

Keeping up with Demand:

Phoenix Fire Department Response to Increased Emergency Calls



Authored by

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Introduction

The Phoenix metropolitan area has grown by nearly a million residents in the past decade.¹ This influx of residents has correlated with an overall increase in the number of calls for service to the 911 emergency services system, but the effects of that increase on emergency service providers such as the Phoenix Fire Department are unknown. It is possible that rapid increases in the number of calls for service may outstrip the physical and personnel resources of first responders and decrease the overall health and safety of Phoenix residents. The Phoenix Fire Department and the Professional Fire Fighters of Arizona partnered with the Morrison Institute for Public Policy at Arizona State University to explore trends in call volume and response time, as well as the impacts of increased call volume.

This report contains the results of three separate but related studies addressing call volume and response time trends in the Phoenix Fire Department as well as the impact of those trends.

1. Response Time Study

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The first study uses quantitative data on call volume and response time provided by partners at the Phoenix Fire Department to characterize changes in call volume and response time for the 2015-2022 period.

2. Overtime Study

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The second study uses overtime shift and total number of overtime hours data from the Phoenix Fire Department to understand how increasing call volumes might relate to the amount of overtime worked by Department personnel.

3. Interview Study

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For the third study, researchers conducted and analyzed six interviews with Phoenix Fire Department leadership to understand how changes in call volume over time impacted employees and capture insights into barriers to and opportunities for improvement in Department operations.

Quick Takeaways

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- **Call volume has increased 120%** during the study period 2015-2022, although the increase has not been consistent across every year
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- **Average response time has not** increased during that period
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- When looking at the 90th percentile, the **total response time has not changed** during the study period
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- **Overtime has increased**, but primarily for fire engineers and captains rather than firefighters
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- Phoenix Fire Department interview **participants were struggling to keep pace with increased calls for service** because of population growth and more residents with specific needs such as behavioral health or homelessness
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- Participants felt that they were being asked to **compensate for the failures of other health and social support systems** by serving as a “last resort”
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- **Participants were proud of their work** but also worried for their colleagues’ health and well-being under the stress of increased call volume
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- Participants felt that the Phoenix Fire Department was **unable to keep pace with demand** and that “business as usual” was insufficient to maintain quality service
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Response Time Study

Researchers were asked to investigate whether increasing 911 call volume correlated with an increase in 911 call response times. The total number of 911 calls increased substantially over the study period, rising from 181,888 in 2015 to 218,062 in 2022.

Methods

The research team acquired a dataset of 911 call responses for the city of Phoenix over the period January 1, 2015 to December 31, 2022. The dataset includes 1,579,947 unique 911 calls. The researchers then constructed three distinct 911 call response time variables:

Variable 1: Time to En Route

Time elapsed between when a call is reported and when a unit is en route to the scene

Variable 2: Time in Transit

Time elapsed between when a unit calls in en route to the scene and when they arrive on scene

Variable 3: Total Response Time

Time elapsed between when a call is reported to when a unit is on-scene

A small number of observations (i.e., 911 calls) were dropped from the dataset, either because one of the response times was less than zero or greater than 75 minutes. In addition, for the purposes of this analysis, all response times are reported in HH:MM:SS format.

Key Findings

Average response times

Table 1. Average and Median Times for Each Response Variable, 2015-2022

	Average	Median
Variable 1: Time to En Route	00:01:17	00:01:09
Variable 2: Time in Transit	00:04:05	00:03:47
Variable 3: Total Response Time	00:05:22	00:05:01

Distribution of total response times

The research team also examined total response times at the 10th, 25th, 50th, 75th, and 90th percentiles in the distribution (Table 2). In other words, 10% of all calls were at or below a total response time of 00:03:11, 25% of all calls were at or below a response time of 00:04:02, etc.

