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16. Abstract

Emergency medical services (EMS) systems are configured differently depending on several factors, including the size, demographics, geography, and politics of the local communities they serve. Although some information exists about the organization, financing, and delivery of EMS in the Nation's 200 largest cities, there is less information available about how services are organized outside large urban areas, in which 75% of the nation's population resides. There is little evidence to support alternative system designs and configurations in terms of their impact on the effectiveness and efficiency of service delivery. To this end, there is a need to develop a typology of system configurations so they may be evaluated on a common basis. This pilot research attempts to develop such a typology by characterizing local EMS systems in the Mid-Atlantic region of the United States. EMS systems were invited to respond to a 20-question survey to assess their structural components and response configurations as well as topics such as system access, financing, medical direction, and operating procedures. Respondents also provided subjective assessments of additional system features and environmental factors. An 86.1% response rate was achieved. Many responses varied both within and across States. Many system characteristics also varied significantly by the level of rurality, including system access, primary agency types, and operating procedures. Overall, respondents indicated positive system environments and support structures within their systems. With slight modification, this pilot research could be repeated on a national scale.

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BACKGROUND

Emergency medical services (EMS) systems are configured differently depending on several factors, including the size, demographics, geography and politics of the local communities they serve. Although some information exists about the organization, financing, and delivery of EMS in 200 of the Nation's largest cities (Williams, 2007), this information is incomplete and does not provide any information on how services are organized for proportion of the nation's population (75%) who resides outside of these urban areas. What we do know, however, is that there is wide variability in how systems are structured and organized with little evidence to support alternative configurations in terms of their impact on the effectiveness and efficiency of service delivery (IOM, 2007).

OBJECTIVE

To understand which EMS systems work well, an important first step is the development of a typology of system configurations so they may be evaluated on a common basis. This pilot research is a first step toward developing such a typology by characterizing local EMS systems in the Mid-Atlantic region of the United States.

METHODS

The Mid-Atlantic region chosen for this pilot study consists of seven States (Delaware, Maryland, New Jersey, North Carolina, Pennsylvania, Virginia, and West Virginia) and the District of Columbia. This geographic region was chosen for the pilot study for several reasons. First and perhaps most important, we expected that most of the archetypal systems mentioned above would be present in one or more of these States. In addition, the States themselves vary with respect to how EMS is organized at State and regional levels. Moreover, the region is diverse in terms of geography and demographic composition of the resident population. This diversity would allow an examination of variations in EMS configurations by level of rurality and size of the service area.

(Continued on additional pages)

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The States vary considerably by size and population demographics as well as how EMS is organized at the State and regional levels. The total percent of the population that lives within large metropolitan areas ranges across States from over 85% (Maryland and District of Columbia) to less than 20% (West Virginia, North Carolina and Delaware). The only States with more than 1% of the population living in completely rural areas are West Virginia, and North Carolina. A total of 81 counties in the study region are categorized as large metropolitan; 100 as small metropolitan; 31 as large non-metropolitan; 112 as small non-metropolitan and 81 as completely rural.

Traditionally, an EMS system has been defined as a comprehensive, coordinated arrangement of resources and functions organized to respond to medical emergencies in a timely manner (P.L. 93-154, 1973). In order to promote some level of consistency between systems and to ensure potential respondents would have a sufficiently broad perspective (e.g., including areas such as policy development or regionalization of services), this definition needed to be refined. For the purpose of this study, an EMS system is operationally defined as present when there is an identifiable local entity within a State EMS system's administrative hierarchy below the State level (if the State is sufficiently large enough) and immediately above the level of an individual provider agency. In instances where an agency is the sole provider for a jurisdiction and/or that agency serves in a leadership capacity to other services (i.e., there is not an independent administrative body for the jurisdiction), it is regarded as an EMS system. At the core of this particular definition is a desire to evaluate EMS at a level sufficiently close to the localities served by care personnel, but also a need to ensure that we could measure features that looked beyond the organizational boundaries of just a single agency. It should be noted that aeromedical and inter-facility transport service entities were not considered as part of this study.

The identification of systems within the participating States involved the following steps. First, each State EMS office was contacted several times in person, by phone, and by e-mail to learn more about the unique EMS environment and organization within the State. After being informed of the project, its overall goals, and our working system definition, every State EMS official provided contact information for each EMS system in their respective areas. The majority of systems identified were at a county (or equivalent) level, with a handful of additional systems representing multi-jurisdictional areas, independent cities or miscellaneous systems (e.g., an airport authority, or military installation or facility).

In three States (New Jersey, Virginia, and West Virginia), there were geographic areas identified that contained no EMS systems based on our definition. Conversations with the relevant State EMS offices revealed that while there were EMS agencies operating within these areas, they did not do so under a coordinated, local administration. As a result, these EMS agencies operated almost completely independent of each other and would interact directly with the State EMS agency on any matters (e.g., protocols, certification) that was outside the scope of its organizational walls. To characterize areas such as these at some cursory level, contact information for these counties (often an emergency services, public health or related contact) was obtained from the National Association of Counties (NACO).

All EMS systems, as defined using the criteria above, were mailed a 20-question survey, along with a postage-paid return envelope. The survey addressed the following topics:

- Overall size of the system, as characterized by the annual number of EMS responses and transports, as well as the total number of EMS personnel;
- Access to the system through 911;
- Provider and dispatch agency types;
- Response configurations, operating procedures, and use of volunteers;
- Mutual aid agreements and response to calls outside the primary service area;
- Medical control;
- Source of funding for the system.

The survey also contained a series of opinion questions focusing on resource levels, system support, system environment, and system change. Counties without systems meeting our criteria were sent an abbreviated 6-question survey designed to gather basic EMS information.

Analyses were primarily of a descriptive nature, focusing on frequencies of characteristics and exploration of differences across the States. Differences between geographic and demographic categories were also examined using chi-square and analysis of variance techniques as appropriate.

RESULTS

A total of 273 systems and 82 non-system counties were identified across the 7 States and the District of Columbia. No systems were identified in New Jersey. Of the 273 system surveys sent out, 235 were returned, yielding a response rate of 86.1%. Response rates among systems did not vary significantly by State or rurality, though the response rate among the 'non-system' counties was considerably lower (56%).

The size of the systems included in the survey is characterized by self-reported information on: (1) number of EMS care personnel (at all levels, including volunteers); (2) annual number of EMS responses; and (3) annual number of EMS transports. Given the skewed distributions of these variables, as well as extreme outlier data pushing up the value of the means, the standard deviations observed are quite large. As a measure of central tendency, the median is thought to better represent the size of a typical EMS system within a particular category. Mean (standard deviation) and median statistics for the size measures broken down by rurality are shown below:

		Large Metro (n=52)	**Small Metro (n=60)**	**Large Non-Metro (n=23)**	**Small Non-Metro (n=61)**	**Completely Rural (n=39)**
Annual EMS Responses	Mean (SD)	42,001 (76,406)	23,049 (43,250)	19,374 (26,218)	6,055 (4,103)	2,417 (3,229)
	Median	17,000	13,000	11,000	4,844	1,500
Annual EMS Transports	Mean (SD)	27,853 (56,837)	14,804 (19,291)	12,258 (14,463)	4,256 (2,491)	1,779 (2,432)
	Median	9,300	9,500	8,321	3,900	1,200
Number of Personnel	Mean (SD)	1,032 (2,284)	634 (1,349)	470 (816)	147 (229)	136 (476)
	Median	283	250	254	91	40

Nearly all respondents (94%) report the availability of E-911, although only 59% note access is available through wireless. Access through wireless E-911 varies by both State and rurality. As expected, wireless E-911 is less available in more rural systems and in smaller systems.

Most respondents (60%) report that more than one type of agency is involved in first response as well as transport activities. Of those systems using first responders (98% of all systems report using first responders), 70% of respondents indicate use of a fire department to provide these services and 52% report that the fire service is the primary group responsible for first response. Additionally, large systems are significantly more likely to use fire-based first response than their smaller counterparts. Nearly two-thirds of respondents in large metro areas report a fire department as the primary agency used for transport. In less urban areas, the use of a third service agency is more typical. Emergency dispatch functions are primarily handled by a city or county communications department for nearly half (48%) of responding systems, with an additional 22% served by a public safety department. The primary type of agency used for first response, transport, and dispatch varies across and within States.

First response personnel are used nearly all systems (98%). However, the results indicate that only 36% of first response workers are dispatched to all 911 calls. The results indicate that first responders were most likely (93%) to be dispatched to 911 calls in conjunction with a transport ambulance.

