TOMPKINS COUNTY COUNCIL OF GOVERNMENTS:

EMERGENCY RESPONSE AND PLANNING SUBCOMMITTEE

RURAL EMERGENCY MEDICAL SERVICE AND SYSTEMS: CHALLENGES, OPPORTUNITIES, AND RECOMMENDATIONS FOR TOMPKINS COUNTY

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We would like to thank Trumansburg Mayor Rordan Hart, Cornell Professor and Town of Dryden Deputy Supervisory Dan Lamb, PADM 5900 Teacher's Assistant Damien Sharp, County Fire Coordinator Justin Vann, and State Legislative Offices of Senators Hinchey and Helming. We are also deeply indebted to the many staff who have offered their time and knowledge, from Cornell University to the municipal representatives who assisted in providing data for our analysis.

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Executive Summary

Background

The Emergency Medical Services (EMS) system provides emergency medical care and transport to patients in need. Containing first response, medical treatment, and emergency transport functions, EMS is an integral part of both medical and first response systems in the United States. This report discusses the regulatory and operational changes EMS systems, agencies, and staff have faced as the industry has evolved, and finds both challenges and opportunities for EMS in Tompkins County and other rural areas.

Operational strains are acute in rural areas like Tompkins County, where large service areas and low population density make it difficult for many EMS agencies to operate profitably. These strains are exacerbated by a relative lack of rural medical practitioners in low-population districts, which often expand the EMS mandate to include the role of rural emergency room and crisis response (Hart, 2021). In response to these pressures and the increasing costs to agencies and supportive municipalities, this report was requested by the Emergency Response and Planning (EMRP) Subcommittee of the Tompkins County Council of Governments (TCCOG) to investigate and analyze the reasons behind the increasing burden on EMS agencies, impacts on the provision of EMS services, and recommendations to develop and maintain a resilient and effective network of EMS providers.

Process

The Cornell Institute of Public Affairs (CIPA) team first examined the state of EMS in the state and country through existing reports and literature. Local municipalities have taken on increasing responsibility in supporting rural medical services, as federal policy makers have shifted their focus from industry support to regulation. We then examine several county and regional EMS Task Force reports as well as models from other states, identifying underlying patterns to help guide our analysis.

A series of interviews with local EMS leaders, response data obtained from Tompkins County Dispatch, publicly available municipal budgets, national EMS response data from the National Highway and Transportation Safety Administration, and qualitative policy analysis tools are then used to update a 2017 report commissioned by the Tompkins County EMS Task Force. The report concludes by recommending a fundamental shift in the way that EMS is understood by policy makers, making recommendations for operational and policy changes at the county level, offering suggestions for using this report at the state level, and suggesting areas for future study.

Recommendations

First, we re-examine and partially reiterate many of the optimization-based recommendations found in the 2017 Tompkins County report and in other EMS Task Force reports. These recommendations include establishing recruitment pipelines, strategically staging community EMS resources, and working to reduce “frequent flyer” calls that do not require medical assistance. Next, we recommend actions, including financial support for agencies, a re-framing of the perceived volunteer shortage as an industry-wide staffing issue, and other policy solutions that treat EMS as a regional medical provider rather than volunteer-based first response. Ultimately, we find that the most realistic solutions to this part of the broader healthcare crisis include additional financial support for agencies.

Project Background

Tompkins County is situated in the heart of New York's Finger Lakes Region and encompasses the southern portion of Cayuga Lake. In addition to the county seat, the City of Ithaca, and several smaller villages, the county is also home to nine incorporated towns and prominent higher education institutions including Ithaca College and Cornell University. The county includes roughly 500 square miles and just over 100,000 residents. Outside the City of Ithaca, Tompkins County is predominantly rural with a median household income of about $60,000 and with roughly 15% of its population over 65 (U.S. Census Bureau QuickFacts, n.d.).

The county is also home to several agencies that provide prehospital medical care and transport. Like much of rural Upstate New York, Tompkins County has seen the strain on these ambulance agencies increase for many years. Notably, in 2016, Slaterville Ambulance closed its doors permanently due to a lack of volunteer staff. This closure prompted the Tompkins County Council of Governments (TCCOG), a consortium representing Tompkins County municipalities, to create an EMS Task Force to study the problem and propose solutions (TCCOG). The Task Force met with local municipal and EMS leaders, commissioned several studies of county-wide EMS resources, and made recommendations to Tompkins County and TCCOG and its member municipalities. These recommendations are discussed in greater detail below, as they focus on solving the most acute symptoms of the strain on EMS as evidenced by the Slaterville closure:

- Recruiting and retaining volunteers
- Optimizing current resources
- Increasing the presence and functionality of county level emergency response coordination and support

The EMS Task Force held its last meeting in the spring of 2018, but two years later TCCOG again recognized that the strain on EMS services was a pressing issue and created a standing committee to address the issue, called the Emergency Response and Planning Subcommittee (ERPS). While the ERPS is also focused on the acute symptoms of stress evidenced in volunteer EMS and fire departments, they have taken note of the increasing costs associated with all EMS providers in the county and have chosen to take a broader view of the causes and long-term determinants so that a more comprehensive solution may be found.

The following discussion and analysis contextualize the provision of EMS in Tompkins County within broader EMS trends throughout the country and situates the state of EMS within both a local and national timeline. We additionally analyze salient challenges facing EMS in Tompkins County and provide recommendations and next steps to help ensure that residents of rural areas have access to equitable, effective, and efficient prehospital care and transport services.

Literature Review

Industry History and Current Trends

Emergency Medical Services (EMS) refers to the system that is engaged in providing emergency medical care. The most easily recognized aspect of the EMS system is the ambulance, a specialized emergency response vehicle that is staffed with emergency medical technicians and/or paramedics and carrying supplies and equipment to provide Advanced Life Support (ALS), Basic Life Support (BLS), and to transport patients in need of care in hospitals or other specialized facilities. There is substantial variation within the industry and many EMS providers are members of fire and rescue squads, hospital staff, or helicopter crews. For the purposes of this report, EMS is used to refer to prehospital medical care and ground transport for patients.

In order to understand the state of EMS in Tompkins County, it is helpful to understand the roots of modern EMS in the United States. Most scholars find the beginnings of EMS in the French Revolution, when generals began to realize that it was more efficient to retrieve and treat their injured fighters than leave them to die on the field of battle (Pearce, 2009). This innovative approach was emulated during the American Civil War and became common place in subsequent military conflicts around the world. The first World War saw the deployment of tools that would later become the foundation for first response: the use of signal boxes to call for medical help and carriages to carry the wounded (History of EMS, n.d.). Over the following decades, EMS in the United States grew to include more notable features: radio dispatchers and onboard surgeons traveling primarily in hearses, which were the most common vehicle able to accommodate a prone patient.

Modern EMS in the United States is often traced back to 1966, when the National Academy of Sciences–National Research Council released "Accidental Death and Disability: The Neglected Disease of Modern Society" (Shah, 2006). This report came at a time when the lack of a functional EMS system was seen as an emerging and important crisis that potentially threatened the health of all Americans; a crisis exacerbated by the perception that soldiers were receiving better emergency treatment in war zones than at home (Pearce, 2009). The Highway Safety Act of 1966 brought the weight of the federal government to bear on the problem by providing more than $1.9 billion dollars[1] over the next decade to fund and support state and regional programs, education, and research meant to catalyze a more robust and professional EMS presence around the country (Pearce, 2009).

