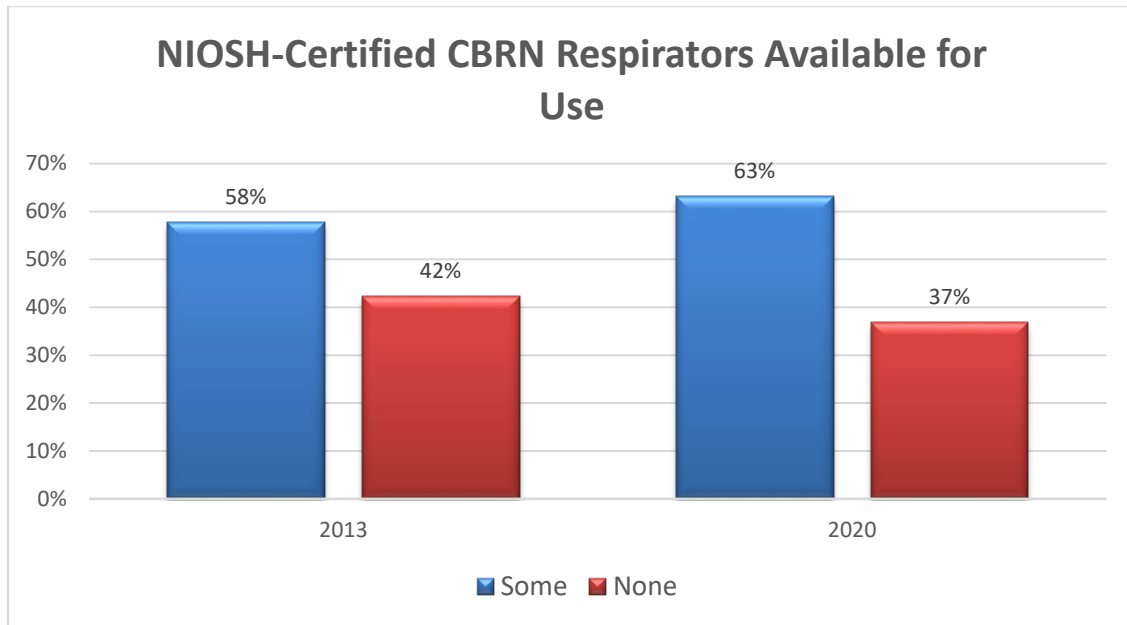


Fig. 45: NIOSH-Certified CBRN respirators available for use in 2013 and 2020

All fire departments are part of the response to a homeland security incident in their community. A homeland security incident can involve chemical or biological agents, so emergency responders need personal protective equipment that can protect them in such situations. NIOSH-Certified CBRN Respirators protect emergency responders in atmospheres which contain chemical, biological, radiological, and nuclear (CBRN) agents.