Advanced life support (ALS) was the primary form of EMS transport in over 80% of the systems. In general, large metro areas included ALS first response and transport to a greater extent to less urban systems (52% compared to 25% to 41% elsewhere). Estimates of population coverage associated with primary agency types and response configurations are shown below:

	Resident Population Coverage (%)
Primary First Response	
Private	11.6
Fire department	67.2
Government-based/third service	8.6
Other (or no 1st response)	12.6
Primary Transport Agency	
Private	31.0
Fire department	36.1
Government-based/third service	20.2
Other	12.7
Primary Dispatch	
City/County	63.2
Public safety	16.9
Other	19.8
Primary Configuration	
BLS 1st response/BLS transport	7.9
BLS 1st response/ALS transport	40.9
ALS 1st response/BLS transport	7.6
ALS 1st response/ALS transport	36.0
BLS transport only	1.6
ALS transport only	5.9

The majority of respondents (86%) report the use of volunteers, although the percentage of personnel serving in such a capacity has a tendency to be lower in larger systems. Over two-thirds of respondents note that call coverage is of major concern due to staffing shortages, however this unease was more prevalent among less urban systems (over 80% of the small non-metro and completely rural counties indicate call coverage as a major concern compared to only 57% of the large and small metro areas).

Nearly all respondents (94%) report their systems having mutual aid agreements, although the components addressed by these agreements vary widely across and within States. While the majority (88%) of mutual aid agreements addresses issues of service coverage, only one-half address communication linkages and merely one-third address licensure or certification of personnel, financial reimbursement or liability issues. Over one-quarter (29%) of respondents indicate that their primary transport agency *often* responds to calls outside the primary service area; an additional 44 % indicate they *sometimes* respond to these calls.

Nearly all respondents (96%) indicate medical direction is present at the system level. In 40% of these systems, this leadership is provided by a system-wide, "in-house" medical director who is a physician chosen or hired by the system's coordinating organization (as opposed to being imposed or required by some external entity). For another 50% of the systems, medical oversight is provided by an external director who is a physician administering from a remote organization, such as a local hospital.

Multiple sources of funding are used to finance EMS systems. The majority of respondents in 4 States as well as the District of Columbia indicate their primary source of funding stems from tax subsidies, while in two other States (Pennsylvania and West Virginia), systems are primarily financed by fees or billing for services. There is a strong relationship between the source of primary funding (tax subsidies versus fee for service) and the rural-urban continuum, with more urban areas depending more extensively on tax subsidies. Most systems also report that they receive donations.

Opinion-based questions allowed respondents to rank their agreement with statements on a 5-point Likert scale ranging from strong disagreement (1) to strong agreement (5). Mean summary scores were generated for each of four topical areas (resource levels, public participation, system support, and system environment). The subjective assessments of the respondents reflect a generally positive outlook on EMS systems in their areas.

DISCUSSION

Following a surge of activity in the 1960s and 1970s, Federal support of EMS systems has steadily declined, leaving State and local governments to take the lead in program development and system design. In addition to dwindling Federal support, heterogeneity across regions with regard to factors such as population size, rurality, geographic layout, and funding sources affects EMS priorities in these regions. The lack of centralized funding coupled with the qualitative differences across regions that dictate different needs have led authors to conclude that EMS configurations vary significantly across the nation (IOM, 2006; Shah, 2006). The results of this study support these earlier conclusions with the exception of a few variables that were universally skewed, such as the use of first responders and the presence of medical control..

The rural – urban continuum is useful for establishing patterns of various features of EMS configurations. Urban systems have higher call volumes, use volunteers less frequently, support greater use of a tiered response structure and non-response vehicles, have increased non-emergent use, and have more-developed administrative structures (Giordano & Davidson, 1994). Rural jurisdictions often must rely on volunteers, have longer response times, face high personnel turnover and service coverage issues, lack quality medical direction, and may lack advanced prehospital care. Further, rural areas often encounter greater financial constraints and sometimes even lack the infrastructure for complete public access to the emergency care system (IOM, 2006; NHTSA, 2004; Garnett & Spoor, 1994). This study supports some of these characterizations; for example, urban areas rely on fire-based agencies for transport, whereas rural systems tended to use private and third-service agencies to provide transport. However, some factors did not vary as a function of rurality. Nearly all respondents reported the use of first responders (98.3%) and ALS personnel (97.9%) within their systems.

Medical control was present at the system level for over 96% of systems; however, the likelihood that the director was in-house was higher for more urbanized systems. More rural systems were more often supported by an external director. This may be because urbanized systems have complex administrative structures in place to support their size, personnel, and budgets. As anticipated, urban and suburban systems have a significantly higher presence of operating protocols that allowed for response to the scene and patient transports without the use of lights and sirens for less emergent cases.

Availability of wireless E-911 in the EMS system differed significantly by rurality. This is an important issue for rural areas and our data indicate this difference to be largely dependent on the availability of wireless 911. It is notable that despite this variation, 90% or more the small non-metro and completely rural areas could still use the EMS system through hardwire-enhanced 911.

Although the primary source of system funding did not vary by rurality, there were significant differences in individual finance categories. With the exception of Pennsylvania, the use of taxes to finance EMS generally increases as the system becomes more urban. A similar trend was observed for systems in receipt of non-homeland security grants. Whereas the commitment of municipal or county funding is often logically a matter of having a large enough population to support the tax base, the difference in grant funding may be a result of

having the more sophisticated administrative systems generally needed to apply for and manage these funding streams. It is also possible that this difference may reflect a divide in the focus areas of those organizations awarding the grants. The true source of this difference in grant funding warrants further study. Billing and reimbursement continues as a source of significant funding, and it is interesting that rural systems receive a higher proportion from these sources. Although rural systems may be thought to rely more often on fundraising and donations, these data may indicate that the EMS industry is evolving and systems of all backgrounds are learning to "make do" with new tools and services.

At its core, health care is local, so variation in system configurations is expected. We recognize that no single model, design, or delivery system is suitable for every locality. Local systems must select elements of EMS based on needs and available resources to survive and provide essential community services. As a result, EMS systems incorporate multiple agency types, response configurations, and funding streams, and strive to integrate these elements into a cohesive whole. This study shows significant differences between and within States and verifies many distinctions across categories of system size and rurality. Despite the variations, EMS systems presented fairly consistent views through the survey's opinion questions, noting pervasive system change and positive environments and support structures, although adequate resources remain a key concern.

This pilot study of mid-Atlantic EMS systems, especially given the high response rate, demonstrates that a similar process could be executed on a national scale. The ability to link descriptive EMS system data on a national level with these datasets would only increase the usefulness of these data, allowing for greater comparison of system designs and outcomes.

Table of Contents

A. Introduction and Overall Objectives

Emergency medical services systems are configured differently depending on several factors, including the size, demographics, geography, and politics of the communities they serve. Although some information exists about the organization, financing, and delivery of EMS in 200 of the Nation's largest cities (Williams, 2007), this information is incomplete and does not provide any information on how services are organized outside of these large urban areas. The lack of information about less-populated regions is significant given that 75% of the Nation's population resides outside of the areas discussed by Williams. What we do know, however, is that there is wide variability in how systems are structured and organized, with little evidence to support alternative configurations in terms of their impact on the effectiveness and efficiency of service delivery (IOM, 2007).

To understand which EMS systems work well, an important first step is the development of a typology of system configurations so that they may be evaluated on a common basis. This pilot research attempts to develop such a typology by characterizing local EMS systems in the Mid-Atlantic region of the United States. This typology will also assist in establishing a common EMS language and provide the basis for tracking progress in the development of EMS systems in the future. The need for these data is important. In its effort to better prepare for mass casualties and disasters, the Nation must have a better understanding how emergency medical services are organized and delivered at the local level so these resources are appropriately integrated into an overall systems response capability (IOM, 2007).

Initially, the project was to use a case study approach and focus on the collection of detailed information from a limited number of prototypical EMS delivery models. The project team convened a panel of EMS experts to discuss the types of systems of interest and their prominent features. The panel also helped identify a handful of (mostly larger and well known) EMS systems located around the country. The identification of these systems was difficult, however, due to the great variability in how local EMS systems were organized. Subsequently, it was decided that a more appropriate first step would be a census-style survey of EMS systems. This change to the study methodology would allow for wider exploration of the variation in EMS system design and response configurations. After further consultation with NHTSA, it was agreed that relying on specific details from a limited number of archetypal systems would likely not be useful in generalizing ideas to a national scope given the enormous number of derivatives that would need to be considered. A full accounting of EMS systems would yield a data set thought to be far more useful as a research and planning tool, similar to the way the National Inventory of Trauma Centers has benefited the trauma community. With this revised approach, NHTSA began this accounting and characterization of EMS systems as a pilot project, beginning in the Mid-Atlantic region.

