Increased Calls for Service-Affecting Service Levels, What Alternatives are Available for Wooster Fire?

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CERTIFICATION STATEMENT

I hereby certify that the following statements are true:

1. This paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

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ABSTRACT

The Wooster Division of Fire (WFD) has been formally providing emergency services to the City of Wooster since its establishment in 1888. Since that time, Wooster Fire has continued to absorb additional roles and responsibilities. In 1974, fire-based emergency medical services (EMS) were implemented in the City of Wooster. At that time, the Fire Division began transporting medically ill patients at the basic life support level; by 1997 the Division transitioned to include advanced life support service. Since the 1990s, no significant enhancements have occurred in the methods by which the Wooster Fire provides emergency services, yet the calls for service have increased by 113.4%. Recent utilization of a data-driven decision-making process has documented that rising calls for service have been negatively impacting Wooster Fire's response times and the desired level of service to the community.

The problem that this evaluative research study will address is that increased calls for service are impacting Wooster Fire's response times and its ability to serve the community. The purpose of this study is to evaluate Wooster Fire's growing call volume and explore ways to improve the level of service in an efficient and cost-effective manner.

The following questions will be answered by this evaluative research:

1. What are the call volume trends for Wooster Fire?
2. What are the population trends in the City of Wooster?
3. What are the call volumes of comparable cities?
4. What are alternative operational programs that could enhance the level of service and reduce call volumes for Wooster Fire?

The procedures utilized for this research project were a literature review; a review of call volume and response time data; an analysis of population data of the United States, Ohio, and Wooster; and, finally, an investigation of other types of alternative operational programs currently in use in the fire service to reduce response time and call volumes.

The results of the research show that Wooster is experiencing increased calls for service, which have led to increased response times. Conversely, Wooster is running fewer calls per staff than comparable cities. The implementation of alternative operational programs or projects could lead to opportunities to reduce response times, call volumes, and make Wooster Fire efficient.

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Statement of the Problem

Calls for service for Wooster Division of Fire have been increasing steadily for decades. Since 1990, the population of Wooster has increased by 14% (biggest us cities) and the fire department's call volume has increased by 113.4% (WFD, 2017). The steady increase in calls for service, while utilizing the same number of staff members is resulting in higher response times. This trend is directly impacting the level of service that meets the needs of the community and the level of service citizens have come to expect.

Wooster Fire strives to meet NFPA 1710: Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments standard (2016) and has documented in 2016 its own desired response time standards via policy #312. NFPA 1710 establishes objectives that state that turn out time should be within 80 seconds for fire and special operations response and 60 seconds for EMS response. Travel time for the first arriving fire suppression unit should be within 240 seconds for non-high rise incidents. Travel time for the full assignment at a fire suppression incident should be 480 seconds or less. Travel time for medical incidents with the capabilities of an automatic defibrillator or higher capabilities should be within 240 seconds or less. Wooster Fire's policy #312 states that turnout should be one and half minutes or less and travel time for first arriving fire and EMS units should be four minutes or less.

The division is currently working on completing a community risk assessment: standard of cover to formally document emergency incident baseline and benchmark standards. But during an interview with Chief Saley, he stated that the division has historically attempted to ensure emergency units arrive on scene (response time) within six minutes so that the department

can minimize the impact on cardiac arrest victims and fire growth. Although, a review of annual reports up to 2010 shows no documentation of response time analysis. In 2010, Chief R. Eyler documented response times for EMS alarms only. The 2010 year-end report documented 78.44% of EMS travel time (time of tone – time on-scene) was within 4 minutes. Data analysis for the 2016 annual report indicates that EMS travel times increased to 5 minutes and 25 seconds and Fire travel times increased to 9 minutes and 16 seconds. During the above six-year period; the data shows response times increased by approximately one and half minutes, during which the chances of survival of cardiac arrest by decrease 10% (AHA, 2014) and allows fires to develop more than double in its size (3D Fire, 2007). This increase shows a negative impact on stated service levels to the community and does not meet desired intent of the response standards according to Chief Saley.

If Wooster Fire desires to maintain an efficient and cost-effective service despite increasing call volumes resulting in higher response times, maintaing the status quo is not an option. *The problem that this evaluative research study will address is that increased calls for service are impacting Wooster Fire's response times and its ability to serve the community.*

Purpose of the Study

The purpose of this study is to evaluate Wooster Fire's growing call volume and explore ways to improve the level of service in an efficient and cost-effective manner.

Research Questions

The following questions will be answered by this evaluative research:

1. What are the call volume trends for Wooster Fire?
2. What are the population trends in the City of Wooster?

3. What are the call volumes of comparable cities?
4. What are alternative operational programs that could enhance the level of service and reduce call volumes for Wooster Fire?

BACKGROUND AND SIGNIFICANCE

The City of Wooster is a mature community in northeast Ohio with a population of 26,749 people, as of the 2015 census. The City contains approximately 11,000 dwelling units within 17.7 square miles, composed of mostly low-to-moderate income (LMI) households. As the county seat of Wayne County, the City of Wooster is the center of commerce, recreation, shopping, and dining for its mostly rural region. Due to an increase in commuter traffic, Wooster's daytime population increases by approximately 10,674 people daily (2015 census). In addition to a large residential area, Wooster also has a large industrial base, commercial district, and two higher education campuses. The two college campuses bring a diverse seasonal population into the city during the school year.

The City of Wooster, Division of Fire, was created in 1888 and has developed into the only career fire department in Wayne County, Ohio. The Division responds to over 4000 fire and EMS alarms each year with forty- five (45) career firefighters that are cross trained as paramedics and one (1) civilian office coordinator. The Division operates out of three (3) fire stations, covering all requests for service inside the corporation limits and adjoining contractual areas of a surrounding Township. All stations are staffed twenty-four (24) hours a day, three hundred and sixty-five (365) days a year with a minimum staff of 10 firefighters and fire officers. The fire division strives to maintain one hundred (100%) percent advanced life support (paramedic) operations, while striving to meeting the National Fire Protection Association (NFPA) 1710: Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments standard (2016) and Divisional response time standards. This target goal is being worked towards by cross-staffing fire and EMS units with a minimum staffing level of three (3) personnel at each

station and utilizing off-duty staff when simultaneous calls for service occur (personal interview, Saley).

The staffing levels within the Fire Division had remained stagnant since 1990 when the City added six firefighter-EMT's to operate an ambulance out of fire station #2. Since that time the population of Wooster has increased by 14% (biggest us cities) and the Fire Division's call volume has increased by 113.4% (WFD, 2017) (Appendix 3).