Thermal Imaging Cameras

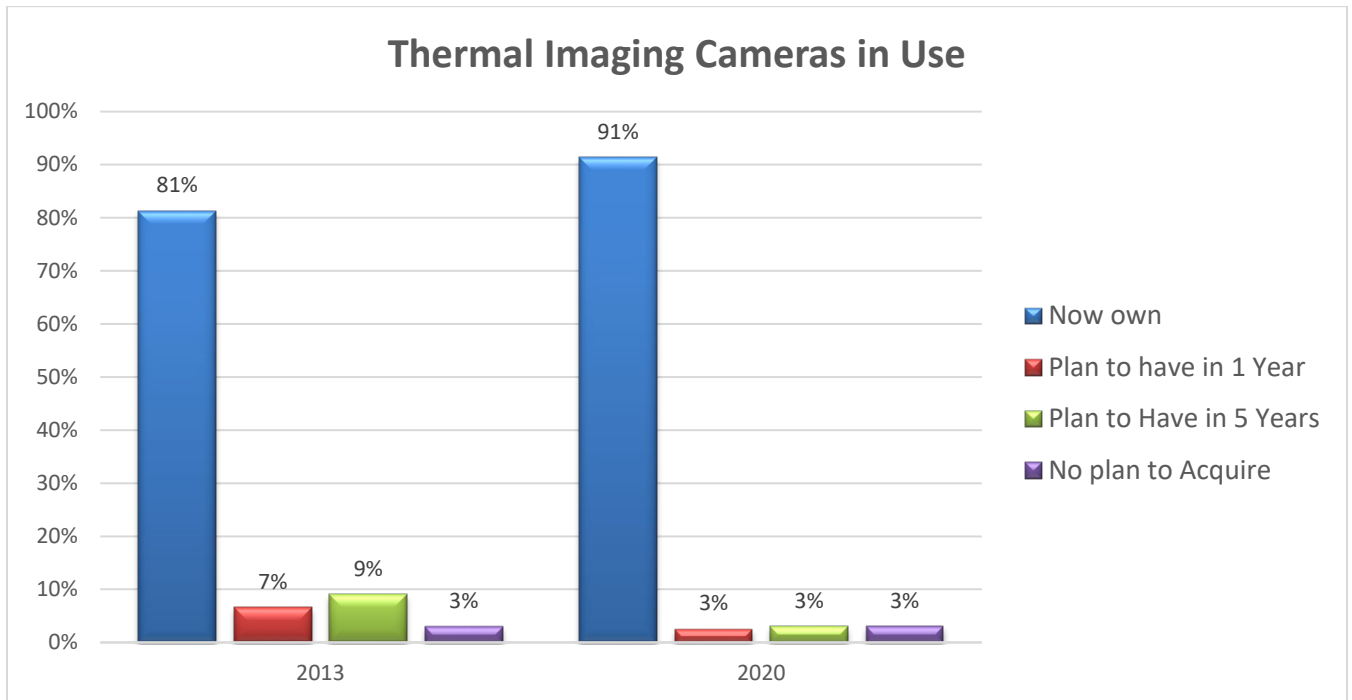


Fig. 46: Percentage of departments providing thermal imaging cameras

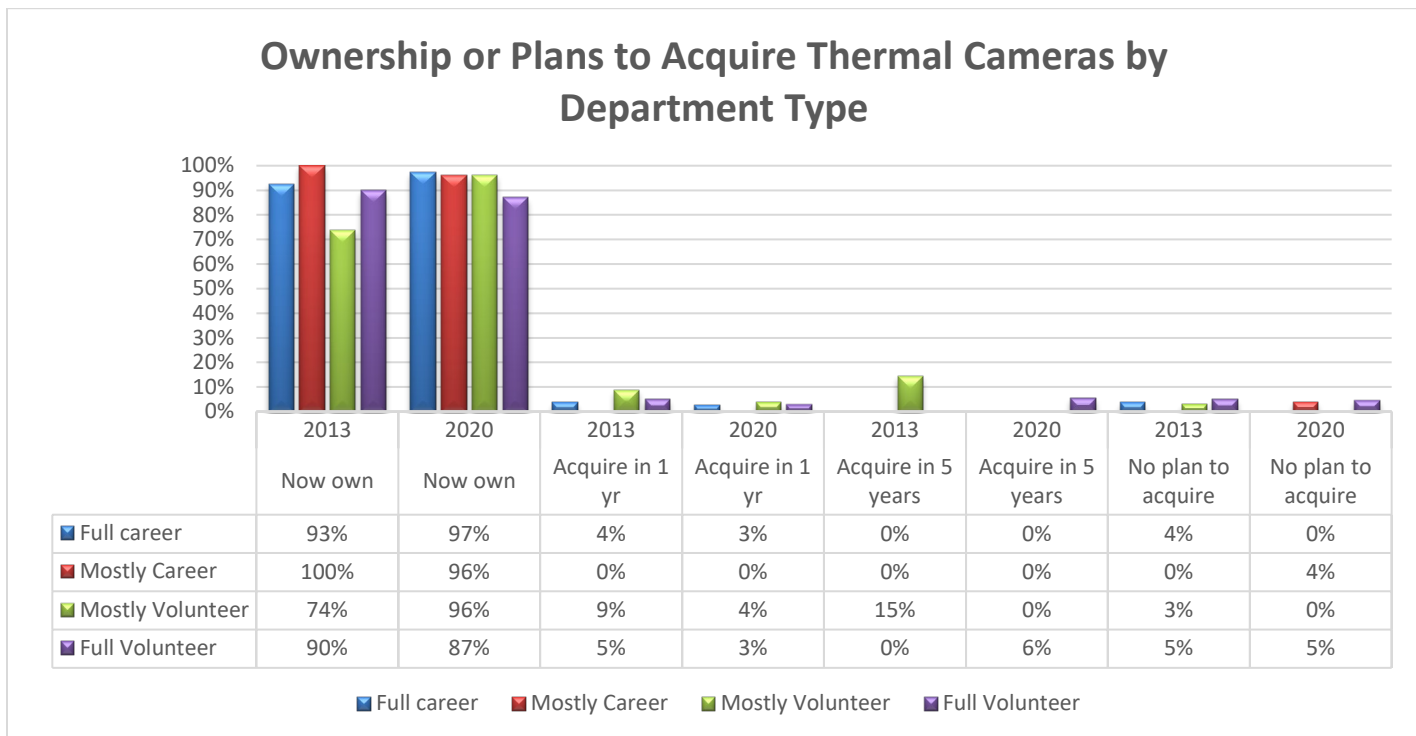


Fig. 47: Thermal imaging camera ownership or plans to acquire by department type

Success in Meeting Need

Thermal Imaging Cameras: Figure 46 shows that a very high percentage of departments have this technology, which assists firefighters in locating trapped occupants, downed firefighters, and hidden fire during structural firefighting operations.

The use of thermal imaging cameras has increased as technology has improved, and the price has dropped. Some manufacturers are integrating thermal imaging cameras with SCBA, which should help make this device available to every firefighter in the future.