B. Methods

B.1. The Study Region

The Mid-Atlantic region consists of seven States, Delaware, Maryland, New Jersey, North Carolina, Pennsylvania, Virginia, and West Virginia, and the District of Columbia. This region was chosen for the pilot study for several reasons. First, and perhaps most important, we expected that most of the archetypal systems would be present in some of these States. In addition, the States themselves vary with respect to how EMS is organized at the State and local levels. Moreover, the region is diverse in geography and demographic composition. This diversity allows an examination of variations in EMS

configurations by level of rurality and size of the service area. Finally, we expected the support of the Mid-Atlantic EMS Council, a long-standing collaboration of the seven States and the District, would greatly assist in the execution of the project.

Table 1 summarizes the characteristics of the States in the study region. Data to characterize the States and their counties come from the 2003 Area Resource File (Department of Health and Human Services, 2003). The States vary considerably by size and demographics. Of particular relevance is the distribution of counties within States by rurality as defined by the rural-urban continuum (Butler, 1994) (see below). The total percentage of the population that lives in large metropolitan areas ranges across States from over 85% (Maryland and District of Columbia) to less than 20% (West Virginia, North Carolina, and Delaware). The only States with more than 1% of the population living in completely rural areas are West Virginia (21 of its 55 counties are categorized as completely rural), Virginia (32 of its counties are categorized as completely rural), and North Carolina (23 of its 100 counties are categorized as completely rural). A total of 81 counties in the study region are categorized as large metropolitan; 100 as small metropolitan; 31 as large non-metropolitan; 112 as small non-metropolitan, and 81 as completely rural (**Figure 1**). As shown in **Table 1**, there is also wide variation in rates of injury fatality both across and within States (ranging from 38.2 per 100,000 population in New Jersey to 80.7 per 100,000 in West Virginia).

Based on data from the National Association of State EMS Officials (NASEMSO, 2005), States are categorized according to selected characteristics of the State EMS authority (**Table 2**). Maryland is the only State in which the State EMS agency is an organizationally independent unit reporting directly to the Governor. In the District of Columbia, EMS is incorporated in a cabinet level department. The remaining States position these authorities within an "Office of EMS," situated in the organizational hierarchy of a State health department. The 29 functions over which the State EMS agency has definitive authority are also summarized in **Table 2**. In Maryland and North Carolina, the State EMS office has authority over nearly all of the functions (28 of 29 in Maryland and 27 of 29 in North Carolina). In contrast, Delaware has definitive authority over only 13 of the 29 and Virginia, 17 of the 29.

B.2. Identifying Local EMS Systems

With the study region for the pilot defined, the next task involved the identification of "systems" present at the jurisdictional or county level. Traditionally, an EMS system has been defined as a comprehensive, coordinated arrangement of resources and functions organized to respond to medical emergencies in a timely manner (P.L. 93-154, 1973). This definition serves well when looking at the broader functions or components of the system, but falls short in terms of clarity when attempting to identify system entities at the jurisdictional level. For example, a single provider agency may be able to adequately act upon the 15 components originally outlined in the Emergency Medical Services Act of 1973 or later modified in the EMS Agenda for the Future (NHTSA, 1996), but this would only illustrate enough coordination to internally operate and often does not touch on broader issues such as policy development and implementation or regionalization of services. For the purpose of this study, an EMS system is operationally defined as present when there is an identifiable local entity within a State EMS system's administrative hierarchy below the State level (if the State is sufficiently large enough) and immediately above the level of an individual provider agency. In instances where an agency is the sole provider for a jurisdiction and/or that agency serves in a leadership capacity to other services (i.e., there is not an independent administrative body for the jurisdiction), it is regarded as an EMS system. At the core of this particular definition is a desire to evaluate EMS at a level suffi-

ciently close to the localities served by care personnel, but also a need to ensure that we could measure features that looked beyond the organizational boundaries of just a single provider. It should be noted that aeromedical and interfacility transport services were not considered as part of this study.

The identification of systems in these States involved the following steps. First, each State EMS office was contacted several times in person, by phone, and by e-mail to learn more about the specific EMS environment and organization in the State. After being informed of the project, its overall goals, and our working system definition, every State EMS official provided contact information for each EMS system in their respective areas. The majority of systems identified were at a county (or equivalent) level, with a handful of additional systems representing multi-jurisdictional areas, independent cities, or miscellaneous systems such as an airport authority or a military installation.

In three States (New Jersey, Virginia, and West Virginia), there were geographic areas identified that contained no EMS systems based on our definition. Conversations with the State EMS offices revealed that while there were EMS agencies operating in these areas, they did not do so under a coordinated, local administration. As a result, these EMS agencies operated almost completely independent of each other and would interact directly with the State EMS agency on any matters (e.g., protocols, certification) that was outside the scope of its organizational walls. New Jersey presented a unique illustration of this circumstance. According to the State EMS director, the State has no regional EMS structure and local agencies are not aligned in any meaningful or consistent way with regard to their administration (Halupke, 2006). EMS services are credentialed at the level of the locality and have no administrative layers between the individual townships and the State. To characterize areas such as these at some cursory level, contact information for these counties (often an emergency services, public health, or related contact) was obtained from the National Association of Counties (NACO).

B.3. The Surveys

All EMS systems, as defined using the criteria above, were mailed a 20-question survey, along with a postage paid return envelope (see **Appendix A** for a copy of the survey). This survey was sent to the contact identified by the State EMS office, typically the Director of EMS for the system. To maximize the response rate, we limited the number of questions in the survey to 20. The survey addressed the following topics:

- Overall size of the system, as characterized by the annual number of EMS responses and transports, as well as the total number of EMS personnel;
- Access to the system through 911;
- Provider and dispatch agency types;
- Response configurations, operating procedures, and use of volunteers;
- Mutual-aid agreements and response to calls outside the primary service area;
- Medical control; and
- Source of funding for the system.

The survey also contained a series of opinion questions focusing on resource levels, system support, system environment, and system change. Finally, respondents were given the opportunity to provide additional narrative to better describe any unusual system structure, functions, or arrangements.

State EMS directors were given an opportunity to review drafts of this survey and provide feedback as part of several Mid-Atlantic EMS Council meetings. Several State EMS directors chose to assist us

by providing agency envelopes and a signed note on official letterhead to accompany our cover letter. This was done to mimic a package mailed by the State itself and to encourage survey completion through the endorsement of the State director.

Counties without EMS systems meeting our criteria were sent an abbreviated 6-question survey (Appendix B) designed to gather basic data on access, provider agencies, and funding from a contact in the county government. Recipients of the abbreviated survey were given an opportunity to provide contact information for a county government office or a lead organization responsible for the oversight of EMS in their jurisdictions (consistent with our definition above). When they did, we followed up with the larger 20-question survey to more fully explore the EMS features of that area.

For both the full and abbreviated surveys, non respondents received second mailings with pre-paid return envelopes as well as follow-up phone calls or faxes as needed.

B.4. Summary and Analysis of the Data

Data collected were entered into a Microsoft Access (v. 2002) database and analyzed using the SAS statistical software package (v. 9.1,). Analyses were primarily descriptive, focusing on frequencies of characteristics and exploration of differences across the States. Differences between geographic and demographic categories were also examined using chi-square analysis for dichotomous and categorical variables and analysis of variance (ANOVA) techniques were used to explore differences across continuous variables. In instances where ANOVA results showed significant differences, Duncan's multiple range test was used to determine the sources of the variation. Maps were generated using ArcMap GIS software (v. 8.2).