Many fire departments look to mutual aid assistance when trying to balance increased service demands. Unfortunately, the majority of our Wayne County fire departments utilize volunteers or a minimal complement of full-time and part-time staff to handle their emergency response needs. Any additional emergency responses into the City of Wooster by these agencies place additional strain on the already limited personnel these departments have available. Response times are further increased because volunteers are responding from home. Additionally, mutual aid is intended to be reciprocal. As Wooster's call volume increases, so does the risk of not being able to help other communities when they need mutual aid assistance.

In today's era, fire departments are tasked with responsibilities far beyond general fire suppression activities. Expectations have evolved from the community's desire to have someone to come to their assistance when called to much more. The fire service has historically taken on additional roles and responsibilities and it makes sense as there is already a cache of employees that can be trained to respond to and mitigate as many types of emergencies as possible (Hart). This is true in Wooster, as it is all over the nation. Wooster Fire's original mission statement was "save lives and fight fire" when the fire department's primary role was fire suppression and code enforcement. In today's era, Wooster Fire responded to 62 different incident types, along with

emergency medical response. These additional incident types and responsibilities have a direct correlation to the increased calls for service that is being experienced by Wooster Fire.

Wooster Fire strives to meet NFPA 1710: Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments standard (2016) and has documented in 2016 its own desired response time standards via policy #312. NFPA 1710 establishes objectives that state that turn out time should be within 80 seconds for fire and special operations response and 60 seconds for EMS response. Travel time for the first arriving fire suppression unit should be within 240 seconds for non-high rise incidents. Travel time for the full assignment at a fire suppression incident should be 480 seconds or less. Travel time for medical incidents with the capabilities of an automatic defibrillator or higher capabilities should be within 240 seconds or less. Wooster Fire's policy #312, states that turnout should be one and half minutes or less and travel time for first arriving fire and EMS units should be four minutes or less.

A review of annual reports up to 2010 shows no documentation of response time analysis. In 2010, Chief Eyler documented response times in the year-end report for EMS alarms only. The 2010 annual report documented 78.44% of EMS travel time (time of tone – time on-scene) was within 4 minutes. In 2016, data for the annual report indicated the EMS travel time increased to five (5) minutes and 25 seconds and Fire travel time increased to nine (9) minutes and 16 seconds. Research by the American Heart Association (AHA) shows that cardiac arrest survival rates decrease by 7% - 10% for each minute that CPR and medical interventions are not performed (2014). Underwriters Laboratory (UL) indicates that the development of fire to the flashover stage has been reduced to five minutes, from 30 minute,s due to modern furnishings in residential homes (Kerber, 2014). The research by AHA and UL shows the impact that response

times have on services levels. The minute and a half increase between 2010 and 2016 indicates a potential increase in property loss and reduced positive outcomes for cardiac patients. A review of the data in year-end reports from 2010-2016 show a correlation between increase call volumes (10%) and increase response times (1.5 minutes). An additional factor that was documented in the 2016 annual report was the impact that concurrent calls for service have on the fire division. Chief Saley, the author of the report, stated that "27% of the time, 60-100% of our available workforce is committed to an emergency call and are unavailable to respond to another emergency request. This situation results in increased response times, reliance on mutual aid from surrounding volunteer fire departments, and minimizes our ability to protect critical infrastructures" (2017). Due to the lack of response time data included in annual reports and limited use of sophisticated analytic software in the past, the response times documented in 2010 will be the baseline that any further research will be built upon.

As call volumes increase, the availability of staff members for non-emergency functions like public relations and training also decreases. In 2015, the fire administrations issued inter-departmental communication that directed the fire division to only schedule and attend public relations events that have a public safety theme and limits the timeframe for participation to an hour. This was a change from past practice of attending any public relations event that was requested. Chief Saley stated that stipulations on attendance to public relations events was a direct result of not having the needed emergency response units in-service, which has led to increased response times (personal interview). The fire administration also changed past practices on how training was conducted to ensure availability of emergency response units. In the past, all crews would relocate to one station for training. This method of training often led to crews being called back to their respective response district, increasing response times and

caused many staff members to miss portions of the scheduled training. The current practice for scheduled training provided flexibility by directing stations and crews to cover each other's response district (unless a critical alarm occurs), so that training can be completed without interruption. Additionally, the Division has developed contractual agreements with a neighboring department to cover multi-company training events. This training agreement is in-lieu of monetary payments for providing emergency services to a portion of their fire district. The division has looked at alternative options to maintain non-emergency functions, but none have found to be operationally feasible.

If Wooster Fire desires to maintain an efficient service, the status quo is not a feasible option. The Fire Division must look for alternative ways to enhance operations while balancing costs and service levels for the citizens of Wooster. As this quandary is explored, the Fire Division needs to evaluate the current processes, demographic trends, call volume trends and evaluate if there are any programs that are a viable solution.

LITERATURE REVIEW

As an organization whose primary role is to serve the public, any changes or trends in a community's population and demographics will have a direct impact on the fire services ability to serve their communities. The general population of the United States of America grew by 7.4 million people or 2.4% since the 2010 census. In comparison, the State of Ohio's population growth has been flat at 0.3% (Exner). There are only five other states with lower population growth rates or states that have lost population. On the other hand, California and Texas experienced significant growth. Texas had a rapid increase in population growth of the past three years that equals the existing population of Cuyahoga County, Ohio, who is home to the City of

Cleveland (Exner). The City of Wooster has experienced steady growth in its population over the years. Sperlings Best places, a website that publishes population trends, stated that Wooster had a 5% increase in population from 2000 to 2010 and a 2.5% increase from 2010 to 2016 (2016). In 2016 Wooster had 10,639 households, with a population density of 1,639 people per square mile.

Based on the population trends in the US, Ohio, and Wooster, fire departments should examine specific demographics changes to see if there is potential for any impacts, either positive or negative. Ohio has witnessed growth in international populations, with 50,000 people moving to Ohio from foreign lands (Exner). The immigration population growth will be a driving factor in the developed world and will impact the make-up of future society. If the offspring of these original immigrants are considered, the growth of this demographic may increase up to 50 to 60 percent. All of these factors will affect call volumes, how we interact with the public and the cultural challenges to fire safety (Comeau). Generational demographic changes are an additional factor that needs to be considered by fire departments from a human resource and service perspective. As of 2016, the millennial generation (ages 18 to 35 years old) is the largest living generation in the Unities States with 79.8 million people. This generation is more likely to be living with their parents, which may reduce the number of households that fire departments are responsible for serving. The baby boomer generation follows millenials with 74.1 million people (Cilluffo & Cohn). The State of Aging & Health in America (2013) is a white paper by the Center for Disease Control that reviewed significant health concerns for America's aging population stated that a large amount of the aging population would be entering an age range that will require additional medical care in the future. By 2030, due primarily to the baby boomer generation, the number of Americans 65 years or older will reach 20% of the

population at 72 million Americans. As the United States population's life expectancy continues to increase, the number of Americans65 years or older is expected to rise to 89 million Americans by 2050. The author indicated that these trends would have a serious impact on the healthcare system across the country. With approximately 1 in 5 Americans falling into a demographic that will need additional emergency services, the author indicated that there would need to be a significant modification to the pre-hospital medical care system to cope with the increase in calls for service.