While federal support largely achieved its goal of reshaping EMS throughout the country, a reliance on state governments to disperse funding and control the bulk of EMS regulations allowed the industry to fragment over the next few decades as federal support waned. The decline in federal support was highlighted in 2002 and 2003 when the Department of Homeland Security (DHS) distributed $3.38 billion to "enhance emergency preparedness." While EMS providers represent about 33% of first responders and have an essential role in emergency response, the industry received only about 4% of the DHS funding (Pearce, 2009). Almost twenty years later, EMS issues span the jurisdictions of a wide variety of departments and offices ranging from the Centers for Disease Control (CDC) to DHS and including the National Highway and Traffic Safety Administration and several others. At the state level, New York has

[1] In 2021-adjusted dollars.

largely chosen to consolidate regulatory power within the Department of Health while distributing the responsibility for execution to individual counties and EMS agencies.

Regulation for the EMS industry in New York State is fragmented and divided, and funding is nearly nonexistent. This leaves individual agencies and municipalities responsible for payment of services, equipment, and training using billing revenue and often relying on tax levies to underwrite the ever-increasing expense. These recent developments, when looked at through the lens of even this brief history, can be seen as a continuation of the EMS industry's growing pains or as a de-evolution from federal, to state, and local fiscal and operational responsibility where local taxpayers increasingly bear the inequitable burden of providing essential life-saving medical care and transport.

Current Trends in EMS

> *EMS is widely viewed as an essential public service, but it has not been supported through effective federal and state leadership and sustainable funding strategies. Unlike other such services—electricity, highways, airports, and telephone service, for example—all of which were created and are actively maintained through major national infrastructure investments, access to timely and high-quality emergency and trauma care has largely been relegated to local and state initiatives.*
>
> -Committee on the Future of Emergency Care in the United State Health System (Pearce, 2009)

The modern EMS industry is a product of its history in many ways, as evidenced by the previous brief overview and the effects of the federal government's declining and uneven oversight financial support. However, EMS is not only a healthcare field, but also influenced by the history and growth of all first response industries, especially fire services. Unlike EMS, fire companies initially grew out of domestic insurance companies, who paid volunteer firefighting brigades to prevent loss to their insured properties as early as the 1750s (Fire Department's Insurance Company, n.d.). Over the following century these fire brigades began resembling the rural Volunteer Fire Departments that we know today and began to include fire department-based "rescue squads" as early as the 1920s (History of EMS, n.d.). These squads grew in abundance until, by the 1960s, they were nearly as prevalent as ambulance services run by morticians (Shah, 2006). These fire companies, hook and ladder companies, and rescue squads were akin to social organizations and were almost exclusively run with unpaid, volunteer labor and leadership except in some large cities. This trend continues, with 72% of firefighters operating as unpaid volunteers (Evarts & Stein, 2020).

As EMS became increasingly sophisticated in response to federal support in the 1970s and 1980s, it also moved more firmly into the realm of fire companies. However, as medical calls began to increase in both absolute terms and as a percentage of total fire department calls, it has become increasingly common that EMS departments have become specialized units within fire departments or have separated entirely and formed their own agencies (EMS System Demographics, 2011). Splitting agencies to provide specialized EMS care can prevent overburdening fire departments but it may also lead to increased EMS costs as well. These often-hidden costs are exacerbated in rural areas like Tompkins County, where difficulty meeting continuing education requirements, burnout, and a multitude of other hurdles make recruiting both paid and unpaid staff more difficult than in urban centers (Freeman et al., 2009).

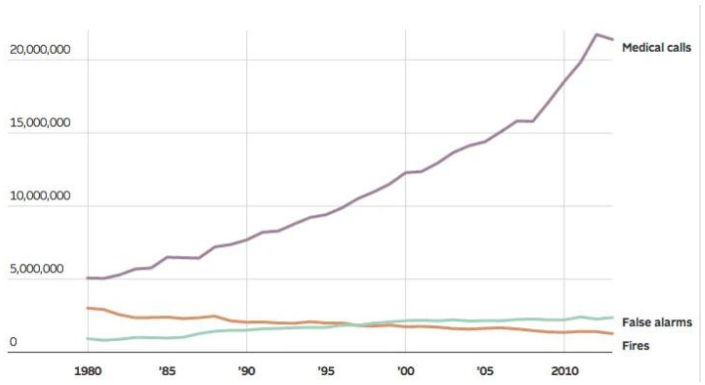

Figure 1: Fire Department Calls, 1980- 2015. Source: Stromberg, 2015

State Funding Models

Many states have creative solutions to work around the lack of federal funding for emergency medical services. In Pennsylvania, the state government has established the EMS Operating Fund (EMSOF), used to maintain, improve, and develop the quality of the EMS system. According to the EMS development plan, the health department may increase the initial payment or reimbursement amount of EMSOF (Emergency Medical Services Operating Fund). These funds are specifically used for EMS system development, maintenance, and improvements. Improvements and maintenance can include ambulances and communication equipment, as well as training, education, and EMS agency licensing purposes.

New Mexico provides funding that includes local EMS system improvement and EMS vehicle procurement under the Emergency Medical Services Fund Act (NMAC 7.27.4). Financial support for approved EMS vehicles is provided by the state with a 25% local match. The EMS system improvement plan aims to fund project that improve both local and statewide system improvements and also includes funding for projects such as providing training opportunities for EMS volunteers (Staff, n.d.).

Ohio's state government has implemented an EMS Grant Program that provides funding to improve emergency medical services through enhanced training for responders, as well as improved equipment. Funding for the grant program is primarily sourced through traffic tickets (Ohio EMS Staff, 2021). The state has divided funding into differing levels of priorities, with the highest level of priority associated with personnel training, equipment and vehicle procurement, accessibility, and quality of emergency medical services.

There are also models of fully state-run EMS services in rural areas of Canada. British Columbia and the Yukon fund and operate provincial ambulance services directly. Quebec and Nova Scotia also fund and operate ambulances but rely on some private operators; the national government covers costs for all first nations people (Symons & Shuster, 2004).

Local Funding Models

This section reviews common EMS operational models.

Model	*Private Company*	*Municipality*	*Nonprofit*	*Hospital*
Employee Type	Paid Employees	Volunteer & Paid Employees	Volunteer & Paid Employees	Paid Employees
Funding Sources	Transport billings, Medicaid/Medicare Reimbursements	Transport billings, Medicaid/Medicare Reimbursements, Budget funds	Transport billings, Medicaid/Medicare Reimbursements, Budget funds, fundraising & grants, etc.	Transport billings, Medicaid/Medicare Reimbursements, additional service billings
Rural Population Considerations	Only viable in densely populated regions	Viable in rural regions, with municipal budget subsidization	Viable in rural regions, only with strong volunteer and fundraising pools	Only viable in regions densely populated enough to support a hospital

Figure 2: Comparison of common funding model types. Source: Williams, 2006

Contract-based Models

Contract-based models can take the form of fire departments, private entities, or other types of organizations. In most cases, municipalities put a contract out to bid and select from competitive applicants. This requires a dense enough population to be financially viable and assumes there are multiple agencies in the area. The benefits of competition ensure that performance metrics are met. If there are not enough organizations in the region to receive multiple bids, the local government may solely work with a private company to provide services for a designated area. However, as in the bidding-based model, it is necessary to have revenue potential in the area served, so this model may not be viable in rural communities.