System characteristics were summarized by: (1) State; (2) rurality of the area serviced by the system; and (3) size of the area serviced by the systems as measured by the annual number of EMS responses (as reported by the systems). The rural-urban continuum classification scheme (Butler, 1994) was used to categorize counties by rurality. The standard categorization scheme defines 4 metropolitan (metro) and 6 non-metropolitan (non-metro) categories. Metropolitan areas are grouped by population size and non-metro counties by degree of urbanization and proximity to metro areas. For the purpose of this analysis, these 10 codes were further collapsed into 5 categories:

- **Large Metro Areas** (RUC Codes 0 and 1): counties in metro areas of 1 million population or more (including both central and fringe counties of metro areas)
- **Small Metro Areas** (RUC Codes 2 and 3): counties in metro areas of less than 1 million population (includes both those of greater than or less than 250,000 population)
- **Large Non-Metro Areas** (RUC Codes 4 and 5): urban population of 20,000 or more (including those adjacent to and not adjacent to a metro area)
- **Small Non-Metro Areas** (RUC Codes 6 and 7): urban population of 2,500 to 19,999((including those adjacent to and not adjacent to a metro area)
- **Completely Rura**l: (RUC Codes 8 and 9): population less than 2,500 (including those adjacent to and not adjacent to a metro area)

The size of the EMS systems were categorized by tertiles of the distribution of annual number of EMS responses and labeled as small, medium and large (small =< 3,968 calls; medium = 3,968 – 12,000 calls; and large = > 12,000 calls). Self reported data on size were not available for 13 of the systems.

C. Results

C.1. Categorization of Systems and Non-Systems within States and Response Rates

The total number of systems and non-systems by State and rurality are summarized in **Table 3** and in **Figure 2**. A total of 273 systems and 82 non-system counties were identified across the seven States and the District of Columbia. No systems were identified in New Jersey. Of the 273 system surveys sent out, 235 were returned, yielding a response rate of 86.1%. Response rates among systems did not vary significantly by State or rurality, although the response rate among completely rural systems was lower (79.6%) than less rural systems (Range: 86.7% to 92.0%). The response rate among the non-system counties was considerably lower; only 48 of the 82 non-system counties returned the survey for a response rate of 55.8%. These response rates were consistent across States and rurality of the service area.

Before proceeding with a detailed description of the systems surveyed, we describe the responses from the non-system counties (summarized in **Table 4**). Of the 48 non-system respondents, 60.4% indicated that there was some oversight of EMS by the county government. An additional 29.2% indicated that while there was no county oversight, there was a single lead organization outside the county government that provided oversight of EMS in their areas. In New Jersey, over one-fifth of the respondents (21.4%) indicated there was no lead organization or county oversight of EMS (Compared to 4.4% in Virginia and 9.1% in West Virginia). Nearly two-thirds of the respondents indicated their counties could access EMS through wireless 911 and nearly all (95.7%) denoted the use of ALS personnel. A combination of fire-based, private, and hospital-based agencies can be found throughout the non-system counties and the majority (89.6%) also use volunteers in their EMS environments.

C.2. Characteristics of Systems

In this section, we describe the characteristics of the systems that responded to our survey.

C.2.a. System Size

The size of the systems included in the survey is characterized by self reported information on: (1) number of EMS care personnel at all levels, including volunteers; (2) annual number of EMS responses; and (3) annual number of EMS transports. These numbers were divided by the resident population to obtain estimates of the totals per 1,000 population. The mean and median numbers across counties by State and by rurality are summarized in **Tables 5 and 6**. Variation in these numbers by system within States is evident in **Figures 3-5**.

C.2.b. Access through 911

Although slightly more than one-quarter of the respondents across all States indicate that individuals can call EMS though a 7 or 10 digit number, only two respondents (representing an airport and a military installation in Maryland) report that this is the only way individuals can access EMS **(Tables 7-9)**. Nearly all respondents (94%) report the availability of enhanced 911 (E-911, systems in which caller's phone number and geographic location appear on screen), although only 59% note access is available through wireless E-911. Access through wireless E-911 varies by both State and rurality **(Figure 6)**. As expected, wireless E-911 is less available in more rural systems and in smaller systems. For example, only 41% of respondents from rural systems report that wireless E-911 is available to them while that percentage is at least 15% higher within all other levels of rurality (ranging from almost 57% in large metro areas to nearly 70% in large non-metro areas).

C.2.c. Provider Agency Organizations

Most respondents (60%) report that more than one type of agency is involved in first response as well as transport activities (**Tables 10-12**). Only 19% of the systems surveyed report that more than one type of agency is involved in dispatch. The involvement of multiple agency types in first response and transport is fairly consistent across States and categories of the urban-rural continuum.

For the purpose of the survey, we defined first response as "the dispatch of medical personnel to the scene in a non-transport vehicle." Of those systems using first responders (98% of all systems report using first responders), 70% of respondents indicate use of a fire department to provide these services. Approximately half (52%) report that the fire department is the primary (most frequently used) agency involved in first response, although this percentage is highest for more urban areas (76% for large metro areas) and lowest for rural areas (22% for completely rural areas). Large systems are significantly more likely to use fire-based first response than their smaller counterparts (85% compared to 50%). In rural areas, the primary agency identified for first response is more equally likely to be fire, third service or a private agency. The primary type of agency used for first response also varies across and within States (**Figure 7**).

The primary type of agency used for transport (from the scene to a health care facility) also varies across and within States (**Figure 8**). Over all systems, there is no predominate type of agency providing transport. Within States, one or two types of agencies typically predominate. Nearly two thirds (65%) of respondents in large metro areas report a fire department as the primary agency used for transport. In less urban areas, this percentage is considerably lower, ranging from 0% in completely rural areas to 22% in smaller urban areas. In these areas, the use of a third service agency is more typical than in the large metro areas (ranging from 25% in the large non-metro areas to 41% in the small metro areas). The reported use of a fire department as the primary transport agency varies by system size, increasing from 16% in small systems to 27% in medium-sized systems and 38% in large systems. Interestingly, use of independent volunteer ambulance services (either as a participating or primary transport agency), does not vary consistently across the rural-urban continuum.

Nearly one half (48%) of respondents affirm that emergency medical dispatch of response vehicles is performed primarily by a city or county communications department. An additional 22% of systems are primarily served by a public safety department. These agency types closely resemble each other and are likely responsible for all emergency services (police, fire and EMS) communications. However, they remain distinct based on either additional functions performed (e.g. a county communications department might also be responsible for airports or public works) or on the name of the governmental department in which it resides. As with first response and transport, these percentages vary across and within States (**Figure 9**) as well as by rurality (**Table 11**).

Estimates of the total population within and across all States that are served by the different types of first response, transport, and dispatch agencies were derived by applying the percent distributions of the most frequently used agency type by the population figures for each system. The results are summarized in **Table 13**. Across all systems, we estimate that approximately 36% of the resident population lives in counties served primarily by fire-based agencies, 31% by private agencies and 20% by government-based / third service agencies. However, these percentages vary substantially by State.

C.2.d. Response Configurations and Use of Volunteers

Although first responders are used in most systems (98%), only 36% of respondents indicate they are commonly dispatched to all 911 calls. Respondents were asked to indicate the response configuration most frequently used within their systems; the results are summarized in **Tables 14-16** and **Figure 10**. The majority of respondents (80%) said that ALS transport was most frequently used. This percentage was slightly higher in the large and small metro areas (89% and 92%, respectively) compared to non-metro and rural areas (76% - 78%). In general, it was more frequent in large metro areas for the common response configuration to include both ALS first response and ALS transport (52% compared to 25% to 41% elsewhere). Estimates of the total population within and across all States that are served by ALS and BLS personnel are summarized in **Table 13**. The majority of the population (83%) live in areas served primarily by ALS transport personnel (41% live in areas where the primary configuration is BLS first response/ALS transport, 36% in areas where the primary configuration is ALS first response/ALS transport, 6% in areas where ALS transport only is the norm).

The majority of respondents (86%) report the use of volunteers, although this percentage varies by State (**Table 14**). Among EMS systems that deploy volunteers, the average percent of personnel serving in such a capacity is similar across the urban-rural continuum (45% across all systems, **Table 15**). However, there is a tendency for this percentage to be lower for larger systems (29%) compared to medium and small systems (36%, **Table 16**). The percentage of systems in which volunteers typically respond to calls from a fire or EMS station house as opposed to from their homes, work, or other locations within a designated response area varies significantly by both rurality and system size (68% in large metro areas, 43% in large non-metro areas and 9% in completely rural areas). Over two-thirds of respondents note that call coverage is of major concern due to staffing shortages, however this unease was more prevalent among less urban systems (over 80% of the small non-metro and completely rural counties indicate call coverage as a major concern compared to only 57% of the large and small metro areas).

Nearly all (92%) of the systems surveyed have operating procedures that allow EMS transports without use of lights and sirens, whereas only 70% have operating procedures that permit response to a scene in a similar manner. The transport of patients to non-hospital destinations is sanctioned in only 19% of all systems, with significant variation noted by rurality of the service area.