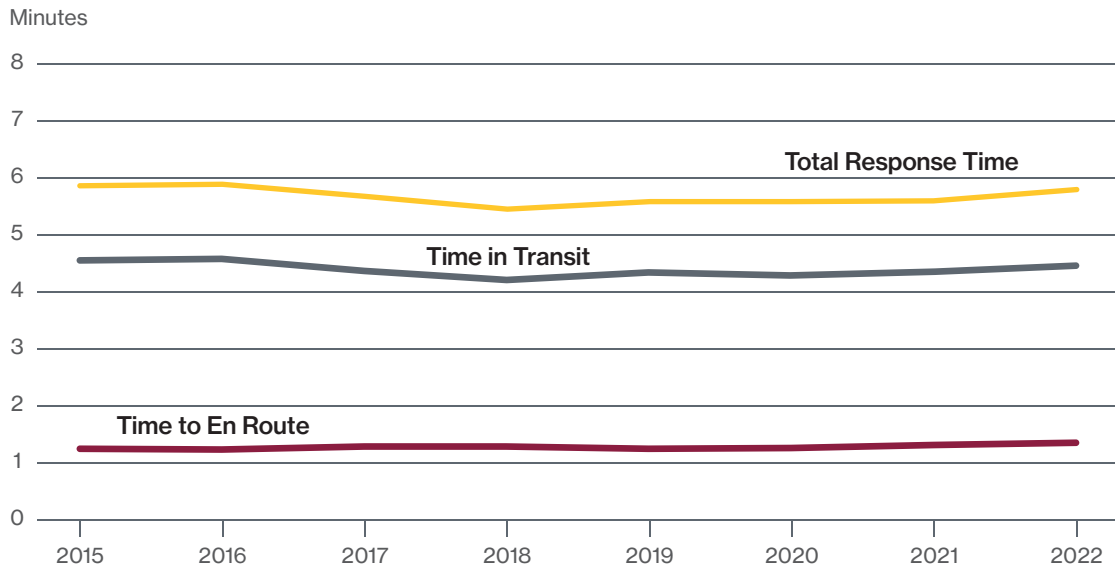
Table 2. Percentile Distributions of Total Response Time, 2015-2022

Percentile	10th	25th	50th	75th	90th
Total Response Time	00:03:11	00:04:02	00:05:01	00:06:13	00:07:39

Trends in response time

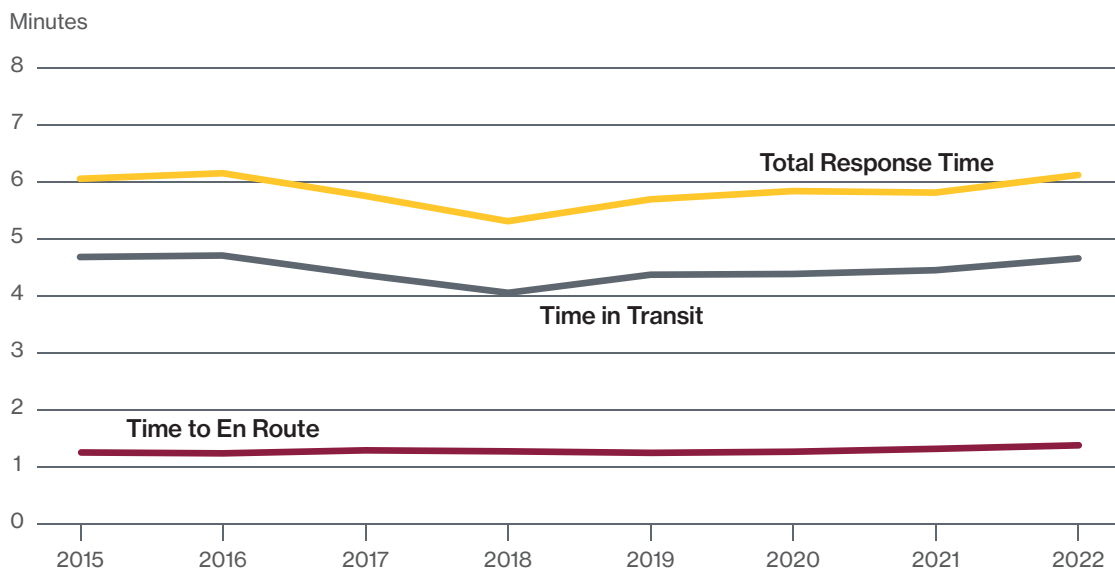
The research team examined all three response time variables during that same period in an effort to determine whether response times increased, decreased, or remained constant. Figure 1 (below) shows the response trends. In all cases, the response time appears to have remained consistent over time, with little discernible increase or decrease in response time.

Figure 1. 911 Call Response Times



The research team then isolated 911 calls that resulted in ambulance transport to a hospital to investigate whether response times had changed for the most serious 911 calls. Results are shown in Figure 2 (below.) The analysis suggests that, for these relatively serious 911 calls, all response times remained consistent over the study period.