Advanced personnel location equipment

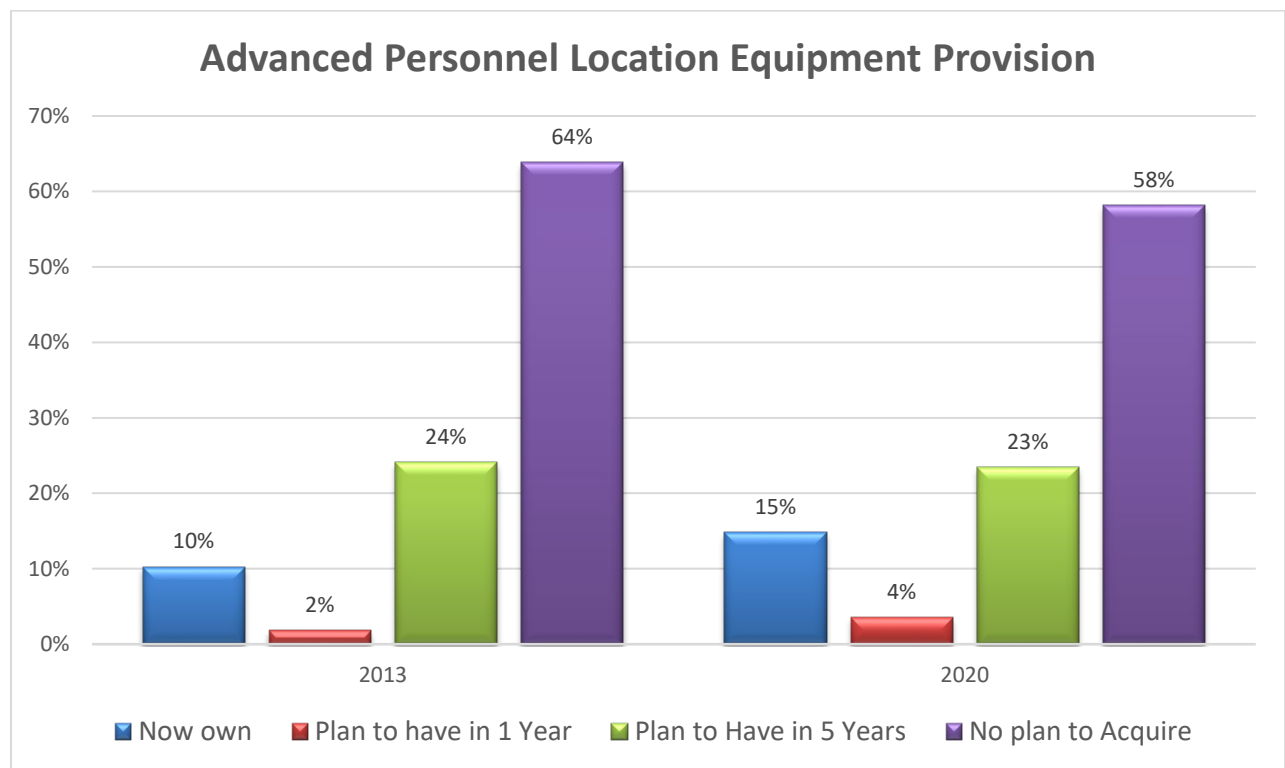


Fig. 48. Provision of advanced personnel location 2013 and 2020

Lack of Success in Meeting Need

Advanced personnel location equipment: The risk to firefighters inside a structure fire is significant. If a firefighter goes down or gets lost inside the building, it can take other firefighters a long time to find that firefighter. A study conducted by the Phoenix Fire Department and Arizona State University showed that it takes an average of eight minutes for a Rapid Intervention Team (RIT) to locate a downed firefighter.³¹ Advanced personnel location equipment is available to assist the incident commander in tracking firefighters inside structures, yet very few fire

³¹ Perry, Ron. (2002) Rescue Sector Training Exercises, Final Data Report. University of Arizona.

departments have this technology. In Figure 48, we see that almost 60 percent of fire departments have no plans to acquire this potentially lifesaving technology.

Chemical/biological sample collection capability

Many fire departments are actually all-hazard departments and are part of the homeland security response in their community. Transportation accidents involving hazardous chemicals are possible in every community, and the threat of terrorism includes the possibility of the use of chemical or biological weapons.