The United States Census issued a report in 2014 analyzing the effects of the baby boomers on the U.S. population. The Baby Boom Cohort in the United States: 2012 to 2060 discusses the changes we should expect to see in our aging population. This report provided similar demographic information that was in The State of Aging & Health in America (2013) white paper by the Center for Disease Control. The report stated the nation's first baby boomer reached the age of 65 in 2011, and by 2029 all baby boomers will be 65 or older. With mortality taken into account, the baby boomer generation will make up 20% of the U.S. population or one in five Americans will be a baby boomer by 2029. The intent of the report was not focused on emergency services but rather focused on changes to the demographics of this population group. Demographic changes included in this report indicates that the baby boomer generation is comprised primarily of white, non-Hispanic Americans. As this population dies, the percentage of diversity in the US population will also change. The United States will see a swing away from a predominately white, non-Hispanic nation, to a nation that more evenly distributed among all demographic groups.

Population and societal changes go hand and hand with fire department call volumes. The National Fire Protection Association (NFPA) documented that fire department incidents reported

to the national fire incident reporting system increase 218.4% from 1990 to 2015. In the most recent three year period (2013-2015), NFPA documented a 6% increase in call volume (2017). The Toledo Fire and Rescue Department (TFRD), Ohio is feeling the effects of the increased call volume trends. In 2017, TFRD exceeded 60,000 calls for service for the first time. Of the 60,662 calls, 89% were EMS calls and 11% were fire (non-EMS) calls. Comparing the rising call volume to the early 1990s, the TFRD has witnessed a 114.3% increase in calls. The majority of the increased calls have been EMS related, as the 2009 EMS calls were 26% less than 2017 (Dunn). TFRD believes that the EMS system is stressed and that there are several driving factors for the increased utilization of the system. Some of these factors include a lack of healthcare, cost of medical care, availability of medication, lack of medical providers, and the current opioid epidemic. TFRD's staff stated that they are exhausted after leaving their 24-hour shift and that the next day off is unproductive. This demonstrates that staff are in need of additional rest to recover from the effects of the activities of the previous work shift. The increased calls for service have the TFRD looking into other alternative programs like community paramedicine, so they can rapidly respond to more critical calls more effectively (Duun, 2018). A report produced by the Federal Emergency Management Agency (FEMA) documents that EMS and Rescue calls are the largest category of incident call types that fire departments respond to. FEMA documented that 64.1% of the overall runs were EMS and Rescue, followed by good intent calls at 10.5%, false alarms at 8.7%, service calls at 7.1%, fire calls at 4.7%, and severe weather calls at 0.1% (FEMA, 2017).

The trend in call volume increases, with the highest percentage of those increases falling in the EMS incident call type, will require fire departments to evaluate how they operate in the future. This issue is also affecting police departments. The opioid epidemic alone has resulted in

a significant increase in calls and workload for our public safety partners, also requiring them to rethink how they operate. The Center for Disease Control and Prevention documented that more than 33,000 people had died from opiate overdoses in 2015 in America. This death rate now exceeds the number of people killed in car accidents and deaths from gun homicides (Zezima, 2017). Due to the increase in overdose calls, police officers are becoming counselors, doctors, and social workers out of necessity. The traditional punitive tactics are no longer working and many police officers are required to educate and work with the victim's or drug user's issues for a successful outcome (Zezima). Many departments are implementing alternatives tasks forces to combat the rising opiod problem. In Ross County, Ohio, police officers are part of the Ross County Post Overdose Response Team. This team makes visits to the home of a person that has overdosed and will provide them education, outreach support, and interventions (Zezima). Our brothers in blue understand that this is only one piece of the puzzle but is an alternative concept to help control this explosive service demand.

Similar alternative concepts are being implemented and researched by the fire service as well. Fire Chief Houk of Jefferson Township, Ohio conducted an in-depth research study of the feasibility of a Mobile Integrated Healthcare program in his community. The American Academy Of Orthopedic Surgeons (2018) Community Health Paramedicine training manual defines mobile integrated health care as, a system for providing services with a range of allied health care professionals, including but not limited to community paramedics. The community paramedic works with the patient to manage the health to control disease processes. The community paramedic can ensure the patient is taking medicines properly, eating regular meals, attending scheduled doctor examinations, perform safety checks of the patient's residence, and many more supportive functions. The mobile integrated healthcare provider can identify and help

the patient receive support from other community health organization when appropriate, thereby reducing the impact on the healthcare system (2018). Chief Houk's study investigated this type of alternative program for its viability as a cost-effective option for his fire department (2016). In his research, Chief Houk indicated that a limitation he encountered was the ability to locate enough data from fire departments that are currently utilizing Mobile Integrated Healthcare in his region to substantiate his research (2016). To locate sufficient data, Houk was forced to expand his scope of study into larger urban organizations. After much effort and research, Houk identified areas in which community paramedicine can be a useful tool for fire-based EMS organizations. Houk documented that readmission to the healthcare system and the increased number of none life-threatening illnesses that are being transported to the emergency department for lack of other options put an operational and financial drain on the EMS system (2016). Another medical issue identified as a problem is the lack of chronic disease control. In this situation, patients are unsure or unable to manage their own healthcare needs, and they are unaware of alternative social services in the community that could help them take better care of themselves. A general summary of the research indicated that it is usually not the specific medical illness that is the problem but rather the lack of understanding of how these patients can take care of themselves to stay healthy. Mobile integrated healthcare is an alternative concept to enhance service or reduce calls volumes to these types of patients (2016).