Figure 2. 911 Call Response Times Requiring Transport to a Hospital



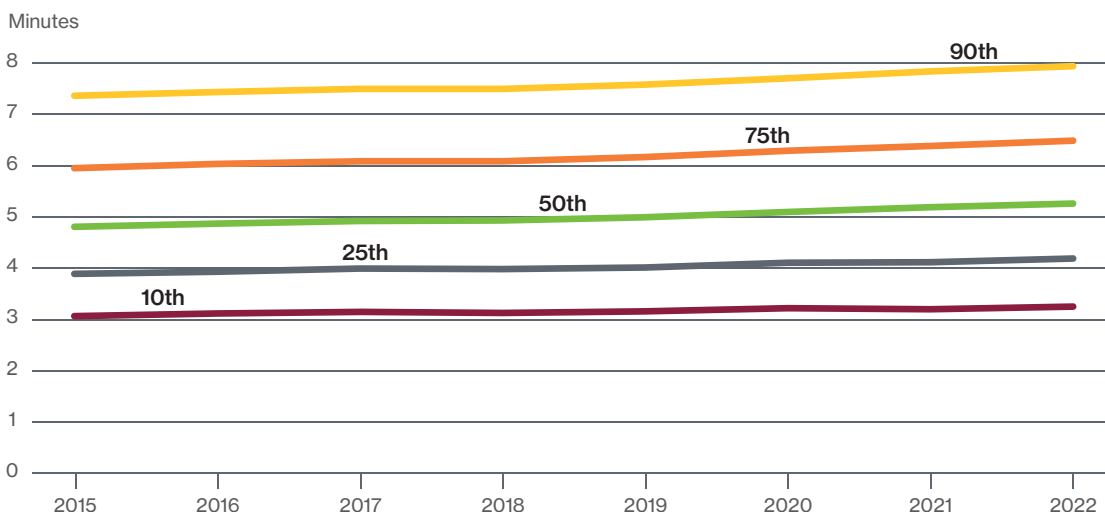
Researchers then investigated whether response times at specific points in the distribution of all calls had changed. For example, if response times at the 90th percentile increased, it could signal a reduction in service quality or potentially place individuals at risk of poor health outcomes. Therefore, the research team examined the 90th percentile total response time for each year of the study period (see Table 3). Again, the data suggest little change in 911 call response times.

Table 3. 90th Percentile Total Response Time

2015	2016	2017	2018	2019	2020	2021	2022
00:07:22	00:07:27	00:07:31	00:07:31	00:07:36	00:07:43	00:07:51	00:07:57

For a complete look at the trend at multiple percentiles in the distribution, Figure 3 (below) plots the total response time at 10th, 25th, 50th, 75th, and 90th percentiles of the distribution. The data once again suggest that 911 call response times were relatively flat throughout the distribution of response times.

Figure 3. Percentile Distribution, Total Response Times



Response time distribution by code

Researchers also analyzed various subgroups of 911 calls. Figure 4 examines the total response time for the six most frequent 911 call types: difficulty breathing, ill person, fall, altered level of consciousness, ill person requiring advance life support, and chest pain. Figure 5 assesses the trend in Class M (Medical) total response times. Figure 6 demonstrates the trend for some of the most medically serious call codes: acute behavioral disturbance, abdominal pain requiring advanced life support, chest pain, cerebral vascular accident, difficulty breathing, heart attack, internal bleeding, and overdose. In all cases, the research team plotted the trend at various percentiles in the response time distribution (i.e., 10th, 25th, 50th, 75, and 90th percentiles.) Consistent with the results discussed above, the research team found evidence that response times remained consistent over the study period.

Figure 4. Percentile Distribution, Total Response Time for Six Most Frequent Codes