An additional contracting option entails the local government owning the infrastructure and handling the oversight and management for EMS response but contracting with an ambulance provider for the actual services. It ensures more public oversight, as the assets are owned by the government and only the operations are left to the contractor. However, it means that government leadership is needed for the oversight and can lead to strain on staffing resources (Williams, 2006).

Municipality Oversight Models

EMS services are often associated with fire response, whether municipally funded or run by volunteers. These primarily come in two configurations, including a single role delivery, where the departments have a dedicated EMS division, or personnel having dual roles and being trained in both fire and emergency medical response. A third-service model consists of a department in local government that is solely dedicated to emergency services. The local government has control over the service, leading to an increased need for staffing. Additionally, this model requires funding from local government, so it is dependent on their budget. It is notable that the lack of competitive factors such as multiple companies bidding for the contract means that the budget may eventually become unsustainable (Williams, 2006).

Additional Models

Nonprofit EMS agencies provide some advantages because funding sources may be more diverse, as they consist of cost reimbursement, fundraising, grants, and more. The staffing options are equally flexible, as nonprofit models tend to contain a mixture of volunteer and paid responders. Separate leadership from the local government means that this model can potentially expand beyond municipal geography and serve a wider populace. However, nonprofit models may not be able to serve a wide geographic area, as they are limited by their fundraising abilities. The lack of municipal oversight means that some regions within a rural area are left without coverage.

Another alternative model consists of a hospital operating a separate emergency response unit. Services are subject to the hospital's billing rates and contingent upon a hospital operating within the geographic location of the community served, making it unsuitable for more rural communities.

EMS agencies in Tompkins County already take many of the forms outlined above and while each model reviewed offers possible benefits, all models rely on billing, tax, fundraising, and other community resources and revenues to fund operations.

Task Force and Commission Reports

The literature on EMS service highlights a "real and growing" and "multifaceted" crisis that corresponds directly with trends found in Tompkins County (Pearce, 2009 p xiv). The work of many national committees and commissions has been directed at solving the EMS crisis. Many of these groups have recommended the formation of a single national agency to centralize EMS governance and the "regionalization" of EMS at the local level (e.g. Pearce, 2009), Wheatley, 2010), and Pilgrim et al., 2010). Joseph F. Waeckerle, Chief Medical Officer for the Office of Homeland Security, points out that regionalization must be "win-win," and should not be viewed as a "one-way funnel," but rather as "collegial communication and coordination, so that everybody wins" (Wheatley, 2010). These recommendations highlight the need to focus on mutual aid, network dynamics, and system resilience as critical aspects of an effective EMS service and to support those priorities with federal funding programs.

Local and regional EMS reports have also been commissioned across New York State. A search for "EMS" on the site of one Upstate New York consulting firm yields six results for recent reports assessing public EMS systems in Upstate New York (CGR Reports, n.d.). In Tompkins County alone, five reports on local EMS systems have been commissioned since 2016 (EMS Task Force | Tompkins County NY, n.d.). These reports universally highlight growing call volumes, unsustainable cost increases, and inter-agency mutual aid requests as leading causes of concern (e.g. Bishop, 2021 and Dutchess County EMS Task Force Report, 2017). Solutions to these and many other local concerns range from resource optimization strategies at agency and regional levels (e.g. Stilley Jr. 2019) to increased recruitment and retention efforts for volunteers and paid staff (e.g. Yu et al., 2017 and Beglin et al., 2015). Increasing the role of county or regional support, coordination, and oversight in order to better leverage these recommendations is also a nearly universal theme in these reports.

Data & Analysis

Quantitative Analysis

Budget

The issue of EMS capacity often overshadows another problem. As standards of care have steadily increased since the 1960s, EMS has moved away from previous models and become a highly technical and specialized part of the healthcare industry. The critical role that EMS plays as community first responders should not obscure its healthcare orientation.

A review of EMS contracts for towns in Tompkins County demonstrates rising EMS costs. In Figure 3, note that the change from 2016 to 2021 is 79% - an increase that is clearly not sustainable for small municipal budgets. These figures cover the Town of Dryden when Slaterville Ambulance closed and include a reduction in their budget of $3,500 in 2017. However, it is important to note that while that closure increased the strain on EMS agencies, there is no discernible immediate impact on the Dryden EMS budget which grew at a stable rate until 2020. The presence or lack of volunteer labor does not play a role in these figures as these agencies are staffed by full-time paid staff.

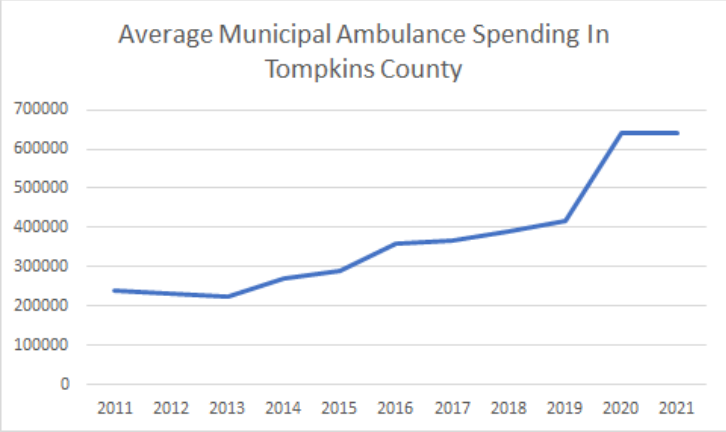

Figure 3: Average EMS contract costs for Tompkins Towns

Figure 4 illustrates the average percent change of town EMS contracts for the Towns of Ulysses and Dryden – the two Tompkins County towns that pay for EMS contracts through tax levies. Not only have costs increased substantially over the past decade, but those increases have come in fits and starts as agency leaders struggle to adjust to changes in administrative and staffing needs. The fragmented and highly local nature of these agencies prohibits the type of risk or loss sharing that might make these kinds of abrupt changes more manageable in the context of a larger operations budget. This results in drastic effects in local tax levies and substantial constituent pressure on local municipal leaders (Hart, 2021).

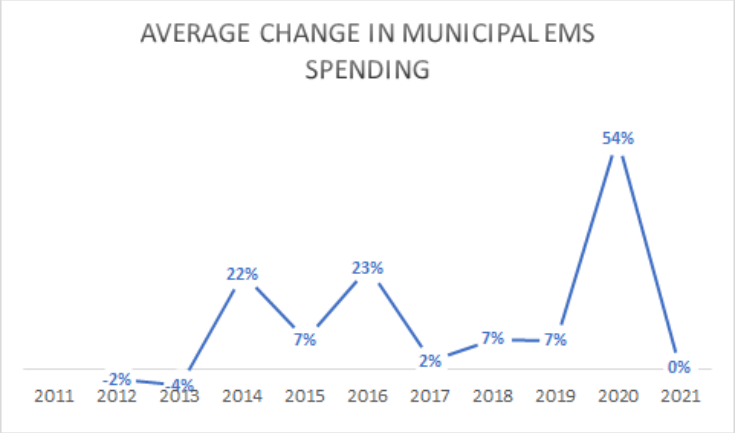

Figure 4: Average EMS costs for Tompkins' Towns

As Tompkins County's EMS costs have continued to rise over the last decade, so have health care costs across the country. Figure 5 removes a startling jump (almost 100% in one fiscal year) in EMS contract costs for the Town of Dryden in 2020 and overlays national health care spending. The resulting graph shows that EMS spending is remarkably like national health care spending trends.