C.2.e. Response to Calls Outside Primary Service Areas

Nearly all respondents (94%) report their systems having mutual aid agreements, although the components addressed by these agreements vary widely across and within States (**Tables 17 – 19).** While the majority (88%) of mutual aid agreements address issues of service coverage, only a half address communication linkages and merely one-third address licensure or certification of personnel, financial reimbursement or liability issues.

Over one-quarter (29%) of respondents indicate that their primary transport agency *often* responds to calls outside the primary service area; an additional 44% indicate they *sometimes* respond to these calls. (**Tables 17-19 and Figure 11**) The percentage of systems in which the primary first response agency *often* or *sometimes* responds to calls outside the primary service area is slightly lower (12% and 39% respectively). The percentage of systems in which the primary transport agency or first response agency responds to calls outside the service area is lower for less urban as compared to more urban areas (e.g., 43% of the transport agencies in large urban areas *often* respond to calls outside the service area compared to only 23% of transport agencies in completely rural areas).

C.2.f. Medical Control

Nearly all respondents (96%) indicate medical direction is present at the system level (**Tables 20 -22** and **Figure 12**). In 40% of these systems, this leadership is provided by a systemwide, in-house medical director who is a physician chosen or hired by the system's coordinating organization. For another 50% of the systems, medical oversight is provided by an external director who is a physician administering from a remote organization, perhaps based at a local hospital. The percent of systems with a systemwide, in-house medical director is considerably higher for more urban areas and larger systems (52% for large metro areas compared to 26% for completely rural areas, 54% in large systems and 32% in small systems).

C.2.g. Financing

Multiple sources of funding are used to finance EMS systems (**Tables 23-25 and Figure 13**). When asked about their primary source of funding, the majority of respondents in 4 States as well as the District of Columbia indicate their primary source of funding stems from tax subsidies, while in Pennsylvania and West Virginia, systems are primarily financed by fees or billing for services. There is a strong relationship between the source of primary funding (tax subsidies versus fee for service) and the rural-urban continuum, with more urban areas depending more extensively on tax subsidies (e.g., 72% of systems in large metro areas compared to 43% of systems in completely rural areas).

C.2.h. Subjective Assessment of System-wide Features

In the last part of the survey, respondents were asked their opinions about the adequacy of resource levels, public participation, system support, and the system environment. For each of the items listed within a particular subcategory, respondents were asked to indicate whether they: (1) strongly disagreed, (2) disagreed, (3) were neutral, (4) agreed or (5) strongly agreed with the statement. The percent agreeing or strongly agreeing with the statements is presented in **Tables 26-28**. To summarize responses within each category, scores were computed for each respondent by assigning scores of 1 to 5 as indicated above, adding the scores and taking the average across the items (2 items were reversed scored to be consistent with the direction of the other items). Respondents were also queried about the extent of change within their systems, both experienced in the past and anticipated in the future. Results suggest the following:

- Resource Levels: Only 30% of respondents across all States agreed or strongly agreed that their systems had adequate staff to meet demand; 58% agreed or strongly agreed they had adequate resources (vehicles, equipment). These percentages varied somewhat across States. There was no consistent correlation with rurality of the service area. The mean overall score for Resource Levels was 2.97 (range across States: 2.75 – 3.27).
- Public Participation: Although 70% of the respondents agreed that the public is satisfied with EMS services, most felt the public did not have a high level of awareness of the system (i.e., only 28% agreed or strongly agreed that the population served had a high level of EMS awareness, participation or support). Defibrillators can be found in many public places in 44% of the systems, although this percentage was significantly higher in larger metro areas (65%) compared to less urban areas (e.g., 36% in completely rural areas). The percentage of systems in which bystanders often provide CPR prior to EMS arrival was low (25%) and did not vary significantly by State or rurality of the service area. The mean overall score for Public Participation was 3.06 (range across States: 2.97–3.35).
- System Support: Most respondents (74% agreed or strongly agreed) noted that hospitals in the system are supportive of the EMS personnel and agencies (74% agreed or strongly agreed that hospitals are supportive). Overall, this satisfaction was consistent across States

and levels of rurality. A lower percentage was satisfied with the level of physician involvement; only 59% of respondents agreed or strongly agreed that their system has a high level of physician involvement. Physician involvement was somewhat lower in the more rural versus urban areas. Most respondents were positive with regard to collaboration with non-EMS organizations (76% agreed or strongly agreed that the EMS system collaborates with non-EMS organizations), although satisfaction varied somewhat across States and rurality of the service area; only 61% of systems in large metro areas agreed or strongly agreed that EMS systems collaborate with non-EMS agencies compared to 74% for completely rural and over 85% for non-metro areas. Over three-quarters of the respondents (79%) agreed that the flow of patients through the system is generally smooth, with a tendency for a greater percentage of more rural areas positively endorsing this item (85% of the small non-metro and completely rural areas compared to 67% of the large metro areas). The mean overall score for System Support was 3.76 (range across States: 3.25 – 4.25).

- System Environment: Over three-quarters (77%) of all respondents said that their personnel enjoyed working within the system, with some variation evident across States and rurality. "Turf Wars" were noted as a problem for only one-quarter of the systems, with a tendency for more rural systems to indicate this as a problem. Politics were noted as a problem for 41% of the systems, but again, there was variation across States. The mean overall score for System Environment was 3.41 (range across States: 2.67 – 3.64).

Few respondents (18%) agreed that their systems looked much the same as 10 years ago and even fewer (8%) agreed that their systems will look much the same 10 years into the future. Further, less than one-half (46%) agreed or strongly agreed that their systems adapt well to change.

D. Discussion and Conclusions

D.1. Feasibility and Cost of Survey

This pilot confirmed the feasibility of conducting a survey of local EMS systems. Overall, the response rate of the systems identified through the State EMS directors was high (86%), with slightly lower response rates from systems in completely rural areas (80%). This high response rate can be attributed to: (1) the reasonable length of the survey; (2) good contact information (i.e., surveys were sent directly to the individuals responsible for overseeing the system); (3) endorsement from the State EMS agency; and (4) multiple contacts by mail and telephone. The typical number of contacts, either by mail or phone, needed to receive a completed survey from the majority of EMS systems was 1, although this ranged as high as 4 for a handful of locations.

Not surprisingly, the response rate from non-system counties was considerably lower (56%). In many instances, these surveys were sent to county officials with some responsibility for emergency services or public health. These contacts were obtained from the National Association of Counties (NACO), which maintains commercial mailing lists of government officials at the county level. Obtaining completed surveys from this group of respondents may have been hindered through inaccuracies in the NACO database or the lack of EMS focus or professional interest on the part of the identified individual.

This pilot study of mid-Atlantic EMS systems, especially given the high response rate, clearly demonstrates that a similar process could be executed on a national scale. As part of a national effort, the

support of the State and regional EMS officials would be critical, not only in the identification and recruitment of systems, but also in the interpretation of the results. The benefits of a national research study would be remarkable. As data standardization continues to become more firmly established in EMS with efforts such as the National EMS Information System (NEMSIS) (http://www.nemsis.org) and the Performance Measures Project (http://www.nasemsd.org/Projects/PerformanceMeasures/), extending this pilot research on a national scale would be useful. The ability to link descriptive EMS system data on a national level with these datasets would only increase the usefulness of these data, allowing for greater comparison of system designs and outcomes.

D.2. Overall Results:

D.2.a. Common Themes: Variability in and Across States

Following a surge of activity in the 1960s and 1970s, Federal support of EMS systems has steadily declined, leaving State and local governments to take the lead in program development and system design. This shift has created a fractional system of care nationwide and continues to promote regional and individual approaches to system design (IOM, 2006; Shah, 2006). As noted in **Table 2**, States have evolved quite differently in how they handle the oversight of EMS. With such contrasting approaches in State regulation and policy, along with differences in overall size, demographics and geography, it is not surprising that we see many differences in our data across these States. The only consistency observed across our pilot States in our analyses were in variables where the data were universally skewed (e.g., the use of first responders was reported by 98.3%, or almost all responding systems).

It is interesting to note, however, that there were many differences observed within each State as well. With the exception of Delaware and the District of Columbia, both quite small geographically and in the number of systems identified, the tables and maps overwhelmingly present a diverse view of EMS within a State's borders with few exceptions (e.g., all responding Pennsylvania systems indicate fees or billing for services as a primary source of funding, see **Table 23** and **Figure 13**). Localities have long played an active role in how EMS should be delivered in their areas, and accordingly, jurisdictions have made choices that suit their local circumstances. As anticipated, differences are observable at the State level, although this may be in part due to the natural variation of systems along other lines, such as rurality and size. It is notable that even in areas where State policy might be able to impose consistency (e.g., system access through wireless E-911), this was often not observed within our sample.