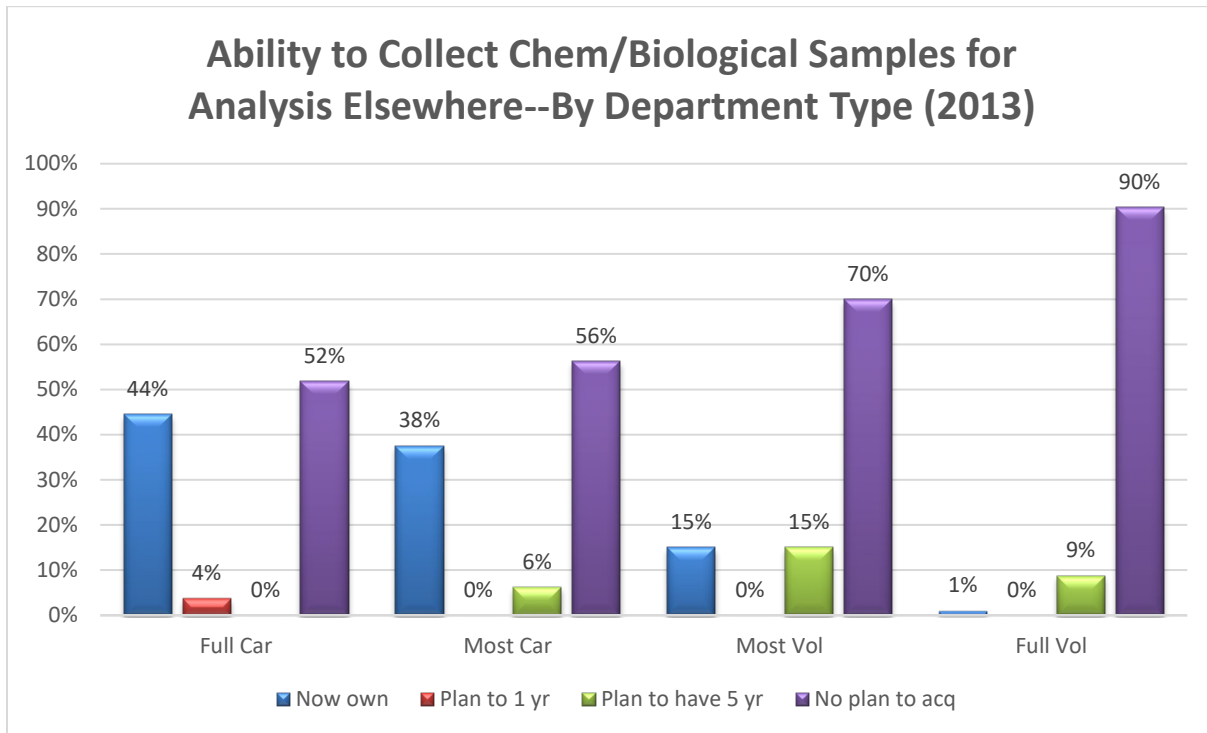


Fig. 49: By responding department type: ability to collect biological samples at scene to be processed elsewhere 2013

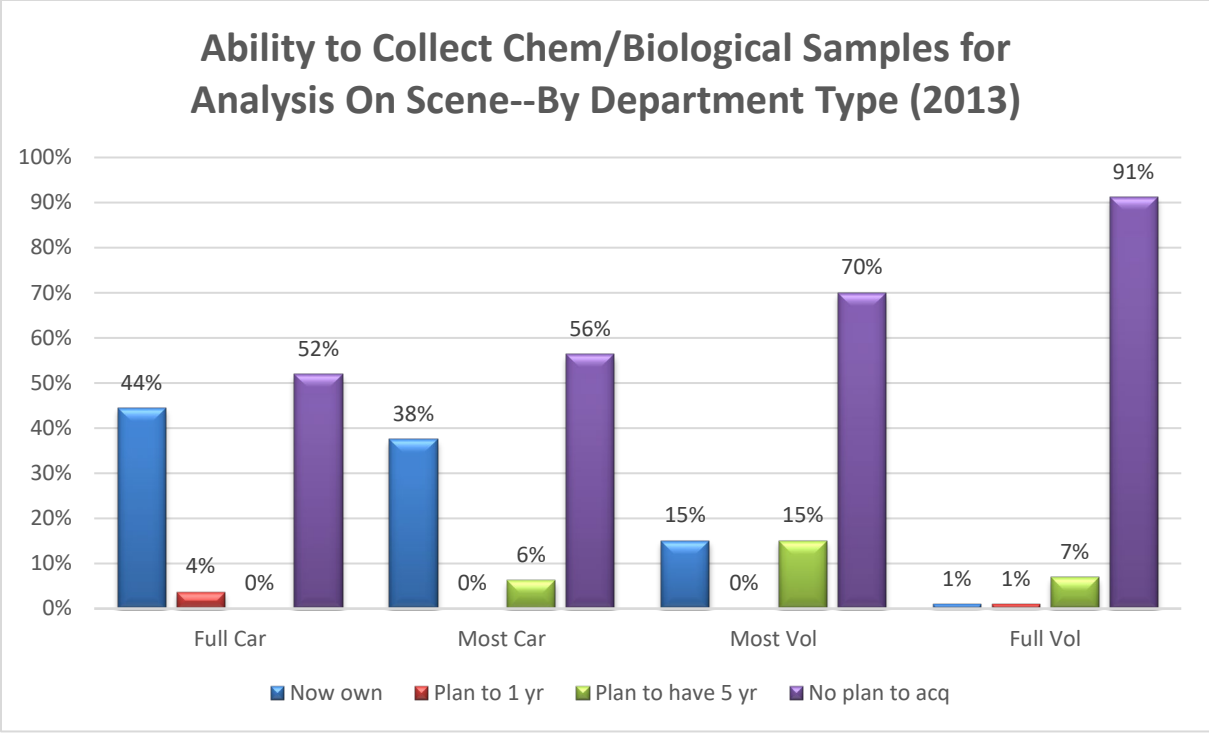


Fig. 50: By responding department type: ability to collect biological samples at scene to be processed on scene 2013