In a publication from the Ohio Fire Chief's Association, Assistant Chief Christopher Menapace discussed parameters for the implementation of Mobile Integrated Healthcare (MIH). Chief Menapace confers the pitfalls associated with the MIH implementation. In an article from In Command, (April/May/June 2016) titled Mobile Integrated Healthcare: How Do We Implement It? Assistant Chief Menapace forwards his findings of a conversation with Deanna

Harris, Chair of the Emergency Medical Fire and Transportation Services Board, better known as the State EMS Board. The conversation advises fire departments that want to start an MIH program to involve their law departments and medical directors. The article indicates that caution should be taken since members practicing in nonemergency situations are not covered by immunity established ORC 4765.49. In 2016, Deanna Harris and the EMS Board produced a compendium of resources for mobile integrated healthcare. This document provided multiple research papers, training, and tools throughout the region and nation. One specific section of interest for fire departments was the Ohio Revised Code 4765.361, the law on the performance of services in nonemergency situations. This law took effect on September 29, 2015, and states, "An emergency medical technician-basic, emergency medical technician-intermediate, or emergency technician-paramedic may perform medical services that the technician is authorized by law to perform in nonemergency situations if the services are performed under the direction of the technician's medical director or cooperating physician advisory board. In nonemergency situations, no medical director or cooperating physician board shall delegate, instruct or otherwise authorize a technician to perform any medical service that the technician is not authorized by law to perform"(2016). This document provides fire departments interested in the MIH concept a starting point and some suggestions to help develop a program that best suits each community's unique needs.

MedStar Mobile Healthcare is the trade name for the Metropolitan Area EMS Authority (MAEMSA). The MAEMSA is a governmental administrative agency established through the adoption of a uniform EMS ordinance and interlocal agreement in Texas and is one of the largest provides for Mobile Integrated Healthcare in the Fort Worth TX area, providing coverage to nearly one million people. MedStar Mobile Healthcare is considered one of the leaders in the

field of Mobile Integrated Healthcare and authored a book that takes a serious look at the health care system across the United States and compared it to ways that healthcare systems are deployed across the globe. The author looked at why the United States pays substantially more for healthcare per citizen than most other developed countries. In this comparison, it is found that the U.S.'s mortality rates are much higher than the same comparable nations, with increasingly lower standards of living (2016). MedStar outlined how healthcare systems outside the United States focus on fixing medical problems in the most efficient method. Meanwhile, the United States system is focused on high dollar testing, masking the symptoms, and not modifying the underlying behavior causing the issue (2016). The author documented the evaluation of paramedics who visited high-risk patients and help them to manage their disease processes. The services the paramedic provided focused on educating the patient with a better understanding of how to take better care of themselves to reduce readmissions. The author indicated that such services had been shown to be a more cost-effective option than constant readmissions to the emergency departments. These services, very often are paid for by the attending hospitals to avoid the penalties associated with readmission within 30 days of discharge.

Ohio Fire & Rescue Officer Development Conference (2017) "Building an MIH – Community Paramedic Program" is a holistic approach to Mobile Integrated Healthcare. Dan Swayze Ph.D., MBA, MEMS, is the Vice President and Chief Operating Officer of the Center for Emergency Medicine of Western Pennsylvania and is widely considered one of the community paramedicines foremost experts. During Swayze's one day seminar instructed on starting from day one through the training and reimbursement opportunities in your community. This workshop gives recommendations for the startup of an MIH program for the use of manning. Do we use existing members and train them to perform community paramedicine in

between emergency calls or hire dedicated personnel? Training requirements can be expansive and expensive and must be considered into the cost of the MIH program. Considering program reimbursements for service are extremely important to continue a successful program. Knowing how service will be funded is an important step that must be assessed as well. Individual Subscription, Healthcare Facility Subscriptions, Insurance Company Subscriptions or Division Funded must be evaluated to acquire an efficient and sustainable funding source. The seminar opened many new directions for implementing MIH that were not identified previously in other documents.

Utilizing alternative operational programs or response procedures is another method that public safety organizations have used to combat rising call volumes. Rockford, Illinois, Fire Department began investigating utilizing SUVs to respond to EMS alarms, instead of fire apparatus. This concept came out of necessity, as it's fire department fleet of emergency vehicles was barely able to stay in-service. The fire department had to find a way to continue to respond to calls with the resources they had available (Curry, 2011). The author stated that the fire department does not have enough ambulances to respond to all of the medical calls for service. So fire engines respond to provide initial care and then an ambulance will arrive, when available, to transport the patient. The use of SUVs will reduce the wear and tear on the fire apparatus, keep the fire engine in-service and will utilize half the number of firefighters that are deployed on an engine (Curry).

In a personal interview with Battalion Chief Chris Healy of Phoenix, Arizona, Fire Department (PFD) at the Firefighter Physiological Monitoring Technology Summit in Washington D.C. (March 28-30, 2018), the use of low acuity (LA) medics as an alternative program has enhanced the level of service for their EMS operations. Chief Healy indicated that

this concept has been very successful for PFD. The program utilizes low acuity medic units that are staffed during peak hours to handle calls for service that don't meet the predetermined threshold for an advanced life support unit. The LA medic unit utilizes two staff members, instead of a traditional three crew member ALS medic unit. The implementation of this concept has allowed ALS medic units to remain in service to respond to the more critical calls, reduced response times and reduced call stacking.

Another alternative method to reduce response times is the use of technology for behind the scenes functions. The focus on reducing total response times starts at the dispatch center level. Specific aspects of the dispatching process include evaluating the call processing methods, technology to help the dispatcher send the right type and number of emergency vehicles and reaction times of the firefighters (Rhoades, 2012). To help reduce dispatch times, dispatch centers can use computer-aided dispatch, response interrogation software, and pre-announcement technology to help streamline the time of call, to time of dispatch portion of total response times. In an attempt to reduce turnout time, a simple clock on the wall that counts down the seconds to the desired goal can be used to improve performance. The use of mobile data terminals in the apparatus can help reduce travel time with mapping, preloaded preplans and also free up radio airwaves with the use of silent dispatching. These alternative concepts are available but should only be utilized if they improve and simplify operations, not make them harder (Rhoades).

The transition from the traditional fire prevention division to a community risk reduction division is another way fire departments are reducing call volumes and enhancing the level of service to the community. The process starts by conducting a risk assessment of the community and then examining the incident data to determine call volume trends (Crawford, 2014). This information can then be used to modify the emergency response deployment models, encourage

engineering solutions to prevent incidents from happening, educate people on how to prevent and minimize the effects of emergency incidents and implement needed code enforcement policies. These concepts allow the end user to use data to apply a multifaceted system to enhance emergency response and reduce call volumes (Crawford). NFPA documented that the increase in commercial and residential fire and smoke alarm system over the past 20 years has resulted in increased call volumes for fire departments. In 2009 fire departments responded to 2.1 million false alarms, 45% of them were unintentional and 32% were from system malfunctions. NFPA indicated that the fire service could reduce these unwanted fire alarms and provided a guide to do so. The guide includes educating firefighters about the different types of fire alarm technology in use today. The guideline also spells out the need for additional notification and reporting of system issues to the authority having jurisdiction and finally a summary of common causes and solutions to unwanted fire alarm activations. NFPA indicates that these concepts could be a way to combat the increased call volume from false alarms (NFPA, 2018).