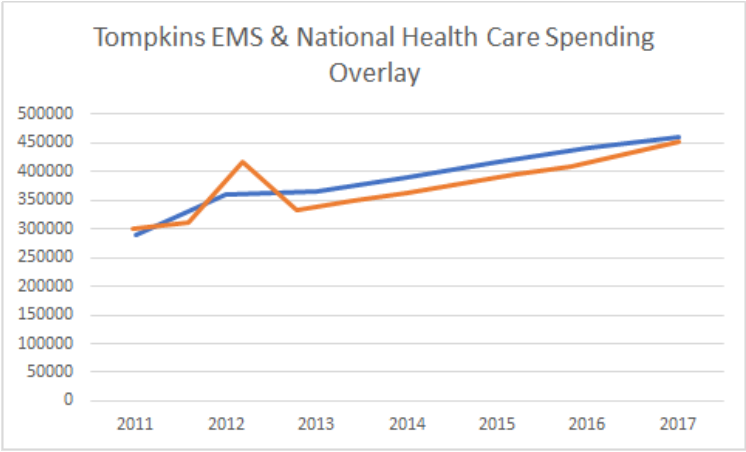

Figure 5: Total National Health Care Spending overlaid on Figure 1 data

Not only are EMTs and paramedics similar to the rest of the medical field in terms of function (they render medical care, administer medications, and increasingly provide "community paramedicine"), but they are subject to similar financial pressures as well. While these financial strains are exacerbated by dwindling volunteer staff, pressures of increasing costs across the industry occur in agencies with paid staff as well. Establishing a causal relationship between costs, volunteer strength, and broader staffing costs in the EMS or broader healthcare industry is outside the scope of this report, but conceptualizing EMS trends and pressures within the context of healthcare shows important and substantial similarities.

Population Density

Within Tompkins County, population density is the primary independent variable determining the profit potential for EMS agencies. More populated areas lead to increased call numbers and therefore more billing revenue. Bangs Ambulance, the sole private for-profit ambulance agency in Tompkins County, is a local example. Other agencies within the county rely on community resources to support operations in the form of either volunteer (unpaid) labor or financial support through tax levies. Bangs is profitable because it covers a district that has approximately 300 people per square mile, whereas the Town of Dryden and Ulysses contain about 160 people per square mile and must levy over a million dollars in taxes to support EMS services.

Rural ambulances serving an area with population density under a threshold between 160 and 300 are more likely to require subsidies, including all Tompkins County municipalities except the City of Ithaca. To assess the local impact of population density on call volumes, we used the 2020 town population to determine the number of calls per thousand people and found a minimum of 119, maximum of 356, a mean of 216.6, and a standard deviation of 62.39. We then calculated the number of calls per square mile and found a minimum of 7.55, maximum of 270.30, mean of 51.71, and a standard deviation of 78.00. The substantial increase in the range and standard deviations from calls per thousand people to calls per square mile indicate a weak relationship between calls and land area.

Total Call Volume by Population (Dec 2020 –Nov 2021)				
Districts	**Population**	**Number of Calls**	**Calls per 1k**	**Call per square mile**
Caroline	3,334	628	190	11.47
Danby	3,421	406	119	7.55
Dryden	13,905	2,835	202	30.05
*City and Town of Ithaca**	54,391	9,828	182	270.30
Newfield	5,126	1,305	255	22.13
Groton	6,014	2,137	356	43.14
Lansing	10,432	2,571	247	36.76
Enfield	3,362	755	222	20.49
Ulysses	4,890	867	177	22.21
**Ithaca City & Town, and Cayuga Heights are combined.*				

Population density has negative correlation with response times, based on national call data available through the NEMSIS data cube, confirming the theoretical case implied by larger geographic distance and longer travel times per call (see Figure 7, below). While we were unable to test this national correlation with local data, the theoretical case strongly implies a similar relationship. Notable increases mutual aid response times when compared to 911 response are also notable in the national data.

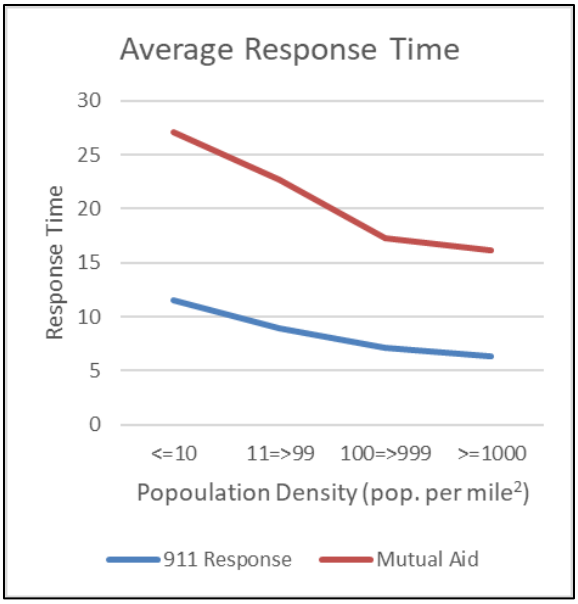

Figure 6: Type of Call compared to population density and response time. 2019 National Data from the NEMSIS data cube (https://nemsis.org/view-reports/public-reports/ems-data-cube/)

Call Data Collection & Analysis

One directive of our analysis is to compare how response times have changed since the 2017 CIPA report. Chart and table formatting as well as data collection, processing, and analysis methods have been chosen for easy comparison with that report.

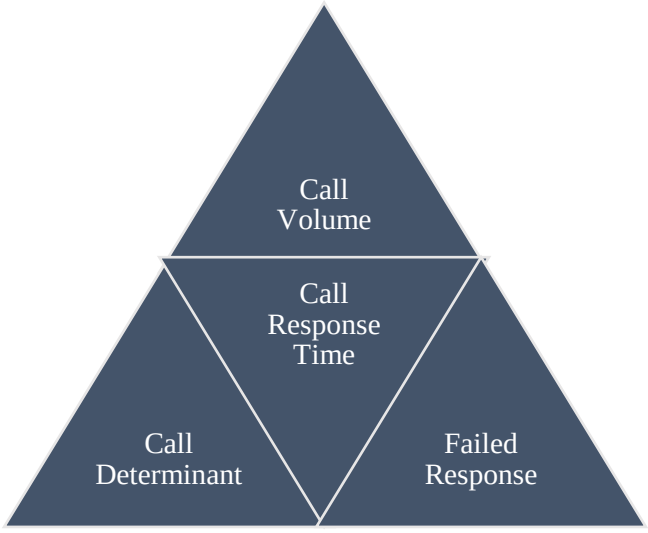

Figure 7: Primary dataset variables collected for analysis

Call Volume Distributions

According to analysis of call volume by districts during December 2020 to November 2021 (Figure 9), Ithaca City and Town (Cayuga Heights is included in Ithaca City & Town) have the highest total call volume.