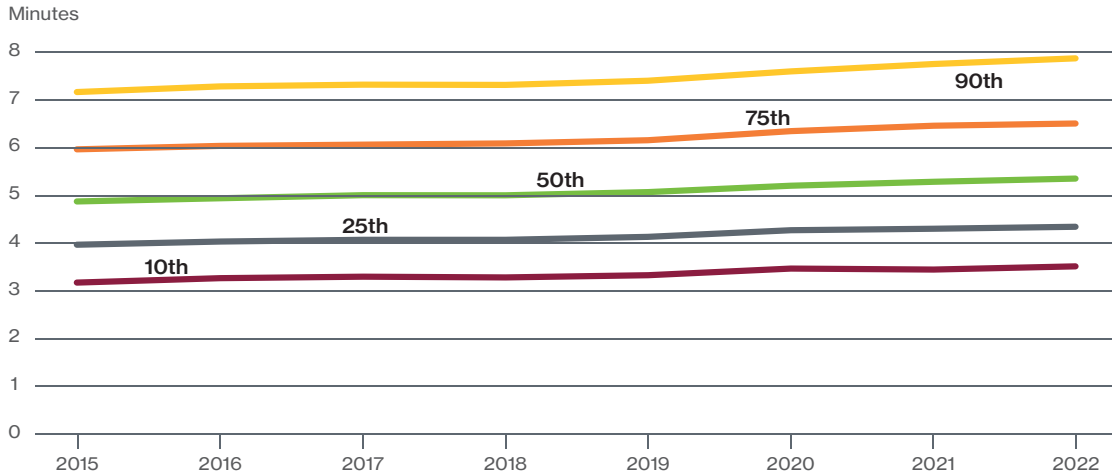


Figure 5. Percentile Distribution, Total Response Time for Class M Codes

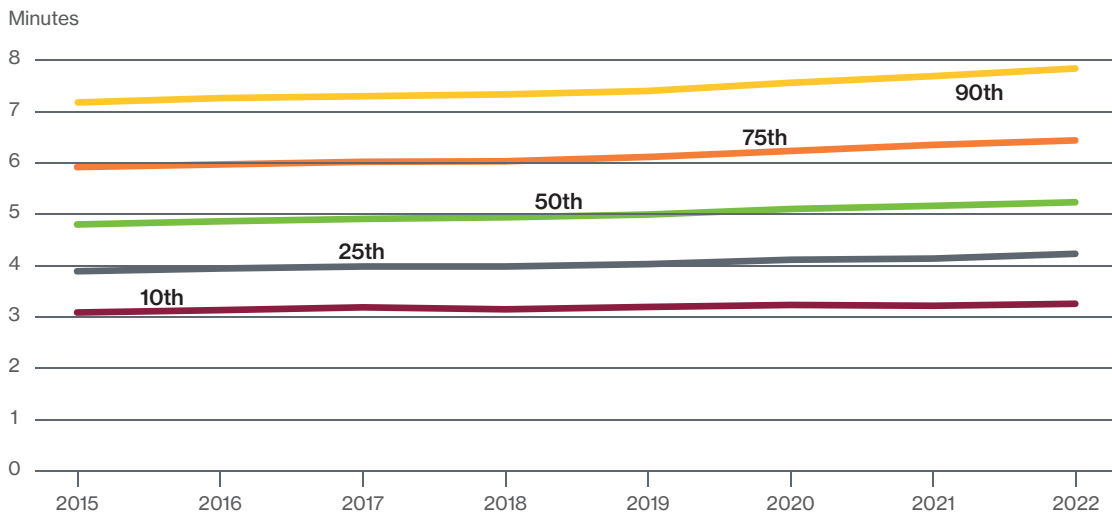
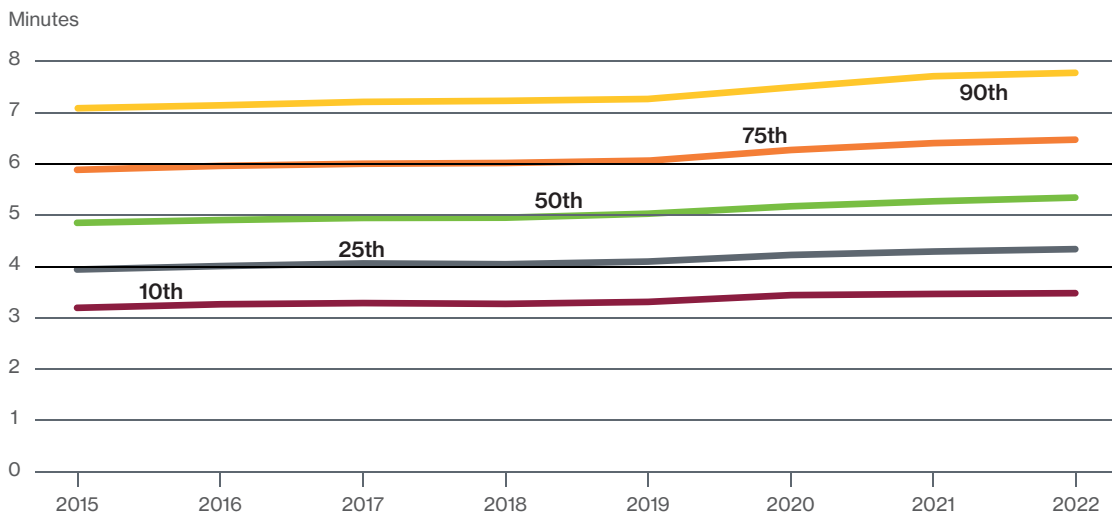


Figure 6. Percentile Distribution, Total Response Time for Most Emergent Codes



Overtime Study

To supplement the analysis of 911 call response times, the research team also explored trends in the total number of overtime shifts and hours worked by some types of Phoenix Fire Department personnel. While 911 call response times showed no change in the analysis, call volumes increased significantly during the study period. Personnel working additional overtime may be one strategy to absorb the additional call volume.