Increased calls for service are a growing concern for many public safety organizations. These increased service demands are related to a variety of factors, including population trends, cultural changes, the growth of business and industry, as well as societal factors like the medical needs of the baby boomer generation and the opioid epidemic. As every public safety organization is different, so is the manner in which the effects of these trends could be addressed. Fire departments have utilized numerous alternative options to address their particular situation and, in doing so, they give other organizations ideas to help identify and implement a solution for common problems.

PROCEDURES

The evaluative research study examined relevant data to give depth to the study and answer the associated research questions. The areas examined include incident call data for Wooster Fire, population trends for the City of Wooster, call volume and staffing of comparable cities and alternative operational programs that can enhance service levels and or reduce call volumes.

The initial step of the evaluative research study was to locate a baseline, so that data could be compared to consistently and to provide validity to the process. Completed run analysis of the Wooster Division of Fire's total calls for service started at the macro level and worked down to the micro level for the period 1990 to 2017. The initial step was to evaluate the total call volume. Then break the data down by EMS and Fire (non-EMS) call types (Appendix 3). The final examination was to break down the call type data into subtypes that included specific occupancy types, population types and mutual aid incident requests to identify trends.

Additional examinations include the evaluation of the population trends of the City of Wooster. This evaluation included an analysis of previous and current census data. An assessment of call volume and staffing levels of comparable cities was conducted by Chief Saley (WFD) for benchmarking in the creation of the Center for Public Safety Excellence Accreditation process. Chief Saley gathered response data, operational statistics and municipal demographics from annual reports and phone interviews of twenty cities that are comparable to Wooster's demographics and economic drivers. This data allowed for the comparison of similar cities and operations to evaluate the effectiveness of Wooster Fire's operation. Lastly, an evaluation was conducted on what types of alternative operational programs are available to Wooster Fire and if they would be feasible options to reduce call volumes, reduce response times or increase service levels.

Definition of Terms

Advanced Life Support – A set of life-saving protocols and skills that utilize the scope of service of a paramedic.

Calls for Service – an assignment that is typically given to public safety professionals that require their presence to resolve, correct or assist a particular situation.

CP. Community Paramedic - a licensed or certified paramedic who has additional training in physiology, disease processes, injury and illness prevention and medical system navigation.

Community Risk Reduction - defined as programs, actions, and services used by a community, which prevent or mitigate the loss of life, property and resources associated with life safety, fire and other disasters within a community. It's the all-hazards solution to the all-hazards response that the modern fire service needs.

MIH. Mobile Integrated Healthcare - the provision of healthcare using patient-centered, mobile resources in the out-of-hospital environment.

PPACA. Patient Protection and Affordable Care Act commonly called the Affordable Care Act (ACA) or colloquially "Obamacare", is a United States federal statute signed into law by President Barack Obama on March 23, 2010.

Response Times - The time interval from the receipt of the alarm at the primary PSAP to when the first emergency response unit is initiating an action or intervening to control the incident.

Time of Call - The point of receipt of the emergency alarm at the public safety answering point

Time of Tone - The point of receipt of the emergency alarm at the public safety answering point to the point where sufficient information is known to the dispatcher and applicable units are notified of the emergency.

Travel Time - The time interval that begins when a unit is en route to the emergency incident and ends when the unit arrives at the scene.

Limitations of the Study

A limitation of this investigative research study is the lack of available response time data. An evaluation of Wooster Fire's annual reports provided significant data on call volume, types of calls, and the break down of fire loss but did not provide specific response time information. Additionally, the manner in which data was collected and interrupted by the Wooster fire Chiefs is unknown. An example of this limitation is response time standards. Data from old annual reports utilized travel times but used the verbiage of response times in the reports. The lack of a commonly defined travel and response time standards may alter the consistency of the data and could create discrepancies in the results of the study.

RESULTS

A comprehensive evaluation of the Wooster Fire Department was conducted to evaluate the overall operation of the organization and it calls for service. This study examined how increased calls for service were affecting WFD's ability to respond to incidents and what options are available to enhance operations in the future. Alternatively, what operational programs or processes would be available to minimize the effects of the rising call volume and allow WFD to provide a cost-effective and efficient service to its community?

Research Question 1: What are the call volume trends for Wooster Fire?

The Wooster Division of Fire has experienced a call volume increase of 113.4% (WFD, 2017) since 1990. This growth has been a slow and methodical increase with no real outliers in those years to increase these numbers dramatically. A review of this trend indicates a steady increase of approximately 4.4% to 4.9% calls for service on average annually. A detailed examination of recent demographic and call volume trends indicate that the Wooster Fire has experienced 4.5% increase in total call volume over the past three years. EMS calls for service has increased by 5.6%, and the fire (non-EMS) calls for service has increased by 7.5% over the same period (WFD 2017). The adult (> 18 years old) population of Wooster is 79.6 % of the total population and children (< 18 years old) represent 20.4% of Wooster's total population. Of the adult population, 13.3% of the adult population falls into the baby boomer generation (US Census, 2015). In contrast, the fire division's EMS calls for service for the baby boomer population is 73% of the EMS call volume (WFD, 2017). Wooster's adult (non-baby boomer) population is responsible for 19.5% of the EMS call volume and Wooster's child (< 18 years old) population represents 7.5% of the total calls for EMS service. An examination of the fire (non-EMS) calls for service, show a 110.7% increase since 1990. Over the past three years, the fire

calls (non-EMS) for service have increased by 7.5%, yet trends do not show a direct upward increase, but rather a gradual increase with peaks and valleys.

Research Question 2: What are the population trends in the City of Wooster?

The City of Wooster has experienced steady growth in its population over the years, with the previous decade averaging less than 5% growth annually. The current population of Wooster is 27,023 (Appendix 1- 2016). The population under 18 years of age is 20.4%, the population 65 years and over is 16.6% of the total population residing in the City (Appendix 1). The median age of a citizen in Wooster is 37 years old. The population by race indicates 91% is White, 3% is Black or African American, 2% is two or more races, 2% is Hispanic or Latino, 1% is Asian, and below 1% identify as another race (Appendix 4). Examining future trends, the population of Wooster that will enter the 65 and older age group should see an increase of 6.2% of the population, totaling 22.8% of the population within ten years (Appendix 3). Utilizing current population data, age brackets and estimated life expectancy averages, the population that will be 65 years or older would increase to 25.73% (best places.net).