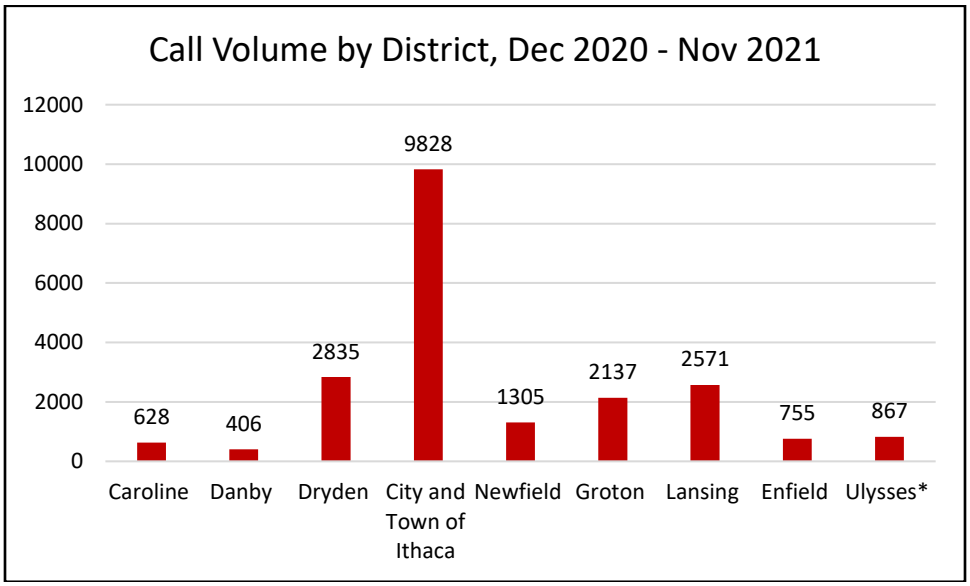

*Figure 8: Call volume by districts (*Ulysses includes the Village of Trumansburg)*

Total Calls per Day of Ithaca City and Town

Figure 10 shows descriptive statistics for Tompkins County EMS calls. The average call volume of the past year is 24 per day. There were 90 days when the daily call volume reached more than 25. There are nine days that the center received 28 calls, which was the largest number of calls in a day.

Total Calls per Day (Dec 2020 – Nov 2021)			
Calls in Day		**Occurrence**	
1-10		13	
11-20		105	
21-25		152	
25+		90	
Mean – 27	Median – 22	Min – 5	Max - 46

Figure 9: Total Calls per Day

Calls by nature

In the table below, we list the number and percentage of calls in each category. We compared Ithaca and non-Ithaca (rural areas) to show the difference in demand. We have made several important findings: In Ithaca and rural areas, calls for falls (17.27% and 15.39%) and unspecified sickness (16.73% and 14.46%) are very common. Compared with Ithaca, chest pain (6.66%) and breathing problems (10.76%) in rural areas are more common causes. Overdose (6.55%) is a major problem in Ithaca, but it is less common in rural areas.

Call by nature Comparison (January '21- November '21)					
Non-Ithaca（Rural area）			Ithaca		
Nature	**Calls**	**Percentage**	**Nature**	**Calls**	**Percentage**
FALLS	607	17.27%	FALLS	482	15.39%
SICK PERSON	588	16.73%	SICK PERSON	453	14.46%
BREATHING PROB	378	10.76%	UNCONSCIOUS	275	8.78%
CHEST PAIN	234	6.66%	UNKNOWN PROBLEM	243	7.76%
UNCONSCIOUS	198	5.64%	BREATHING PROB	228	7.28%
UNKNOWN PROBLEM	176	5.01%	OVERDOSE	205	6.55%
ABDOMINAL	152	4.33%	CONVULSIONS	168	5.36%
CONVULSIONS	141	4.01%	CHEST PAIN	167	5.33%
PI ACCIDENT	141	4.01%	PSYCHIATRIC	118	3.77%
HEMORRHAGE	119	3.39%	PI ACCIDENT	102	3.26%
PSYCHIATRIC	109	3.10%	HEMORRHAGE	98	3.13%
OVERDOSE	87	2.48%	ABDOMINAL	88	2.81%
STROKE	86	2.45%	HEART PROBLEM	78	2.49%
HEART PROBLEM	80	2.28%	CARDIAC ARREST	75	2.40%
CARDIAC ARREST	78	2.22%	TRAUMATIC INJ	65	2.08%
ALLERGY	66	1.88%	ALLERGY	57	1.82%
TRAUMATIC INJ	60	1.71%	STROKE	47	1.50%
BACK PAIN	59	1.68%	DIABETIC PROB	40	1.28%
DIABETIC PROB	50	1.42%	HEADACHE	34	1.09%

Figure 10: Call by Nature (Following the previous CIPA report, data for multiple calls with the same long-term ID has been excluded)

Response Times

Response time is defined as the difference of time between call assignment and arrivals. Our data are obtained from the year 2021 and we did not include the incidents when the calls were not answered. Our dataset consists of failed call responses, reassigned ambulance calls, 911 call processing time, confirmation time, and travel time. D and B determinants are defined as more emergent events including traumatic and cardiac arrest events. Figure 11: Response Time by Determinant and District shows response times according to district and determinants. It shows the proportion of cases that the response time meets the 10-minute-maximum standard and the response times in different areas within 95% confidence interval and 75% confidence interval respectively. Comparisons with data obtained from previous CIPA reports shows evidence of a substantial re-allocation of ambulance resources in Tompkins County (see Appendix 1).

Response Time (Min) by Determinant/ Benchmark									
	AVG	A	B	C	D	O	Met 10 Min	95%	75%
Tompkins County (Ithaca Excluded)	12.1	12.3	11.8	13.6	12.5	10.6	35%	19.8	11.3
Slaterville	9.1	8.8	2.9	19.7	9.1	4.9	28%	18.9	13.5
Etna	13.2	14.8	11.5	11.6	14.5	13.7	22%	18.7	14.2
Speedsville	10.1	7.5	12.5	15.7	14.8		24%	14.8	12.4
Newfield	23.1	28.7	36.6	20.9	12.8	16.7	19%	23.1	15.3
Brooktondale	4.3	0.1	7.2	9.6	3.0	1.6	19%	9.1	6.3
Danby	11.6	8.0	13.3	16.9	12.7	6.9	18%	21.5	18.9
West Danby	10.2	9.4	8.4	8.4	12.4	12.5	17%	15.5	12.3
Lansing	14.3	12.1	13.3	13.7	22.0	10.5	13%	24.6	18.4
Enfield	20.3	31.5	5.1	26.2	10.1	28.8	13%	23.1	15.8
Freeville	14.9	10.4	15.3	16.9	19.2	12.6	45%	17.4	12.9
Groton	6.7	11.7	5.3	0.7	8.7	7.2	26%	9.8	7.4
Trumansburg	10.8	10.1	11.4	10.4	10.8	11.2	12%	14.5	8.3
Varna	7.7	10.3	9.5	9.2	9.7		17%	13.8	11.2
MacLean	8.8	6.2	9.1	9.5	9.6	9.4	13%	12.5	8.9
Dryden	8.2	7.8	7.9	6.4	9.1	9.9	37%	17.4	13.5
Cayuga Heights	8.9	6.5	7.5	7.7	8.9	13.9	35%	18.3	11.9

Figure 11: Response Time by Determinant and District

Qualitative Analysis

Tompkins County is a representative case study for broader trends in EMS. As EMS calls have increased and more municipalities have been forced to create their own EMS agencies or rely on private companies, costs have risen substantially. However, one frequently overlooked aspect is the interrelated nature of emergency response. While local agencies are undoubtedly subjected to the pressures of their county, state, and federal regulatory structures, as well as the broader trends in both the health care and first response sectors, they are highly dependent on the interconnectedness of the field due to mutual aid contracts. This is evidenced both by our quantitative call analysis and interviews with local EMS leaders (Hart, 2021).