D.2.b. Variability by Rurality of the Service Area

EMS has developed very differently throughout the country based on varied histories, economics, policies, and local needs. Perhaps the most pronounced demarcation of such differences is with respect to the rurality of a system's service area. Urban, suburban, and rural jurisdictions vary greatly with regard to population demographics, industry, and economics. Such diversity has led to equally varied expectations of an EMS system within those areas. In urban areas, systems are likely to have higher call volumes, use volunteers less frequently, support greater use of a tiered response structure and non-response vehicles, increased non-emergent use, and have a more developed administrative structure (Giordano & Davidson, 1994). Conversely, rural jurisdictions often must rely on volunteer personnel, have longer response times, face high personnel turnover and service coverage issues, lack quality medical direction, and may lack access to advanced prehospital care. Further, these areas often encounter greater financial constraints and sometimes even lack the infrastructure needed to en-

sure complete public access to the emergency care system (IOM, 2006; NHTSA, 2004; Garnett & Spoor, 1994). Additionally, in urban and suburban areas where multiple agency types are used, the need for improved coordination and integration among disparate agencies increases (Williams, 2004).

When evaluated by level of rurality, our data support many of the differences noted above. The mean number of EMS responses was significantly higher for more urbanized systems, although the higher than expected use of volunteers was interesting. Nearly 80% of the respondents from large metropolitan systems reported the presence of volunteers and the average percent of system personnel that serve in some volunteer capacity was nearly 45%, regardless of rurality. One item potentially affecting response time, particularly in volunteer-rich rural areas, is where individual personnel are based when on duty. In outlying areas, workers may not be at the same location as a fully equipped response vehicle, but somewhere within a designated response area and initiated via cell phone or pager. Rural volunteer personnel were far less likely to respond to calls from a fire or EMS station house (9.4%) when compared to those in large metro areas (68.3%). As expected, significant differences were noted between rural systems, whose respondents expressed far more concern about call coverage due to staffing shortages, and their more urban counterparts. Mutual aid agreements, formal arrangements between agencies to lend assistance across jurisdictional boundaries, are critical in rural systems, especially when service coverage is an issue. Our data indicate that such agreements were consistently present for a large majority (>85%) of systems across all levels of the rural-urban continuum.

Although urban and suburban EMS systems would be expected to make greater use of tiered response configurations and advanced life support personnel than their rural counterparts (Giordano & Davidson, 1994), it was noteworthy that this was not the case among our pilot systems. No significant differences were observed across the rural-urban continuum in either instance, but perhaps the most remarkable observances are that nearly all respondents reported the use of first responders (98.3%) and ALS personnel (97.9%) in their systems. Based on these findings, it seems apparent that the more rural areas of our study population have begun to consider a wider array of system designs in order to meet the unique needs of their jurisdictions. A modestly higher number of first response and transport agency types were reported in more urban areas when compared to rural systems. Although it was suggested earlier that this could lead to difficulties with interagency cooperation and integration, this does not seem to be the case among the pilot systems given the low reported incidence of problems associated with “turf wars” and politics.

Medical control was present at the system level (as opposed to the individual agencies) for over 96% of systems; however, the likelihood that the director to be in-house was higher for more urbanized systems. More rural systems were more often supported by an external director. This may be due to the fact that urbanized systems have more complex administrative structures in place to support their size, personnel, and budgets. As anticipated, respondents from urban and suburban systems reported a significantly higher presence of operating protocols that allowed for both response to the scene and patient transports without the use of lights and sirens for less emergent cases. It remains interesting, however, that there was a significantly higher occurrence of operating procedures allowing for transport to non-hospital destinations associated with rural systems. In general, the allowance for non-hospital destinations could be associated with a non-emergent transport, though the higher prevalence in the completely rural areas may be due to the fact that there are fewer acute care hospitals available in those areas.

The technological sophistication of public access to the EMS system differed significantly by rurality. This is an important issue for more rural areas and our data indicate this difference to be largely dependent on the availability of wireless 911 access. It is notable that despite this variation, 90% or more of the small non-metro and completely rural areas could still access the EMS system through hardwire enhanced 911.

Although the primary source of system funding did not vary by rurality, there were significant differences found in individual finance categories. As expected, the use of tax subsidies to finance EMS generally increases as the system becomes more urban in nature. A similar trend was observed for systems in receipt of non-homeland security grants. Whereas the commitment of municipal or county funding is often logically a matter of having a large enough population to support the tax base, the difference observed in grant funding may be a result of having the more sophisticated administrative systems generally needed to apply for and manage these funding streams. It is also possible that this difference may reflect a divide in the focus areas of those organizations awarding the grants. As EMS continues to eye billing and reimbursement as a means to remain financially viable, it is interesting that a higher proportion of respondents from more rural systems receive funding from fees or billing for their services. While rural systems may be thought to rely more often on fundraising and donations, these data may be an indication that the EMS industry is evolving and systems of all backgrounds are learning to "make do" with tools and services perhaps newly available to them.

D.2.c. Comparisons With EMS System Data Cited by the IOM Report

Descriptive EMS system data cited in the *Emergency Medical Services at the Crossroads* (IOM, 2006) draws from two primary sources: the JEMS 200-City Survey, which annually evaluates EMS agencies in the Nation's largest cities, and the 2003 National Emergency Medical Services Survey, which conducted a nationwide evaluation by surveying State EMS offices. While clear differences exist between each of these projects and this pilot study, including the sampling frames and system definitions used, some comparisons are of their findings are warranted.

For EMS systems in our research containing one of the 200 cities surveyed by JEMS, a direct comparison was made between reported agency types and levels of service. Because the systems from our project were often larger in physical size and scope then the cities they encompass, we expected that agency types and service levels reported by a JEMS city may not be precisely the same as a whole system, but at least present within the system. Our study region contained 22 cities from the JEMS sample and 16 of our EMS systems provided data for comparison. Overall, the categorizations of first response and transport agency types as well as service levels were fairly consistent. More than 90% of the variable-to-variable comparisons were deemed equivalent. It is possible the small number of inconsistencies may have been from genuine changes within those systems or the use of historical data by JEMS (necessary for non-responding cities).

It is often convenient to categorize EMS systems into general headings such as fire-based, private, third service, or hospital-based. When looking at our pilot data in contrast with the groupings provided by JEMS and Mears, it is not surprising we see some differences (**Figure 14**). When looking at the area of first response, the JEMS survey clearly shows an over-representation of the fire service, which is likely due to its urban sampling frame, though data from our pilot study and Mears' work seem comparable. However, the comparison of transport types shows clearer differences, especially in the "fire-based" and "other" categories. Mears shows a higher proportion of fire-based systems and a comparable lower percentage of other (non-fire, non-hospital) types while the JEMS data reflect

percentages firmly in between the other studies. The differences shown between the pilot and the Mears studies may be due to a higher representation of government-based and volunteer systems (47.5% combined) in our work and is perhaps a function of the choice of States included in this research.

D.2.d. Validity and Reliability

Although similar nationwide data are lacking to evaluate data validity and reliability, additional perspectives are available from State and regional EMS officials overseeing the systems within this study. In an effort to begin evaluating such issues, the investigators reviewed preliminary results with the State EMS Director of Maryland. This initial discussion proved interesting and we were encouraged to continue the dialogue in greater detail by including several regional EMS administrators within Maryland. Through a teleconference, individual survey responses for every jurisdiction under each regional administrator's charge were reviewed to check for potential inaccuracies. While recognizing the potential drawbacks that could arise from any self-reported data, the State and regional EMS officials noted several issues that seemed to illuminate either minor inaccuracies or misinterpretations on the part of the survey respondents.

Our teleconference discussions focused on definitions used to classify response categories, question wording, as well as how to best interpret and present results for select questions. As an example of potentially misinterpreted response categories, several jurisdictions indicated the presence of private agencies providing either first response or transport, although regional administrators were not aware of any commercial ambulance organizations contracted to provide such services in these areas. It was speculated that respondents may have mistakenly selected these response categories to reflect fire service agencies that were thought to be private by way of their IRS 501(c)(3) status. Further, certain words within several questions were thought to be open to interpretation. An illustration of this point is the use of the word "primary" to describe an agency type, response configuration or source of funding. Current question formatting does not specify whether "primary" should be taken from the perspective of a system's population or geography. Having the opportunity to discuss an overall viewpoint of local EMS with the Maryland administrators in an interview-style conversation confirmed that the systems we discussed were indeed hybrid in nature. It was widely noted that the presentation of results from the perspective of a "primary" grouping should be taken cautiously because such categorizations may not best fully describe the complex, interconnected system underneath.