Methods

The research team was provided with data on overtime hours worked by some members of the Phoenix Fire Department. This dataset included overtime hours worked by firefighters, fire engineers, and fire captains from 2015-2022. Due to the incomplete nature of 2022 data, all analyses use data through December 2021. In addition, although the data are reported by month in the original dataset, the research team aggregated them to the year level for the purposes of this analysis. Finally, the dataset provided the number of full-time (i.e., 24-hour) overtime shifts for firefighters, fire engineers, and fire captains, which permit full-time shift analyses separately by personnel category. Some results, however, report the number of overtime hours, which represents a summation of hours across all three personnel codes. This is because complete data on full-time hours was not provided to the research team.

Key Findings

General overview

Before reporting on the changes in overtime shifts and hours between 2015 and 2021, it is useful to provide a brief descriptive portrait of what overtime data looks like. The data from 2021 is used as an example.

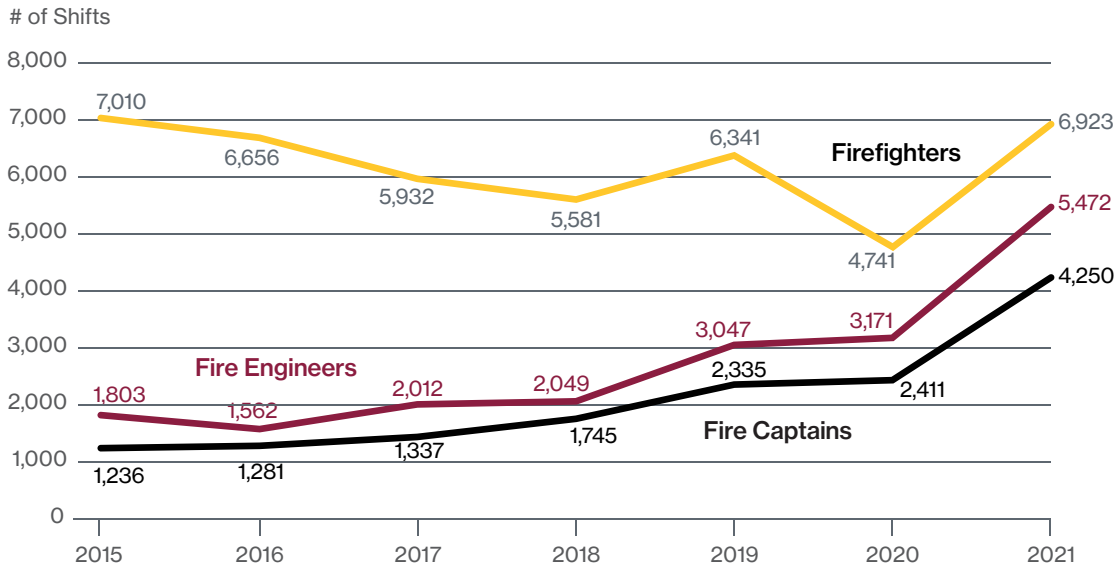
In 2021, there were a total of 16,545 full-time overtime shifts for firefighters, fire engineers, and fire captains. The largest number, 6,923 or 42%, of these shifts were for firefighters, while 5,472, or 33%, were fire engineers and 4,250, or 26%, were fire captains. A total of 442,125 overtime hours were worked by all three personnel categories in 2021; however, the research team could not disaggregate total hours of overtime by personnel category based on the dataset provided.

Increases in overtime

Between 2015 and 2021, the total number of full-time overtime shifts increased from 10,049 to 16,546. This represents an increase of nearly 65% over this period. While the number of full-time shifts decreased slightly for firefighters, from 7,010 to 6,923, there was a marked rise in the number of shifts for engineers and captains. The number of full-time shifts grew from 1,803 to 5,472 for engineers and from 1,236 to 4,250 for captains. These numbers imply a 1% reduction in full-time shifts for firefighters but a 203% increase among engineers and a 244% increase among captains.