Figure 14 shows a snapshot of Trumansburg EMS calls in 2020. The red circle represents the location of Slaterville Ambulance, a volunteer agency that closed in 2016; the purple circle represents the location of Bangs Ambulance, a for-profit private agency based in Ithaca; the black polygons represent the coverage area of Trumansburg EMS; and the blue dots represent adjusted locations of actual Trumansburg EMS calls for 2020.[2]

This graphic illustrates several key factors. First, Trumansburg EMS covers an area that is more than double its contracted district. Second, as discussed in the call response analysis, the closure of Slaterville Ambulance has drawn Trumansburg EMS response coverage further south and east[3]; and finally, the area to the west and north is the source of nearly 50 calls for this year. These features of the graphic are notable because they demonstrates the relative strain on EMS agencies based on population density and mutual aid demand. While Bangs was forced to cover a substantial new area because of the Slaterville closure, the areas to the west and north are covered by independent agencies that are clearly under strain and understaffed, as evidenced by the number of dropped calls that were directed to Trumansburg. Notably, these areas are also very rural with low population densities, and their EMS agencies have been increasingly reliant on inter-hospital transfers to remain solvent (Hart, 2021).

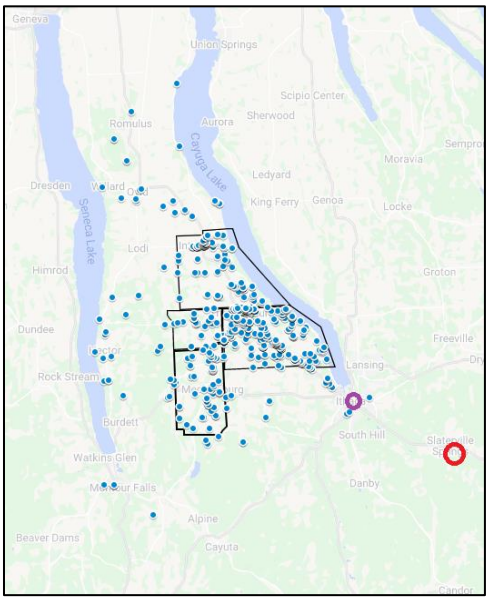

Figure 12: A Snapshot of Trumansburg EMS calls for one calendar year (red indicates out of district calls, size roughly approximates call volumes). Source: Carver, 2021

This local dynamic illustrates an important trend in EMS in Tompkins County and rural communities around the state. As healthcare costs have increased, ambulance agencies have either sought funding through municipal tax levies, closed their doors entirely, or been forced to sacrifice effective emergency coverage in favor of critical care transports to remain financially afloat. This phenomenon shows the interconnected nature of EMS, the impact that mutual aid

[2] The call locations have been randomly adjusted to protect privacy. Their approximate locations have been altered but they have not been moved outside of the general area where they took place.
[3] According to Trumansburg Mayor Rordan Hart and EMS Commissioner Ben Carver (also a co-author of this report), it was "very rare" to get calls in this area before the closure of Slaterville in 2016 (Hart, 2021).

requirements have across vast distances, and interdependence of the EMS network. As neighboring EMS agencies begin to feel stretched, they rely on mutual aid contracts to cover calls in their area. This solution is mutually beneficial in many respects, and helps ensure better and more equitable treatment, but also means that threats anywhere in the EMS network impact the network itself.

Under the current conditions, it is possible to have a scenario in which a call from Romulus is assigned to Trumansburg, who is then unable to answer a call in the southern portion of Ulysses or the north end of Ithaca. This would push Bangs beyond its capacity and leaves a patient east of Slaterville waiting for life saving medicine. That scenario spans more than 50 miles, six municipalities, at least two counties, and two Department of Health Regions and it demonstrates the dynamic nature of the industry and the difficulty faced by local policy makers in devising solutions.

SWOT Analysis

A previous SWOT analysis of Tompkins County EMS focused on strains on EMS as primarily fueled by decreasing volunteer numbers and included a fairly narrow view of relevant stakeholders. This was reasonable given the recent closure of Slaterville Ambulance and the high level of engagement from the EMS Task Force when the report was written. The following analysis takes a broader view, highlighting county EMS as a local service that is part of a regional network and subject to state and national level trends.

Strengths • strong tax base • presence of model agencies • high cultural demand	**Weaknesses** • safety net of the safety net • call volume increases and increased mutual aid • poor problem definition
Opportunities • broader mutual aid • state and federal support • optimize county-wide operations	**Threats** • increasing costs • lack of trained administrative staff, EMTs and paramedics • outside agency failure

Strengths of Tompkins County EMS include a relatively strong tax base when compared to many rural upstate New York communities. This is critical to support ambulance service in areas with low call volumes and therefore low billing revenue. There are also a number of municipalities (notably Dryden and Trumansburg) who have transitioned from fully volunteer-staffed agencies to full-time paid staffing. These agencies present strong models for others that may experience similar transitional periods. Another strength is that like most of the country, EMS is considered an essential service in Tompkins County, both by policy makers (as evidenced by the work of TCCOG as well as many other municipal leaders) and by taxpayers at large. Additionally, the County has taken an increasingly active role in facilitating communication between local leaders in EMS.

Weaknesses generally stem from the role of EMS as the safety net of the safety net. This means that EMS agencies are called upon to support law enforcement, fire, and other emergency services when there is no alternative (Pearce, 2009). This is particularly true in Tompkins County's current effort to reinvent public safety because it has resulted in a substantial number of calls that have been coded as EMS that may otherwise have been police calls. These calls are a weakness because they are frequently for disorderly conduct or similar anti-social behaviors that are both outside the skill set of EMS staff and are non-billable in nature (Hart, 2021). EMS agencies are also called upon by neighboring counties to supply mutual aid, subjecting them to the pressures of EMS outside of Tompkins County. Another weakness is dual pressure of the labor market and budget constraints. It is frequently hard to fill positions at current wage levels, especially EMTs, but simultaneously difficult to raise wages (Hart, 2021). EMS in the county also suffers from poor problem definition in terms of policy solutions because of its historical entanglement with the fire service. This is a substantial weakness because it reduces the ability of stakeholders to truly capitalize on many of the strengths of the system and creates erratic budget fluctuations.

Opportunities for the system are diverse. Most notably, the opportunity for state or federal financial support could help reshape the way that EMS is provided by mitigating financial strain, enabling more predictable budgets, and facilitating recruitment efforts. County-level decision makers may also engage state-level decision makers for support to help expand the laws controlling Certificates of Need (CON). CONs are a pivotal component of the EMS network because they grant operating authority to single ambulance agencies for specific geographic territories. Redefining the CON system could allow for increased county support and a variety of other beneficial impacts but should be undertaken with extreme caution. There is also an opportunity for an expanded definition of mutual aid to be instituted within the county that could increase training opportunities for new EMTs, standardize care and response protocols, and provide a number of other services that could help stabilize agency staffing and operations. This could range from county-specific resource deployments to increased coordination and support for existing resources.