Research Question 3: What are the call volumes of comparable cities?

An evaluation of 20 cities that have similar demographics and economic drivers was conducted to compare call volumes and staffing (Appendix 2). The selected cities have a similar population of Wooster (+ or – 10,000 people), is in a rural or suburban county and is either the county seat or has a college/university in its response district.

In 2016, Wooster Fire responded to 4,041 calls for service. The average calls for service for comparable cities in 2016 were 4,398.6 calls per year, the lowest being 2,498 calls and the

highest being 10,562 calls for service. The ability to respond to emergency calls requires staffing, so staff levels were evaluated as well. In 2016, Wooster Fire had 45 staff members. Of the comparable cities, the average staffing level was 42 members; the lowest was 21 and the highest was 92 staff members. Evaluating the number of calls that each staff member runs shows that Wooster Fire runs 89.9 calls per each staff member annually, while the average calls per staff member are 102.2 annually for the comparable cities. Breaking these components down separately shows that Wooster Fire runs 8.2% fewer calls and it has 7% more staff than the comparable cities. On a call per staff basis, Wooster Fire's staff members respond to 12.2 fewer calls per year, than the comparable cities (Appendix 2).

Research Question 4: What are alternative operational programs that could enhance the level of service and reduce call volumes for Wooster Fire?

The use of advanced technology in the dispatch center is an option to reduce response times, with the ability to get crews en route and on the scene more efficiently and effectively. The use of computer-aided dispatching (CAD) allows the dispatcher to alert the closest and most appropriate emergency services unit(s) of the call for service. The use of automatic vehicle location devices has allowed the Cincinnati, Ohio, Fire Department to get units to an emergency faster and to keep better accountability of their available units (Harper, 2017). One of the most overlooked aspects of response times is the time it takes to get firefighters out the door to respond to the call for service. The use of countdown clocks that are connected to the CAD system can be placed in the stations to promote faster turn out times amongst personnel and ensure that all staff members are meeting NFPA 1710's turn out time standard of 80 seconds of fire incidents and 60 seconds for EMS incidents (Rhoades, 2012 & NFPA, 2016).

The use of non-traditional response vehicles, such as SUV's or hybrid fire trucks used to respond to emergency incidents is another concept to enhance levels of service and reduce response times. Rockford, Illinois, Fire Department began utilizing SUV's to respond to EMS alarms, instead of fire apparatus. This alternative concept allowed SUV to rapidly respond to medical calls when all of the other EMS units were unavailable. This program reduced response times and allowed the fire department to provide care to the patient quicker than waiting for the next ambulance to become available (Curry, 2011). In Greenville, North Carolina, the fire department utilized a hybrid fire engine to respond to emergencies. This unit is a full fire engine with an EMS patient compartment/module behind the front seats so that paramedics can treat a single patient. This concept had reduced response times and provided a high level of cost-benefit to the department (EMS1, 2017). Chief Healy of Phoenix Fire stated that the use of low acuity (LA) medics as an alternative program has enhanced the level of service for their EMS and has been successful. Other options for alternative EMS vehicles are ALS fire engines, engines that respond to EMS incidents to stop the clock and render medical care while waiting for the ambulance crew to arrive. The rescue squad is similar to the ALS engine but is a smaller truck with less equipment and staffing but provided the same service. Multiple role ambulances are similar to the hybrid fire engine concept but are more of a full-service ambulance that has a small PTO pump and water tank to extinguish small fires (Sachs. G. 1998

A current operational program that is showing promise in reducing calls for service among the nation's elderly population (Baby Boomers) is mobile integrated healthcare (MIH). Mobile Integrated Healthcare (MIH) brings education and care directly to the patient in their home. This concept addresses the needs of citizens with chronic medical conditions by helping the patient understand their disease process and providing them with tools to manage this process

on their own and, therefore, reduces the dependency on the EMS system. The implementation of a Community Paramedic (CP) can also help reduce call volumes and enhance service to the patient by having a paramedic monitor the patient's progress and forward reports to their primary care physician to ensure treatment is proceeding as expected.

Community risk reduction is another operational program which, when implemented, has shown the ability to keep communities safe and reduce unintentional calls for service. The transition from the traditional fire prevention division to a community risk reduction division is another way fire departments are reducing call volumes and enhancing the level of service to the community. This information can then be used to modify the emergency response deployment models, encourage engineering solutions to prevent incidents from happening, educate people on how to prevent and minimize the effects of emergency incidents and implement needed code enforcement policies. These concepts allow the end user to use data to implement a multifaceted system to enhance emergency response and reduce call volumes (Crawford).

DISCUSSION

The research data has shown that the trend of increased calls for service is an issue that is affecting fire departments across the United States. The National Fire Protection Association (NFPA) documented that fire department calls for service has increased by 218.4% from 1990 to 2015 (2017). The Toledo Fire and Rescue Department (TFRD), Ohio documented rising call volume by 114.3% since the early 1990's (Dunn, 2018). The research data results indicated the same trend in Wooster. Wooster Fire has had a 113.4% increase in calls for service since 1990, with approximately 88% of the total calls resulting from medical emergencies. Of those EMS calls, the results document that the largest utilizer of the EMS system is the aging baby boomer

population. This population consists of 13.3% of the total population but is 73% of the EMS call volume. This essential data shows that a small identifiable portion of the total population is the most significant utilizer of Wooster fire's services.

The population growth of Wooster has witnessed steady growth at just under 5% over the past decade. The growth of Wooster is slightly higher than the national average of 2.4 % and higher than the State of Ohio's average of 0.3% (Exner). A stark difference in the population trends is that the State of Ohio has witnessed an increase in immigration populations (Exner), while Wooster's demographics indicate it only has a 9% minority population. Based on the population trend results and research by The Centers for Disease Control, Wooster should anticipate a sharp growth in the population that falls into the sixty or older demographic. The Centers for Disease Control (CDC) published The State of Aging & Health in America (2013) white paper to spotlight these trends. In this study, the CDC looked at a large number of people that are coming to an age that they will rely on emergency medical services more frequently. The CDC states "In 2030, when the last Baby Boomer turns 65, the demographic landscape of our nation will have changed significantly." In the year 2030, the US population will see the segment of people over 65 years old double from what the current numbers, rising to an estimated seventy-two million people. At that time this segment of the US population will account for one out of every five people in the country. When these numbers are evaluated against the City of Wooster, Wooster becomes a microcosm of the entire nation mirroring those demographics. If the trends develop as experts are indicating, Wooster Fire should see approximately one thousand calls for service growth between now and 2030. This forecast of increased calls will elevate Wooster Fire's call volume by approximately 2.5 per day. This increase in calls is substantial but not insurmountable for the Fire Division.