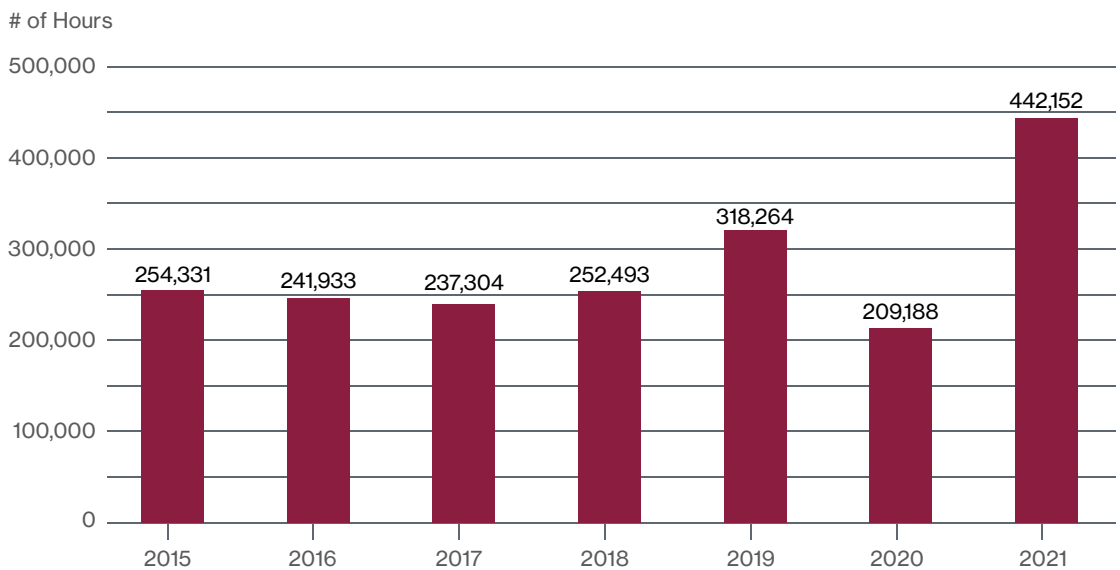
In addition to an increase in overtime shifts for certain personnel categories, the composition of overtime shifts also changed during the study period. In 2021, as previously mentioned, 42% of overtime shifts were firefighters, 33% were engineers, and 26% were captains. In 2015, however, 70% of overtime shifts were firefighters, 18% were engineers, and 12% were captains. This demonstrates that at the beginning of the analysis period, overtime shifts were primarily firefighters; however, at the end of the analysis period, relatively more shifts (as a share of the total) were engineers and captains. **Therefore, the change in overtime shifts has not been uniform across personnel categories, as engineers and captains have experienced the largest increases.**

Figure 7. Overtime Shifts by Personnel Category



The data also show a large increase in the total number of overtime hours (as opposed to shifts) during the 2015-2021 study period. In 2015, a total of 254,331 overtime hours were worked across firefighters, fire engineers, and fire captains. This total rose to 442,152 in 2021, showing a 74% rise in overtime hours over the study period. It is important to note, however, that the number of overtime hours actually decreased between 2015-2017 from 254,331 to 237,304. After that, however, overtime hours increased until 2020, where they once again dipped, then returned to increasing in 2021 (Table 4.) Thus, the increase in overtime hours has neither been persistent nor linear-instead, there are periods of declining overtime coupled with periods of growing overtime.

Figure 8. Total Overtime Hours by Year



Interview Study

Methods

Participants were recruited by convenience sampling through contacts at the Phoenix Fire Department. Phoenix Fire Department leadership sent invitations to participate by email to employees they identified as offering unique perspectives on increased call volume and response time. A follow-up email contact from a Morrison Institute researcher provided additional study details with an invitation to participate. A semi-structured interview protocol was used to collect data. The research team completed six interviews in total. All interviews were with employees classified as leadership; employee titles ranged from fire captain to deputy chief.

Interviews took place over Zoom and were recorded and transcribed. Transcriptions were then checked for accuracy via 10% sample. Analysis consisted of tagging interview segments in Excel and extracting high-level themes.

Key Findings

Factors that increased call volumes

The increase in number of calls for service and the impact of this increase on Department operations was a serious concern for every participant in the interview study. All participants concurred with the data cited above indicating that call volumes have increased substantially during the 2015-2022 period. They further shared their insight that this increase has continued, possibly at an even more accelerated pace, between the end of the quantitative study period (December 2022) and the present (August 2023.) Participants also observed that the bulk of the increase involved calls for emergency medical services rather than fire or rescue operations, and that current Phoenix Fire Department staffing and resources were insufficient to meet the need without serious strain on Department personnel.

Participants identified many possible causes for the rise in call volumes, especially during the 2020-2023 period during and immediately after the COVID-19 pandemic. These causes can be broadly categorized into three related areas: population growth; increases in specialty populations; and holistic response failure.

Population growth was the most straightforward cause for increased call volumes. The Phoenix metro area has seen enormous population growth in the past decade, with 4.2 million residents in 2012 rising to more than 5 million in 2022.² This trend continued through the pandemic with an influx of nearly 140,000 residents in 2021-2022, making Phoenix one of the fastest-growing urban areas in the country.³ A larger number of residents was intuitively understood to lead to a larger number of calls, particularly in service areas experiencing increases in residential urban density like central Phoenix.