Threats to the system include difficulties finding and recruiting EMTs, increasing operating costs, and a lack of qualified staff and administrators. Increasing call volumes and mutual aid requests across county borders also strain and potentially threaten operations. Agency closures that increase mutual-aid demands are also a threat to the well-being of county EMS systems. Finally, these factors and especially increasing tax support may lead to waning support from taxpayers or municipal officials and could threaten the operations of all agencies in the county with the exception of Bang's Ambulance.

Recommendations

The recommendations below are to be considered alongside the recommendations of the previous CIPA report. Many of those recommendations and much of the analysis of that report may hold a different meaning after reading the analysis above and these recommendations, but they are well grounded in research and theory and justify further attention, especially in light of the changes in the industry in the intervening years.

Reframe EMS

A comprehensive budget analysis for EMS operations in the county is impossible, given difficulties separating rescue response costs within fire departments and the privacy of private balance sheets. However, our analysis of Ulysses and Dryden's EMS costs indicate a strong correlation between health care costs and EMS costs that lends credibility to the argument that EMS should be considered a health care field. Despite the increasingly sophisticated medical expertise of both EMTs and paramedics, EMS as an industry continues to be treated primarily as a first response unit and primarily as a subset of fire service. This is logical from a historical perspective, but it prevents policy makers from clearly understanding the pressures that agencies and providers face in terms of certification time and costs, equipment costs, liability, mental strain, and administrative pressure.

To better understand the challenges faced by the EMS industry it is essential that policy makers at the county and state level understand EMS primarily as a medical field with an added first response component. This change of frame promotes a focus on relevant problems and potential solutions that will have longer lasting impacts.

It is equally important that EMS be understood in terms of regional networks rather than primarily existing within jurisdictional boundaries. As an illustrative example: taxpayers in the Town of Covert may provide direct monetary support to Trumansburg EMS, the agency that holds their CON in exchange for coverage. However, Covert is in Seneca County and the Western Department of Health region while Trumansburg is in Tompkins County and the Central Department of Health District. As such, efforts to "optimize" Tompkins County or even the Central Region EMS resources will likely pull resources from Covert.

Creating a resilient and effective EMS network requires understanding the network. Its interdependence is both its primary strength and weakness, and failures in the network – whether through failed policy or other sources – are a threat to the effectiveness of every agency within the network. While there are no easy solutions, it should be clear that policy discussions focused on EMS agencies, county departments, and so on, must include an in-depth understanding of the nature of network effects, the EMS network, and the role that EMS plays in regional health networks.

Lastly, policy makers must reframe what is commonly perceived as a volunteer shortage in EMS. The root of this problem is increased costs for all EMS personnel – whether paid or unpaid – in the form of low pay, increasingly high certification requirements and uncompensated investments, and an ever-increasing call volume that increases the risk of burnout and moral damage (Rentmeester, 2008). Framing the work of volunteers as fundamentally different than that of paid staff misses critical similarities that should be leveraged in order to better serve both communities.

State Policy Actions Affecting Rural EMS

There are bills introduced in the New York State Senate to address the issue of declining volunteerism, low funding, and excessive strain on rural community EMS agencies. The most current, bipartisan bill will lead to the development of a task force in New York to examine the current landscape of EMS agencies (NYS Senate Bill S3503C). As of December 2021, the bill is still awaiting the governor's signature, and will eventually enable a more official, thorough examination of the issues affecting rural EMS delivery.

Our team conducted meetings with the bill's legislative sponsors, Senator Hinchey and Senator Helming. Carmella Mantello, Legislative Director for Senator Helming, directed our attention to the many past failed efforts to pass legislation that addresses rural emergency medical services. The fact that this legislative effort is so close to being signed by the Governor indicates growing, cohesive support for addressing the topic (Mantello, 2021). The bill has also added additional cosponsors in recent weeks, indicating that bipartisan support continues to grow.

Senator Hinchey's Legislative Director, Brian Coffin, focused our conversations on the overall purpose of the statewide task force, as well as efforts to encourage the Governor in signing. Our team worked to urge TCCOG members in passing resolutions to call Governor Hochul to sign the bill and establish the task force (see Appendix 2).

Members: We recommend that local agency and municipal representatives are included in the task force in addition to other experts, as they are aware of the unique complications in providing rural services.

Research: Formulating a population density threshold for profitable EMS service will help define the need for operations subsidies. Whether in the form of raised Medicaid and Medicare reimbursement, or direct funding to municipal budgets, a formula-based assistance to rural areas with lower call volumes is essential.

Funding: Funding is an essential component of any attempt at reform. Whether funding is provided through increased Medicaid reimbursements or a funding model akin to AIM, CHIPS, or STOA models, it is essential that funding be targeted at rural EMS to prevent the dissolution of small agencies and to mitigate funding deficiencies inherent in rural EMS coverage.

Consolidation: In combination with state funding, consolidation of agencies could be a viable option to make stronger, more centralized organizations. An example of this is within Wake County, NC, which has historically had up to 18 agencies operating simultaneously. In early 2021, Wake County consolidated the 3 remaining agencies into one unified department (Wake County Consolidates Emergency Medical Services, 2021).

County Operations

Tompkins County should take steps to improve EMS resource allocation as discussed in previous task force reports with a particular focus on working to reduce the impact of "frequent flyer" calls. EMS agencies around the county often receive non-emergency calls and mitigating the resource drain caused by these calls would enable meaningful improvements around the county.

Tompkins County should provide training and certification in first aid for care facility staff, County employees, and volunteers, including training in basic telemedicine capabilities for dispatch phone operators. Even basic medical or first aid training for staff or onlookers can be the difference between life and death in many emergencies. This training may also benefit the EMS network by reducing non-emergent calls and providing more detailed information for responders.

The last optimization recommendation is providing data dashboards for agency leaders and policymakers. The data dashboard can help decision-makers analyze many historical data in multiple variables to study trends, forecast results, insight into details, and help decision-makers understand key indicators to formulate policies better. Access to county-wide data would also enable local agencies and municipal leaders to understand their impacts on a broader regional network and enable operations adjustments based on real-time call volumes and other factors.

County Policy

Establishing a more robust county presence in EMS services will require additional funding. It may also require cooperation between Emergency Response, Planning, and Health Departments. Both require substantial support from both the legislature and county administration.

We suggest adding a county EMS medical director position to oversee quality assurance programs for EMS Agencies and to oversee coordination of training and medical protocols. Establishing this position would allow local EMS agencies to save money currently spent on agency-level medical directors and would allow volunteer and BLS-only agencies who do not currently require a medical director to opt-in to this additional service.

County policy makers must also bear in mind the win-win regionalization paradigm mentioned above and work to coordinate and support the priorities of local EMS agencies using public, private, or nonprofit models. Establishing and maintaining ongoing meetings and communications channels among EMS leaders and other stakeholders is essential to understanding how on-the-ground needs may change over time.

Future Studies

Our analysis has shown areas that are ripe for policy solutions and administrative action, but there is substantial room for additional study.