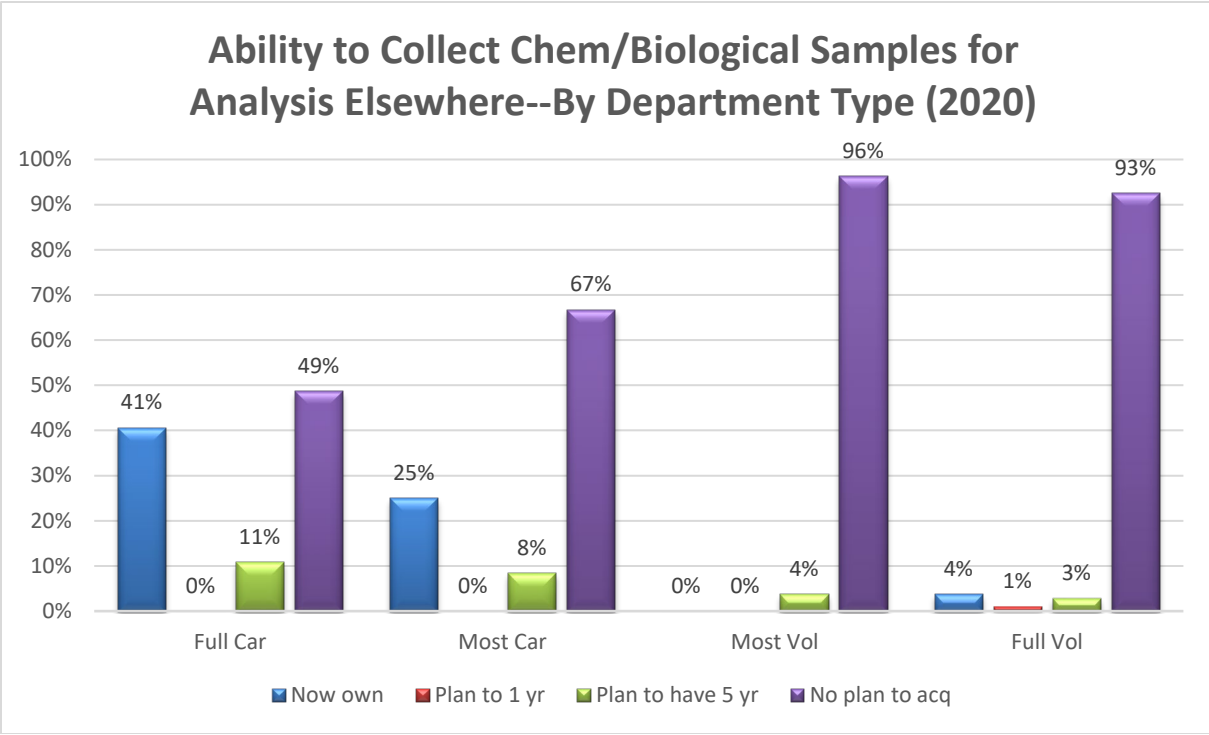


Fig. 51: By responding department type: ability to collect biological samples at scene to be processed elsewhere 2020