Overall, the feedback process was quite informative for the investigators and both interesting and useful according to the Maryland officials. The investigators will continue to follow up with each State EMS director to discuss State-specific results as well as the Mid-Atlantic EMS Council in order to provide feedback, make improvements to the survey instrument, and revise analysis plans for future consideration.

D.3. Limitations of the Pilot

There were several limitations associated with this pilot research and indeed, some of them are challenges in the broader realm of EMS systems research. The lack of existing, standardized definitions in describing the most fundamental elements of EMS presented survey design challenges. With widely varied State and local regulations, norms, and personal perspectives, the language used to classify agencies, and service levels becomes more difficult to develop. As an example, terms such as "volunteer agency" and "rescue squad" may mean the same thing in certain areas of the country or could be completely unique in others. Such issues, along with reliance on respondent self-

classification, only compound the difficulties in designing survey instruments with a national scope in mind and could lead to overuse of "other" categories within particular questions.

Moreover, there will be a need to align the definitions of EMS elements used in any national census with definitions used with the NEMSIS database. As examples, the NEMSIS includes alternative levels of 'rurality' and 'EMS agency types.' As mentioned previously, a goal of completing this census on a national level is to link the descriptive data collected with the NEMSIS, and this necessitates that the data sources have compatible terminology.

The classification of EMS systems, as opposed to individual cities or provider organizations, presents challenges due to their underlying complexity and the potential for heterogeneity even within the system itself. By definition, systems are created from the combination of many pieces, each of which may be very different. As an example, within a single countywide system, fire departments, private agencies, government and volunteer organizations may all be providing services, at a variety of levels in a multitude of ways. To this end, EMS can vary from town to town, even within a highly organized system. Multi-county as well as airport, tribal, or military EMS systems also present challenges. Very large land areas, such as the 10-county system surrounding Pittsburgh, Pennsylvania, are difficult to classify with regard to demography and geography, irrespective of the EMS being provided. Atypical systems, while important to their respective State EMS structures and likely fairly homogeneous as individual units, may prove difficult to compare with the majority of jurisdictional systems.

Throughout our geographic area of interest, it is clear that EMS is credentialed in a variety of ways. At opposite ends of the spectrum are North Carolina, which defines through regulation the minimum service area of an EMS system to be one county, and New Jersey, which only credentials agencies at the local level but does not organize these agencies in any way below the State level (Halupke, 2006). As Mears (2004) convincingly stated, "The definition of an EMS system varies from State to State, which make any analysis of EMS systems impossible." This pilot study attempted to standardize the definition of an EMS system to promote more fluid analyses, but this design has excluded certain geographic areas from consideration. Further deliberation is warranted to determine whether these excluded areas should be considered differently and how they may be brought into the larger framework on a more uniform basis.

While the survey was designed to be broad and generic in nature to ensure brevity and answerability, it is by no means complete in terms of what should be asked of an EMS system. The questions address many of the key facets of system structure and environment, but some specific areas require further inquiry and there is a need to examine yet another class of quantitative and performance variables to assess the relative value of any given configuration. While the system as an entity works to improve the operations it governs, the effective administration of an EMS system requires a different perspective and knowledge-base than is found in field operations. Therefore, the identification of appropriate survey recipients is critical. As first-line administrators at the local level, it is difficult to gauge the consistency of respondents' backgrounds and whether their system roles generally take on a broad perspective (e.g., policy setting) or more targeted focus (e.g., field operations), hence a potential response bias exists.

D.4. Summary and Conclusions

At its core, all health care is local and to this end, variation is something we have come to expect within EMS. It is broadly recognized that no single model, design, or delivery system will be suitable

for every locality, as local EMS systems must choose elements based on needs and available resources to survive and provide essential community services. As a result, EMS systems incorporate multiple agency types, response configurations, and funding streams while striving to best integrate these into a cohesive whole. The results of this study highlight noticeable differences between and within States and verified many of the expected distinctions across various categories of system size and rurality. Despite the variation observed in the structural elements assessed, EMS systems presented fairly consistent views through the survey's opinion questions, noting pervasive system change as well as positive environments and support structures, although adequate resources remain a key concern.

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Table 1: Characteristics of States in the Study Region

	DC	DE	MD	NC	NJ	PA	VA	WV
Total Population	572,059	783,600	5,296,486	8,049,313	8,414,350	12,281,054	7,078,515	1,808,344
Land Area (sq. mi.)	61	1,954	9,774	48,711	7,417	44,817	39,594	24,078
Population Density (people per sq. mi.)	9,317	401	542	165	1,134	274	179	75
Number of Counties by Urban-Rural Continuum (and % of State's pop'n)								
All counties	1	3	24	100	21	67	134	55
Large Metro	1 (100.0%)	0 (0.0%)	12 (87.2%)	7 (16.8%)	17 (89.9%)	12 (50.9%)	31 (52.5%)	1 (2.3%)
Small Metro	0 (0.0%)	2 (80.0%)	3 (5.5%)	28 (50.7%)	4 (10.1%)	21 (33.7%)	31 (25.6%)	11 (40.0%)
Large Non-Metro	0 (0.0%)	0 (0.0%)	2 (3.2%)	8 (8.9%)	0 (0.0%)	6 (5.0%)	11 (6.7%)	4 (15.8%)
Small Non-Metro	0 (0.0%)	1 (20.0%)	6 (3.5%)	35 (19.3%)	0 (0.0%)	23 (9.6%)	29 (9.3%)	18 (27.9%)
Rural	0 (0.0%)	0 (0.0%)	1 (0.6%)	22 (4.2%)	0 (0.0%)	5 (0.7%)	32 (6.0%)	21 (13.9%)
Percent of Population…								
Male	47.1	48.6	48.3	49.0	48.5	48.3	49.0	48.6
65 Years and Older	12.2	13.0	11.3	12.0	13.2	15.6	11.2	15.3
Below Poverty Line	20.2	9.2	8.5	12.3	8.5	11.0	9.6	17.9
Percent of Population[a]…								
White	32.2	75.9	65.4	73.1	74.4	86.3	73.9	95.9
African-American	61.3	20.1	28.8	22.1	14.4	10.5	20.4	3.5
Indian/Alaska Native	0.8	0.8	0.7	1.6	0.6	0.4	0.7	0.6
Asian	3.1	2.4	4.5	1.7	6.2	2.0	4.3	0.7
Some Other Race	5.1	2.7	2.6	2.9	7.0	2.0	2.8	0.3
Percent of Population…								
Hispanic or Latino	7.9	4.8	4.3	4.7	13.3	3.2	4.7	0.7
Age-Adjusted Injury Death Rates – All Injury (per 100,000 pop'n)[+]	79.6	51.6	55.4	67.2	38.2	56.5	52.7	80.7

[a] Alone or in combination with other races listed; percentages may add up to more than 100%
[+] Available through WISQARS (http://www.cdc.gov/ncipc/wisqars/)

Table 2: Organization of EMS at the State Level in Study Region[a]

	DC	DE	MD	NC	NJ	PA	VA	WV
Number of EMS regions	**0**	**0**	**5**	**17**	**0**	**16**	**11**	**7**
Closest description of organizational position of EMS unit within the governmental hierarchy:								
Organizationally independent unit	◘		◘					
Cabinet-level department								
Division of a government department				◘	◘	◘	◘	
Lower section of a government division		◘						◘
Closest description of the State agency in which the EMS office is organized:								
Public Health		◘			◘	◘	◘	◘
Public Safety	◘							
Health and Human Services				◘				
Separate Agency			◘					
Closest description of principal EMS board or committee:								
Regulatory Board With Formal Authority			◘					
Advisory Board With Little Formal Authority	◘	◘		◘	◘	◘	◘	◘

[a] Data obtained from the National Association of State EMS Officials monograph, December 2005.