- Conversations with state representatives indicated an appetite for a better understanding of the threshold population density required for profitability, and an evaluation of the effectiveness of the Certificate of Need system that enables the operation of ambulance services in a given territory.
- Discussions with local EMS leaders indicated a need to better understand the real cost of volunteer labor in terms of how great an investment in time and other resources volunteers must make to serve. Understanding the value of community resources invested in EMS response would be a valuable asset for decision makers.

- Further investigation of the "frequent flyer" problem in terms of agency liability and the liability of care facilities as well as potential policy solutions is necessary for effective resource allocations for all agencies, both in and outside of Tompkins County.
- Finally, developing a business case for larger, regional EMS providers and investigating the possible impacts of increased agency size and scale in a rural context may provide meaningful insights and solutions to the evident frailty of the EMS network in New York State.

Conclusions

Our team conducted analysis of the influences on EMS cost and sustainability of service model and looked more broadly for solutions to the long-term challenges faced by EMS agencies in Tompkins County and other rural New York communities. The slow-moving and multifaceted nature of the EMS crisis makes it a difficult problem to frame in a political context, but it is truly a question of life and death for many. Increased response times have meaningful impacts on patient outcomes and our analysis shows substantial call volume increases and increasing response times in Tompkins County. Addressing these concerns must be a priority for elected officials and administrators alike.

These concerns have historically fallen to local fire departments, nonprofits, and municipal leaders to address. This reliance on local taxes and other community resources creates an inequitable and regressive burden in rural communities and exacerbates the strain on the EMS network by ensuring the uneven distribution of response capacities. As state and national trends continue, it is reasonable to expect the closure of more EMS agencies in rural areas, the continuation of alarming local trends in response times, and an increase in the local burden for providing EMS. Therefore, establishing top-down funding, support, and coordination at both the county and state level is an essential component of any effort to ensure an equitable distribution of resources and a robust network. However, funding changes should be investigated and implemented along with efforts to reframe problems in the EMS network, optimize regional resources, and provide increased support and coordination for local agencies.

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Appendix 1 – Data Comparisons

Response Time by Determinant																			
2017									⟹	2021									
AVG	A	B	C	D	O	Met 10 Min	95%	75%		AVG	A	B	C	D	O	Met 10 Min	95%	75%
11.2	*12.4*	*10.3*	*11.4*	*10.5*	*11.4*	*48.7%*	*21.2*	*14.1*	*Tompkins County (Ithaca Excluded)*	12.1	12.3	11.8	13.6	12.5	10.6	35%	19.8	11.3
18.4	21.7	14.3	19.0	17.0	20.3	11.5%	30.8	21.5	Slaterville	9.1	8.8	2.9	19.7	9.1	4.9	28%	18.9	13.5
16.2	19.9	12.9	14.5	15.0	14.2	10.3%	27.1	18.3	Etna	13.2	14.8	11.5	11.6	14.5	13.7	22%	18.7	14.2
13.7	9.8	23.4	15.4	14.9		33.3%	23.8	18.2	Speedsville	10.1	7.5	12.5	15.7	14.8		24%	14.8	12.4
13.5	16.9	11.9	13.5	12.3	13.3	25.0%	21.8	16.2	Newfield	23.1	28.7	36.6	20.9	12.8	16.7	19%	23.1	15.3
13.4	15.3	13.3	13.3	12.0	10.3	25.2%	22.7	16.2	Brooktondale	4.3	0.1	7.2	9.6	3.0	1.6	19%	9.1	6.3
12.9	15.2	12.1	12.4	11.6	14.1	24.2%	19.1	15.0	Danby	11.6	8.0	13.3	16.9	12.7	6.9	18%	21.5	18.9
12.7	16.2	12.2	12.9	10.4	11.8	34.2%	23.3	16.1	West Danby	10.2	9.4	8.4	8.4	12.4	12.5	17%	15.5	12.3
12.4	16.1	10.3	12.3	11.1	11.5	38.2%	22.4	15.5	Lansing	14.3	12.1	13.3	13.7	22.0	10.5	13%	24.6	18.4
12.3	15.1	11.1	12.0	11.2	19.4	29.8%	19.4	14.7	Enfield	20.3	31.5	5.1	26.2	10.1	28.8	13%	23.1	15.8
12.0	14.6	10.8	12.0	11.1	11.7	36.6%	19.8	14.7	Freeville	14.9	10.4	15.3	16.9	19.2	12.6	45%	17.4	12.9
11.1	11.7	10.9	11.7	10.4	9.4	51.7%	21.6	13.8	Groton	6.7	11.7	5.3	0.7	8.7	7.2	26%	9.8	7.4
10.4	10.4	10.6	10.7	10.0	9.9	57.6%	20.1	12.7	Trumansburg	10.8	10.1	11.4	10.4	10.8	11.2	12%	14.5	8.3
10.1	10.9	10.1	9.8	9.7		54.4%	17.1	12.1	Varna	7.7	10.3	9.5	9.2	9.7		17%	13.8	11.2
9.6	9.2	9.9	10.5	9.1	6.4	60.9%	16.4	11.7	MacLean	8.8	6.2	9.1	9.5	9.6	9.4	13%	12.5	8.9
8.4	8.7	8.3	8.8	7.8	10.7	74.8%	16.7	10.0	Dryden	8.2	7.8	7.9	6.4	9.1	9.9	37%	17.4	13.5
7.5	8.1	7.4	7.2	6.8	8.4	85.5%	12.9	8.4	Cayuga Heights	8.9	6.5	7.5	7.7	8.9	13.9	35%	18.3	11.9

The 2017 data analysis shows that relatively high Slaterville response times due to the recent closure of Slaterville Ambulance. The 2021 chart shows that resources have been allocated from around the county to cover that area, resulting in a general increase in response times in almost every district. This apparent reallocation reflects the underlying network dynamics and highlights the potential impact of resource allocations in general.

Appendix 2 – Resolution of Support for NYS Senate Bill S3503C

The following resolution was drafted as a template and shared via TCCOG with member municipalities and presented by our team to the Dryden Town Board and Trumansburg Village Board:

WHEREAS, *this board* recognizes that ambulance services provide critical emergency health care, particularly in rural communities; and,

WHEREAS, *this board* understands that rural ambulance departments are under unprecedented financial stress which is causing many rural services to close which forces others to take on ever-larger service areas, which negatively impacts response times and the overall service provided to residents; and,

WHEREAS, these pressures on the availability of ambulance services creates issues with the equitable distribution of emergency healthcare that disproportionately affects low income and disadvantaged communities in remote areas of NY State; and,

WHEREAS, *the EMS budget* has increased by more than *40%* in the past five years, causing a regressive tax burden on low-income households; and,

WHEREAS, the foregoing issues are shared by rural municipalities and EMS/ambulance departments throughout New York State; NOW

THEREFORE, BE IT RESOLVED, that *this board* requests that the Honorable Kathy Hochul, Governor of the State of New York, sign pending legislation establishing the New York State Rural Ambulance Task Force, Senate Bill S3503C; and,

BE IT FURTHER RESOLVED, that a copy of this resolution, accompanied by a letter from the *Village/Town*, be sent to Governor Hochul, Senator Hinchey, Senator Helming, Senator Oberacker, Senator O'Mara and Assemblymember Kelles.