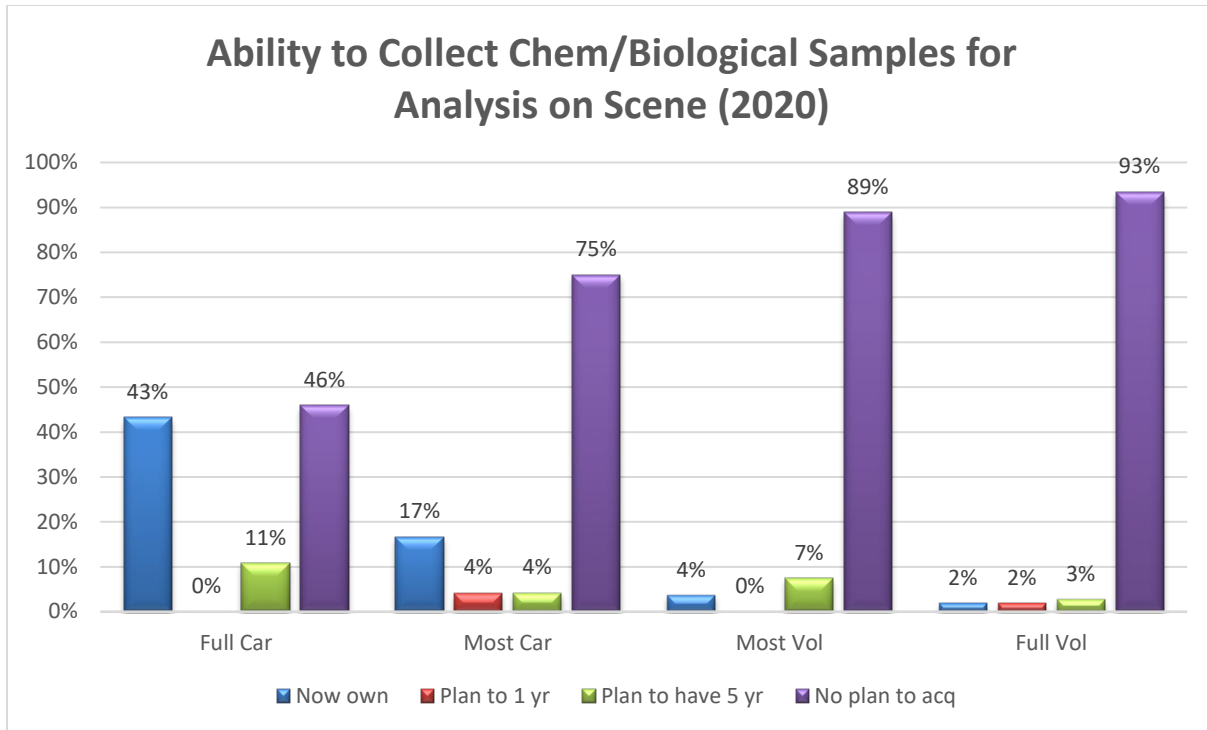


Fig. 52: By responding department type: ability to collect biological samples at scene to be processed on scene 2020

Limited Success in Meeting Need

Chemical/biological Sample Collection Capability: As illustrated in Figures 49-52, the results indicate that career and mostly career departments have the greatest capability, while volunteer and mostly volunteer departments have the least capability. The results between 2013 and 2020 did not vary significantly. Purchasing and maintaining chemical and biological detection equipment is expensive, and the user must have ongoing training, which makes it impractical for smaller departments to invest in this technology. A better solution is for smaller communities to sign interlocal agreements for mutual aid to cover this risk in their community.

Carbon Monoxide Air Monitors

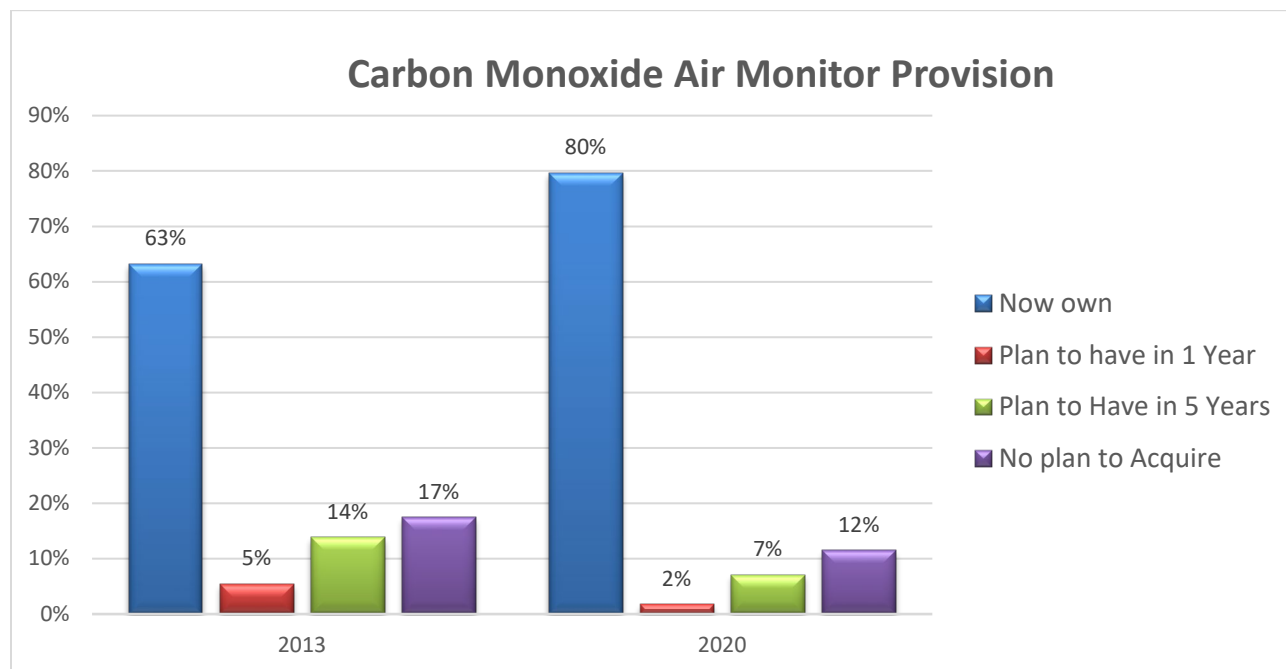


Fig. 53: Departments providing carbon monoxide air monitors in 2013 and 2020

Good Success in Meeting Need

Carbon Monoxide Air Monitors: Carbon monoxide (CO) is a colorless and odorless gas and health hazard, which is present at all structure fires. Affordable air monitoring equipment is available that can detect the presence of CO. It is a common practice for firefighters to remove their protective breathing equipment once the fire is out and to breathe ambient air while performing salvage and overhaul operations. Studies have shown that CO and other toxic gases are present for prolonged periods during the overhaul operations that follow the extinguishment of flames. Eighty percent of fire departments report having CO monitoring equipment, and another 9 percent report plans to acquire such equipment, approximately 12 percent of fire departments report no plans to acquire CO monitoring equipment (see Figure 53).