The research completed on comparable cities call volumes, and staffing levels provide a baseline for the comparison of the service demands of similar organizations. As the results of the call volume trends of Wooster research question show, Wooster has witnessed an increase in calls for service, although, this trend is not specific to Wooster. The results of comparable cities run volume show that many other cities are experiencing a high number of calls for service. As with any service delivery provider, as demand increases so does the need to add staffing to cover those rising demands. The results show that Wooster Fire runs 8.2% fewer calls and it has 7% more staff than the comparable cities. On a call per staff basis, Wooster Fire's staff members respond to 12.2 fewer calls per year, than the comparable cities (Appendix 2). Based on this information, Wooster Fire can absorb additional calls for service, with its current staffing levels.

The results of the evaluation of alternative operational programs that could reduce call volume or increase services varied widely in its specific implementation, but many had similar themes. The utilization of dual-purpose response vehicles was a common concept that had been used to address increased calls or enhance services. Rockford, IL. Fire Department used SUV's to respond to EMS calls instead of fire apparatus (Curry, 2011). While Greenville, North Carolina, modified a fire engine to have the capabilities to treat and transport medically ill patients (EMS1, 2017). Both engineered concepts have helped reduce response times and provide more effective care without significant changes in how the fire departments operate. However, the utilization of extensive programs or divisions like mobile integrated healthcare and community risk reduction have the potential to reduce call volumes even more significantly, but their implementation may be more difficult and have more pitfalls (Menapace, 2016). The current model of Mobile Integrated Healthcare has shown to be valuable in many communities to address both reducing call volume and public health. The addition of Community Risk Reduction

(Crawford, 2014) gives many communities the resources to address numerous public health problems. Community Paramedics can get out into the communities and render assistance for a variety of issues. Mobile Integrated Healthcare providers have had success in collaborative operations with law enforcement when dealing with the opioid epidemic and helping those that are afflicted by drug addiction. The opioid epidemic is one problem area where MIH has shown promise for the good of its communities, coupled with this is the benefit to the general healthcare needs of the communities aging population. Deploying healthcare professionals as part of the MIH program to help citizens understand their disease process and how to manage them has had positive outcomes across the county.

The results of the research have provided substantial evidence of the cause of Wooster Fire's increased response times: The data points to a steady increase in call volume, no increases in staffing and no changes to how the department operates have led to the problem. Based on the results, the implications for Wooster Fire are less severe than initially anticipated. Yes, call volumes are increasing and response times are increasing but based on comparable cities, Wooster Fire can absorb addition calls for service with its current staff before it is overwhelmed. This knowledge will allow Wooster Fire to focus on implementing specific projects to reduce response times and can take their time and due diligence time in developing and implementing large programs to address the rising call volumes.

RECOMMENDATIONS

The results of the evaluative research and literature review provided a clear understanding of the call volume trends for Wooster Fire and the population trends of the City of Wooster and how increased calls for service are impacting response times. The results of

alternative programs to reduce call volumes and cut response times provided data on how other organizations have dealt with similar problems and options that could be used in Wooster.

The first recommendation to reduce response times is easy to implement but is costly. Wooster Fire could hire additional staff to ensure that personnel are readily available to respond to all calls for service. The addition of one company to respond to calls would require the division to add four members per shift. The additional staff would increase the divisions staffing from 45 members to 57 members and would increase the budget by $1,289,686. The staffing increase would allow the division to strategically place crews in busier districts so they could handle consecutive calls and reduce the need to pull companies out of other districts to respond to the station's coverage area. Further research would be needed to determine what type of additional staff would provide the most cost-benefit and how they could provide the most productivity.

Based on the research, the second recommendation that Wooster Fire should initiate is the use of technology to speed up response times. The use of an IP based station alerting system with turn-out time countdown clock that is connected to the dispatch centers computer-aided dispatch system can cut seconds off response times. A policy would then need developed to set the expectation for the staff so they know what the desired time frame would be. The installation of automatic vehicle locations devices in each of the apparatus would allow the dispatch center to see the location of the apparatus and if they are available for additional calls. The AVLs would eliminate the need to contact the officer in charge to ask what unit should be dispatched next, allowing the dispatcher to reduce the time of tone.

The third recommendation would be to implement a community risk reduction division. This division would include the traditional fire prevention bureau but expand it to be proactive in

reducing unnecessary non-EMS calls for service. The research results stated that over the past three years, non-EMS calls for service increased by 7.5%, which is a 1.9% increase over the EMS calls. Even though EMS is the most significant percentage of the fire divisions total call volume. Based on this trend, Wooster Fire needs to address these non-EMS calls, which include public service calls and false alarms. NFPA indicated that 77% of non-EMS alarms of unintentional or system malfunctions (2018). Using more precise data analytics, the community risk reduction division could identify and eliminate these unwanted alarms and reduce the rising call volumes.

The last recommendation would be for Wooster Fire to conduct additional research on the Mobile Integrated Healthcare concept. This research should include the legal concerns of a program in the State of Ohio, how the concept will be funded and sustained, the required and availability of training and a needs assessment to evaluate if this program is even needed in Wooster.

The purpose of this study is to evaluate Wooster Fire's growing call volume and explore ways to improve the level of service in an efficient and cost-effective manner. The evaluative research has provided a baseline of the call volume and population trends, along with alternative operational programs to reduce response times and call volumes. The above recommendations will build upon this research and provide additional data to provide the highest level of service to Wooster with the resources provided by the citizens.

REFERENCES

American Academy Of Orthopedic Surgeons (2018). Community Health Paramedicine. Burlington, MA: Jones & Bartlett Learning.

Centers for Disease Control. (2013). The State of Aging & Health in America. Atlanta, Georgia: U.S. Department of Health and Human Services.