Along with an increase in overall population, a larger number of individuals in specialty populations was also cited as a reason for rising call volumes. These specialty populations included people experiencing unsheltered homelessness, people with serious mental illness, and people using drugs. These specialty populations were both more likely to call on emergency medical services and more likely to call frequently, so any increase in the number of individuals in these populations would lead to increased call volumes. Participants suspected these populations were increasing both because of a rise in the number of residents in general and because of larger societal trends, such as higher rates of homelessness and substance use disorders during and after the COVID-19 pandemic.⁴

“ The only government agency that you can call that a human being will actually pick up and talk to you is 911. ”

Closely related to the increase in specialty populations was the concept of holistic response failure. Many participants expressed frustration with responding to calls that could not be appropriately resolved by emergency medical services. Participants felt that the Phoenix Fire Department was expected to provide short-term fixes for residents who had been neglected by other health and social service systems, such as behavioral health treatment or housing programs.

These systems, overwhelmed by rising demand, were seen as inaccessible and ineffective in meeting resident needs. When residents were either unable to enter these systems or exited them due to poor quality service, they then called 911 - the only system, several participants observed, where you were guaranteed both a human connection and a timely response. These calls often resulted in a mismatch between available service options (e.g., transport to an emergency room) and caller needs (e.g., assistance with long-term health issues). Furthermore, emergency rooms were described as chronically understaffed and with long wait times before patients could be remanded to staff. These compounding failures created a common experience for first responders: repeated transport of the same individual with complex health and social needs to the emergency room. Participants resented their inability to help and felt they were overloading already crowded hospital systems with unsuitable patients, placing callers in the incorrect-but only available-place to receive care.

“ The fact of the matter is though, that nobody used to quit. When you got this job, you had to fight hard to get it and you loved it and you were super appreciative to get it. And that’s not the case today. ”

Although not directly related to call volumes, every interview also included at least one mention of A.Z. House Bill 2431. The bill, which was signed into law by the governor in June 2022, restricts emergency medical care technicians (EMTs) from diagnosing someone who has called 911 or counseling them to decline emergency medical services.⁵ Participants summarized the bill as functionally preventing first responders from suggesting that some health issues (in one hypothetical example, a child's sprained wrist) might be better served through either non-ambulance transport to an emergency room or through a primary care provider. They reported feeling as though the bill turned emergency medical services into a glorified taxi service because they were no longer allowed to use their training to make informed judgments. Participants warned that, although the bill would not affect the total volume of calls, the number of calls for which transport was engaged had already increased significantly, and they expected this trend to continue. The bill meant that ambulances and their crews were more likely to be already in use for non-emergency incidents when called on for serious emergencies: a demoralizing experience for responders and a further demand on an emergency medical response system already strained to the breaking point.

Call volume and response times

Despite the documented increase in call volume, quantitative data analysis showed no significant changes in call response times over the study period. Participants' reactions to this finding were varied, with some participants expressing disbelief and others unsurprised by the lack of a relationship between call volume and response times. Many participants were pleased that the Department was keeping up with the rise in call volumes while also communicating concern that they were continuously expected to “do more with less.”

All participants were asked by the study team how they would explain a flat trend in response times even as call volume has increased. The most frequently identified factor for response time outcomes was the dedication of employees. A majority of participants made a point to stress the pride and personal investment of the first responders they supervise, emphasizing that their crews would “push it [themselves] until it breaks” to take responsibility for their first due areas

(i.e., the response areas assigned to that particular station.) In other words, response times were flat because of the willingness of Department employees to meet increasing demand, even if it meant sacrificing personal well-being or professional development opportunities.

All other cited reasons for response times remaining stable were considered secondary to the direct efforts of Department personnel. Some of these secondary reasons included: advances in technology such as improved GPS traffic navigation; moving to digital, cloud-based recordkeeping; and being more selective about which types of calls receive an emergency vs. non-emergency response. Additionally, one participant shared that their district had begun to pay increased attention to response time as a metric in 2019. They hypothesized that the elevation of response time as a success metric had trickled down to their stations' crews and incentivized the fastest possible response. If this prioritization was widespread, it may have been an additional factor in motivating personnel to meet the demand of increasing call volumes, even if it meant deprioritizing other needs such as training.