Geographic Information System (GIS) capability

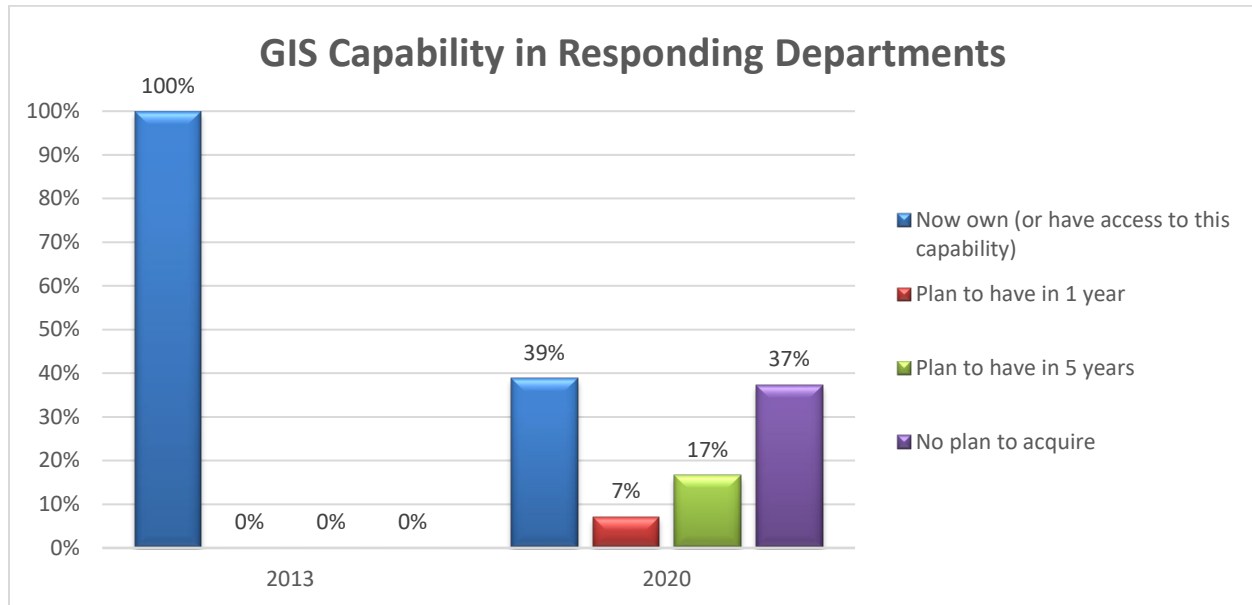


Fig. 54: Geographic information systems capability in responding departments for 2013 and 2020

Success in Meeting Need

Geographic Information System (GIS) Capability: As seen in Figure 54, in 2020, 39 percent of departments reported the ability to access Geographic Information System (GIS) capability for mapping, pre-fire planning, and other applications. This technology contributes to having relevant and current information nearby for use in planning and emergency response.³²

³² The one hundred percent capability reported from 2013 accurately reflects the responses submitted in 2013.

XVI. Top Three Needs

As Figures 55 and 56 illustrate the top three needs cited by survey respondents are consistent from 2013 to 2020 and those are equipment, staff or volunteers, and adequate facilities. These needs apply to departments of all sizes. While fire departments did not self-identify training as a “top three” need, MTAS’ experience serving fire departments is that training should rank as one of the top three needs.