Cilluffo, A, Cohn, D'Vera. Pew Research Center. 4-27-2017. Retrieved from: http://www.pewresearch.org/fact-tank/2017/04/27/10-demographic-trends-shaping-the-u-s-and-the-world-in-2017/

Comeau, E. FireHouse Magazine. 1-11-2009. Retrieved from:https://www.firehouse.com/prevention-investigation/article/10493436/the-role-of-demographics-in-fire-safety

Dunn, R. 1-28-2017, The Blade. Retrieved from: https://www.firerescue1.com/fire-ems/articles/374062018-Ohio-fire-dept-continues-to-struggle-with-increasing-EMS-call-volume/

EMS1 Staff. 3-28-2017. EMS.com. NC fire department gets hybrid fire truck and ambulance. Retrieved from: https://www.ems1.com/ems-products/ambulances/articles/225434048-NC-fire-department-gets-hybrid-fire-truck-ambulance/

Exner, R. Cleveland Time. Retrieved: http://www.cleveland.com/datacentral/index.ssf/2014/01/ohio_ranks_45th_for_population.html

Harper. B. 1-26-2017. Scripps Media. Cincinnati Fire has started using new AVL technology to get units to emergencies faster. Retrieved from: https://www.wcpo.com/news/local-

news/hamilton-county/cincinnati/cincinnati-fire-has-started-using-new-avl-technology-to-get-units-to-emergencies-faster

Houk. William. L. (1-22-2016). Investigation of the feasibility of mobile integrated healthcare/ community paramedicine in the Jefferson Twp. Fire Department. Retrieved from: http://www.ohiofirechiefs.com/aws/OFCA/asset_manager/get_file/126298/houk__w_-_an_investigation_of_the_feasabillity_of_mobile_integrated_healthcare-community_paramedicine_in_the_jefferson_township_fire_department.pdf

Medstar Mobile Healthcare (2014). Mobile Integrated Healthcare, a Guide to Implementation. Burlington, MA: Jones & Bartlett Learning.

National Fire Protection Association. (2013). *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*. Quincy, Massachusetts: NFPA.

National Fire Protection Association. Fire Department Calls Table. (2017). Retrieved from: https://www.nfpa.org/News-and-Research/Fire-statistics-and-reports/Fire-statistics/The-fire-service/Fire-department-calls/Fire-department-calls

Sachs. G. 7-1-1998. The evolution of the fire service ems vehicle. Retrieved from: https://www.ems1.com/ems-products/ambulances/articles/225434048-NC-fire-department-gets-hybrid-fire-truck-ambulance/

Sperlings Best Places. (2016).Wooster People Overview. Retrieved from: https://www.bestplaces.net/people/city/ohio/wooster

State of Ohio, EMS Board. (2016), Ohio Compendium of Resources on Mobile Integrated Healthcare (community paramedicine). Retrieved from: http://www.ems.ohio.gov/links/OhioMIHCresources.pdf

Swayze, D. (2017 July) Building an MIH-Community Paramedicine Progam. Symposium conducted at the 2017 Ohio Fire & Rescue Officer Development Conference, Columbus, OH.

The Patient Protection and Affordable Care Act, 124 STAT .119, H.R. 3590, 2711-10909 (2010)

United States Census Bureau (2010), United States Census 2010, Population Trends for the U.S., Washington, DC: U.S. Government

United States Census Bureau (2014), The Baby Boom Cohort in the United States: 2012 to 2060

United States Census Bureau (2010), United States Census 2010, Wooster, Ohio Population, Washington, DC: U.S. Government

Zezima, K. 3-12-2017, Washington Post. Retrieved from: https://www.washingtonpost.com/national/as-opioid-overdoses-rise-police-officers-become-counselors-doctors-and-social-workers/2017/03/12/85a99ba6-fa9c-11e6-be05-1a3817ac21a5_story.html

https://www.usfa.fema.gov/downloads/pdf/statistics/v17i8.pdf

http://lompocrecord.com/news/local/firefighters-respond-to-all-kinds-of-emergencies/article_56dfc084-3bf3-11e0-b939-001cc4c002e0.html

http://www.governing.com/columns/smart-mgmt/col-fire-departments-rethink-delivery-emergency-medical-services.html

https://www.ncjrs.gov/pdffiles/911.pdf

https://www.marionstar.com/story/news/local/2017/10/28/city-firefighters-say-they-stretched-thin/763121001/

State of Ohio, EMS Board. (2016), Ohio Compendium of Resources on Mobile Integrated Healthcare (community paramedicine). Retrieved from: http://www.ems.ohio.gov/links/OhioMIHCresources.pdf

APPENDIX 1 – TITLE OF APPENDIX

Wooster city, Ohio

Population estimates, July 1, 2017, (V2017)	NA

PEOPLE

Population	
Population estimates, July 1, 2017, (V2017)	NA
Population estimates, July 1, 2016, (V2016)	27,023
Population estimates base, April 1, 2010, (V2017)	NA
Population estimates base, April 1, 2010, (V2016)	26,179
Population, percent change - April 1, 2010 (estimates base) to July 1, 2017, (V2017)	NA
Population, percent change - April 1, 2010 (estimates base) to July 1, 2016, (V2016)	3.2%
Population, Census, April 1, 2010	26,119
Age and Sex	
Persons under 5 years, percent, July 1, 2016, (V2016)	X
Persons under 5 years, percent, April 1, 2010	6.1%
Persons under 18 years, percent, July 1, 2016, (V2016)	X
Persons under 18 years, percent, April 1, 2010	20.4%
Persons 65 years and over, percent, July 1, 2016, (V2016)	X
Persons 65 years and over, percent, April 1, 2010	16.6%
Female persons, percent, July 1, 2016, (V2016)	X
Female persons, percent, April 1, 2010	52.4%

APPENDIX 2 – COMPARABLE CITY DATA

Jurisdiction	# of Staff	2016 Calls	Calls per Staff
Wooster	45	4041	89.8
Barberton	45	4743	105.40
Green	44	3638	82.68
Brunswick	30	3120	104.00
Stow	53	3895	73.49
Mansfield	92	10562	114.80
Ashland	34	4226	124.29
North Ridgeville	37	3294	89.03
Defiance	23	2498	108.61
Mt Vernon	40	4832	120.80
New Philadelphia	21	2600	123.81
Tiffin	39	2828	72.51
Painesville	29	4403	151.83
Alliance	27	3200	118.52
Kent	30	4146	138.20
Bowling Green	50	3279	65.58
Delaware	62	5891	95.02
Sidney	35	4083	116.66
Xenia	42	5544	132.00
Troy	39	5398	138.41
Marysville	57	3600	63.16
Marion	57	6948	121.89
Average	**42.19048**	**4415.6**	**107.65**

APPENDIX 3 – CALL VOLUME DATA