“ Every day we spend resources at a rate that we can't control... So I think that the call volume is going to continue to go up. I think the stress on firefighters will continue to go up. I think eventually the system is going to show signs of cracking because I can't every day show up and do more than I did the day before. ”

Impacts of increased call volume

Increased call volume was identified as a major source of stress for front-line employees. Participants cited the lack of time for meals, physical overwork, more frequent exposure to short- and long-term health hazards, and especially greater sleep deprivation as major contributors to poor mental and physical health. Employees were more likely to be injured on the job as call volumes rose; instances of prolonged medical leave were also more frequent, making staffing difficult.

Participants broadly agreed that the impacts of these stressors would be felt outside of the workplace environment by employees before they were noticeable in the fire station. Supervisors once again highlighted the dedication of their crews, stating that first responders bring their best efforts at all times because they believe their work takes precedence. However, participants shared that while this dedication may keep the Department operational even in times of extreme demand for service, it can have catastrophic consequences for Department employees in their personal lives. They worried about the impacts of continuous high call volumes on their crews outside of working hours, including the possibility of failing romantic relationships, lack of time for attending to children and family members, increased drug use and addiction, and an inability to cope with everyday responsibilities. It was understood that, by negatively impacting employees' personal lives through workplace stress, those negative impacts would eventually rebound into the stations themselves, making front-line employees less reliable and more likely to take prolonged leave or to exit the profession entirely.

Increased call volumes were also seen by participants to stymie employees' career trajectories. Opportunities for training were put on hold because high call volumes required fully staffed stations at all times. Current front-line employees did not pursue promotions because they did not want more responsibility in a system that was perceived as struggling to keep pace with demand for service. Rates of employee loss were seen as increasing alongside call volumes, either through quitting or through horizontal career movement to other departments in Arizona (as these departments offered comparable pay with a lower call volume). Personnel attrition then further exacerbated stress for remaining employees. Ultimately all of these factors contributed to a pervasive concern that high call volumes would lead not only to poor health and social outcomes for employees, but poor service provision to Fire Department end users as well.

Challenges and opportunities for improvement

When asked to characterize the current operational picture of the Phoenix Fire Department, the consensus among participants was that of an overworked and highly stressed emergency response system whose resources—both human and physical—have not been able to keep pace with a rapidly growing city and a changing social environment. Almost every interview mentioned that the Department was moving in the right direction or was addressing the majority of these stressors in a positive way, praising the Department’s efforts to bring on more employees, upgrade and increase equipment, and create new stations. These efforts, however, were not perceived as sufficient to keep pace with increasing call volumes.

When asked about barriers to the success of these efforts, many participants pointed to factors outside the Department’s control. COVID-19 supply chain delays and high demand caused long wait times for new equipment, even if funding was readily available to purchase it. The pace of new station construction, with the required zoning and permitting processes by the city as well as the length of time required to find suitable land for building, was seen as unable to keep up with explosive growth at the urban periphery (areas which had previously been sparsely populated). On a day-to-day operational level, short-staffed hospitals mean that emergency medical crews often had longer waits to drop off patients after ambulance transport, and emergency dispatchers were overworked, leading to delays in confirming scene details and response status.

Despite these challenges, participants also identified opportunities for improvement within the Department that, if pursued, could help buffer the impacts of increased call volume and other outside factors. Several participants shared their insight about the need to reconsider recruitment methods, stressing that the job qualities that attracted them 20 years ago are less relevant for individuals who may be considering a career in firefighting now and that the Department should update its recruitment methods, training, and job requirements to better reflect the needs of the current workforce.

“ The department has got to change at the speed of relevance. We’re not very good about that. I always like to say our process impedes progress and we just continue to do things in a slow methodical way. There’s some reason for it. But if we keep up at the same pace, we’re going to be in the same place in a year... We’ll be having the same conversations that we are today if we don’t figure out how to move a little bit faster and be a little more innovative and do things differently. ”

Participants also emphasized a need for more dialogue with elected leaders and city officials, stressing that most did not understand what a Fire Department looks like on an operational level or understand their unique needs as both a city Department and as employees. Greater communication with city officials and elected leaders, and especially greater communication about the current challenges faced by firefighters as they struggle to keep pace with call volumes, was seen as a way to have Department needs prioritized rather than buried under a pile of equally urgent issues. As one participant expressed, his colleagues were proud of their work and of being held to a rigorous standard of professionalism, viewing themselves as a dam holding back a flood of catastrophic outcomes for residents. But that pride was predicated on the understanding that “someone else is doing something on the other end to help to lower the water behind the dam for us.” This sentiment was echoed by other participants who acknowledged that ultimately it would take a combination of change and innovation at the Phoenix Fire Department and support from external systems to bring available resources in line with demand.

Endnotes

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