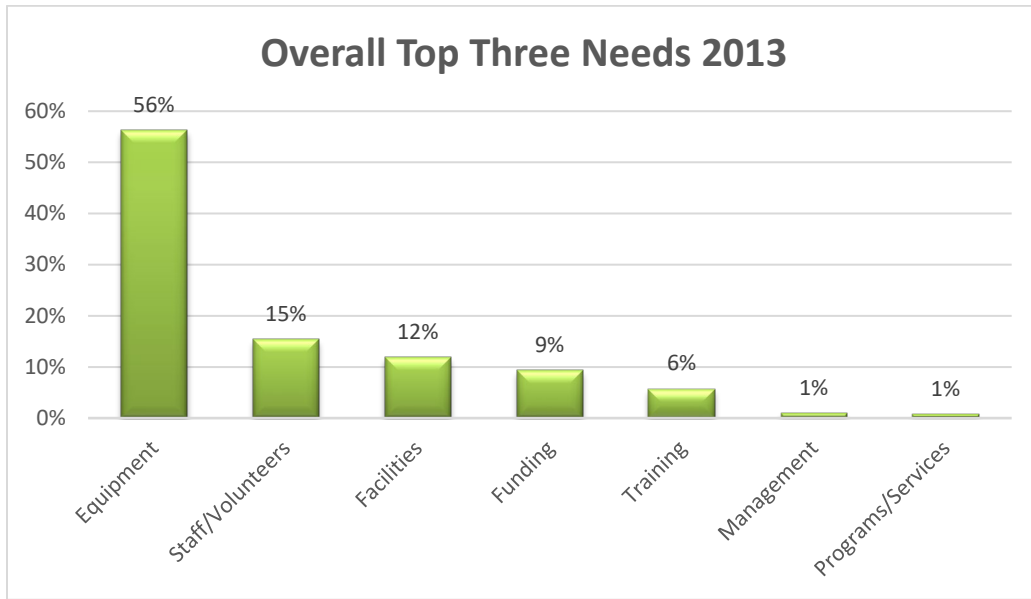


Fig. 55: Overall top three needs from 2013-14 survey respondents ³³

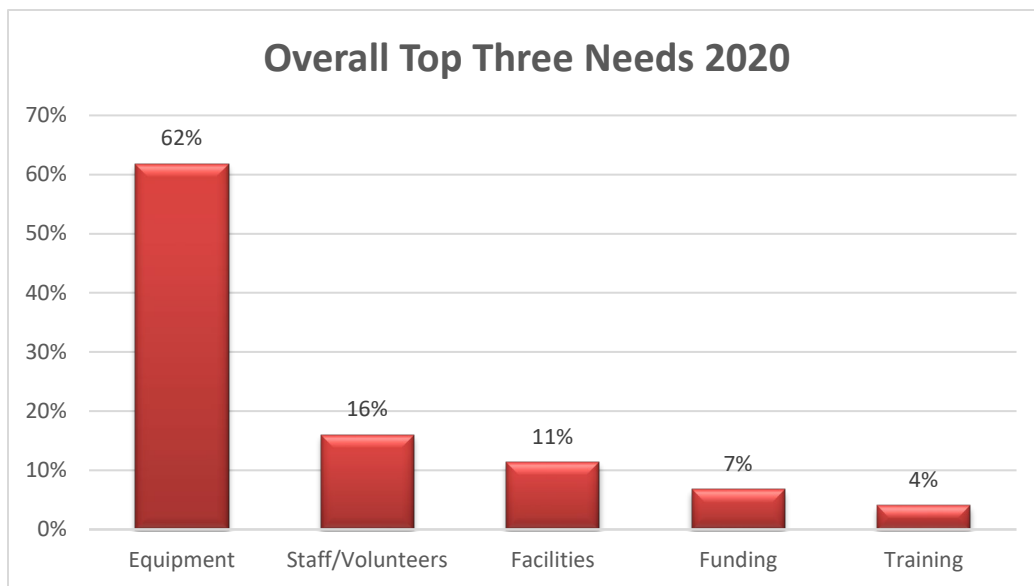


Fig. 56: Overall top three needs from 2020 survey respondents

³³ 2020 data compilation method did not include categories of management or programs/services.

XVII. Conclusion

Very few fire departments just respond to fires. Since the 1970s, fire departments have assumed more duties, from providing first-responder emergency medical services to hazardous materials response to being a major resource in homeland, and hometown, security.³⁴ The fire service assumed many of these duties because there was no other department or agency in the community that could, or was willing to, provide the service. Often, there was a lack of money to purchase the needed additional resources or to hire additional personnel to provide the services. Instead of fire departments not providing a service, departments adapt and improvise to meet the needs as best they can. The result is a variety of unmet needs in fire departments across the state. While many career and mostly career departments have had some success in meeting these needs, departments protecting smaller communities to a large degree have not.

The results of this needs assessment survey indicate that typically, the smaller the community protected, the greater the need in those fire departments. Progress in meeting these needs has been slow, and the Great Recession from 2007 to 2009 certainly contributed to this lack of success. Grant programs, such as the Assistance to Firefighters Grants (AFG), are helpful, but grant programs are competitive and the dollars available through grants are limited. A city or fire department that expects to rely on grants to meet its needs is setting itself up for failure. For real progress, local communities must increase support and funding for the fire department.

Adequate funding of primary services of fire departments in smaller communities is a challenge, much less funding for additional services such as public education, community risk reduction, technical rescue, hazardous materials response, and homeland security. Volunteer recruitment for smaller communities and departments continues to be an on-going challenge as departments struggle to recruit firefighters from a limited pool of qualified personnel. Once recruited, the volunteer must balance the demands of work, home, and the fire department and comply with bare minimum training and participation requirements.

Larger communities have the capability to be self-sufficient except for major emergencies, but smaller communities struggle with providing an adequate fire response. The use of interlocal agreements for automatic aid for outside resources can help address this need. Innovation and efficiency will only take an organization so far, and ultimately, it is going to take additional funding at the state and local level to meet the needs of the Tennessee fire service.

³⁴ Compton, D., & Granito, J. (Eds.). (2002). *Managing Fire and Rescue Services*. ICMA: Washington, DC.



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