Table 2: Organization of EMS at the State Level in Study Region[a] (continued)

	DC	DE	MD	NC	NJ	PA	VA	WV
State EMS office has definitive authority over…								
EMS personnel training and certification course standards	◘	◘	◘	◘	◘	◘	◘	◘
EMS instructor credentialing or qualifications	◘	◘	◘	◘	◘	◘	◘	◘
EMS continuing education session approval	◘	◘	◘	◘	◘	◘	◘	◘
Administration of EMS personnel licensure or certification examinations	◘		◘	◘	◘	◘	◘	◘
Development or approval of EMS field treatment protocols	◘	◘	◘	◘	◘	◘		◘
Ambulance design specifications			◘	◘	◘	◘		
Ambulance staffing requirements	◘		◘	◘	◘	◘	◘	◘
Ambulance equipment and medications approval	◘		◘	◘	◘	◘	◘	◘
Ambulance operational requirements	◘		◘	◘	◘	◘	◘	◘
Ambulance inspection	◘		◘	◘	◘	◘	◘	◘
Ambulance certification or licensing	◘		◘	◘	◘	◘	◘	◘
Ambulance service area approval	◘			◘				
Ambulance service establishment requirements	◘		◘	◘	◘	◘		◘
Ambulance service operational/level of service requirements	◘		◘	◘	◘	◘		◘
Specialty EMS transport systems credentialing or licensure	◘	◘	◘	◘	◘	◘	◘	◘
Ambulance service investigation and discipline	◘		◘	◘	◘	◘	◘	◘
EMS medical director qualifications	◘	◘	◘	◘	◘	◘	◘	◘
EMS field treatment protocol or standing order approval	◘	◘	◘	◘	◘	◘		◘
EMS triage transport protocols	◘	◘	◘	◘	◘	◘	◘	◘
Mutual aid agreements between EMS provider agencies	◘	◘	◘					◘
Dispatch agency approval	◘		◘	◘				

[a] Data obtained from the National Association of State EMS Officials monograph, December 2005.

Table 2: Organization of EMS at the State Level in Study Region[a] (continued)

	DC	DE	MD	NC	NJ	PA	VA	WV
EMS dispatcher training or credentialing			◘	◘				
Pre-hospital data reporting		◘	◘	◘	◘	◘	◘	◘
Trauma center review and designation or categorization	◘	◘	◘	◘			◘	
Other specialty care center review and designation or categorization (i.e., burn, cardiac, pediatrics)	◘	◘	◘				◘	
Trauma registry reporting		◘	◘	◘	◘		◘	
Domestic preparedness and response planning for EMS at local or regional levels	◘		◘	◘		◘		◘
Coordination of domestic planning drills and exercises at local or regional levels	◘		◘	◘		◘		
Coordination of local or regional resources during a disaster or terrorist attack	◘		◘	◘	◘	◘		◘
Total Number and Percentage Endorsed (of 29 categories)	**25 86.2%**	**13 44.8%**	**28 96.6%**	**27 93.1%**	**21 72.4%**	**22 75.9%**	**17 58.6%**	**21 72.4%**

[a] Data obtained from the National Association of State EMS Officials monograph, December 2005.

Table 3: Response Rates by System Status, State, and Rural-Urban Continuum of Service Area

		System Counties		Non-System Counties	
	Total Number of Counties	Total Number of Systems	Number Responding (and Percent)	Total Number of Non-System Counties	Number Responding (and Percent)
By State:					
Delaware	3	3	2 (66.7%)	N/A	N/A
District of Columbia	1	2[a]	2 (100.0%)	N/A	N/A
Maryland	24	28[b]	25 (89.3%)	N/A	N/A
New Jersey	21	0[c]	N/A	21	14 (66.7%)
North Carolina	100	100[d]	90 (90.0%)	N/A	N/A
Pennsylvania	67	16[e]	15 (93.8%)	N/A	N/A
Virginia	134	85[f]	70 (82.4%)	49	23 (46.9%)
West Virginia	55	39	31 (79.5%)	16	11 (68.8%)
By Rurality:					
Large Metro	81	60	52 (86.7%)	20	13 (65.0%)
Small Metro	100	69	60 (87.0%)	16	8 (50.0%)
Large Non-Metro	31	25	23 (92.0%)	2	1 (50.0%)
Small Non-Metro	112	70	61 (87.1%)	21	12 (57.1%)
Completely Rural	81	49	39 (79.6%)	27	14 (51.9%)
All States	**405**	**273**	**235 (86.1%)**	**86**	**48 (55.8%)**

[a] Includes data for Washington Metropolitan Airports Authority
[b] Includes 24 counties as well as systems for Aberdeen Proving Ground, Annapolis City, BWI Airport, and Ft. Meade
[c] According to the state EMS director, there are no formal EMS organizations below the State level other than individual cities or townships.
[d] By statute, an EMS system can be no smaller than a county unit. Each county has its own EMS system with the exception of Camden and Pasquotank Counties, which are counted together. Also includes data for Cherokee Tribal EMS.
[e] Pennsylvania EMS systems are incorporated at the regional level, many of which are multi-county
[f] Although occasionally incorporated into surrounding counties for demographic purposes, this study accounts for the Commonwealth's 40 independent cities as individual system or non-system entities.

Table 4: Characteristics of Non-System Counties
(n=48 Respondents to Short Survey)

Governmental Oversight of EMS or Lead EMS Organization?	All Counties (n=48)	NJ (n=14)	VA (n=23)	WV (n=11)
Yes – County Government	60.4%	50.0%	69.6%	54.6%
Yes – Lead Organization Other Than County	29.2%	28.6%	26.1%	36.4%
No – No Lead Organization Outside County Government	10.4%	21.4%	4.4%	9.1%
EMS Access				
Any Access Through 911	95.8%	92.9%	95.7%	100.0%
Any Access Through Wireless 911	62.5%	71.4%	60.9%	54.6%
Any Access Through 7 or 10 digit	52.1%	78.6%	43.5%	36.4%
Provider Agencies				
Fire Department	58.3%	64.3%	56.5%	54.6%
Private	58.3%	57.1%	52.2%	72.7%
Volunteer/Rescue Squad	89.6%	92.9%	100.0%	63.6%
Police	12.5%	21.4%	13.0%	0.0%
Hospital	25.0%	57.1%	13.0%	9.1%
>1 Provider Agency Type	83.3%	92.9%	87.0%	63.6%
EMS Financed Through . . .				
Tax Subsidies	60.4%	71.4%	69.6%	27.3%
Fees / Bill for Service	72.9%	78.6%	56.5%	100.0%
Donations/Fundraisers	79.2%	85.7%	95.7%	36.4%
>1 Source of Funding for EMS	79.2%	85.7%	87.0%	54.6%
Use First Responders?	72.3%	61.5%	65.2%	100.0%
Use ALS Providers?	95.7%	100.0%	91.3%	100.0%

Table 5: Size of Systems by State

	All Systems (n=235)	DC (n=2)	DE (n=2)	MD (n=25)	NC (n=90)	PA (n=15)	VA (n=70)	WV (n=31)
Annual Number of EMS Responses								
Mean (SD)	19,089 (44,943)	66,750 (89,449)	81,297 (88,666)	26,349 (36,580)	11,384 (12,977)	114,793 (138,011)	9,176 (11,527)	10,455 (21,906)
Median	6,500	66,750	81,297	11,000	7,300	64,000	4,500	2,350
Inter-Quartile Range	13,300	126,500	125,393	19,021	10,016	69,697	9,747	8,158
Mean per Thousand Pop'n Ratio (averaged across systems)	153.0	227.2	203.3	130.2	154.6	131.9	143.6	188.8
Annual Number of EMS Transports								
Mean (SD)	12,566 (30,237)	38,500 (51,619)	94,948 (.)	17,277 (24,436)	8,225 (9,646)	71,525 (100,792)	6,282 (7,660)	7,888 (15,428)
Median	4,688	38,500	94,948	7,000	5,000	32,065	3,800	1,700
Inter-Quartile Range	8,582	73,000	N/A	10,100	6,585	65,590	5,509	7,313
Mean per Thousand Pop'n Ratio (averaged across systems)	112.5	131.1	189.8	95.6	117.2	71.7	103.5	143.9
Number of EMS Personnel								
Mean (SD)	493 (1,346)	820 (962)	1,985 (445)	609 (779)	239 (403)	3,822 (3,958)	237 (292)	73 (81)
Median	148	820	1,985	270	120	2,457	150	47.5
Inter-Quartile Range	250	1,360	630	727	211	4,300	210	40
Mean per Thousand Pop'n Ratio (averaged across systems)	4.4	2.6	7.6	4.6	4.9	4.9	4.3	2.6

Table 6: Size of Systems by Rurality[a] of the Service Area

	All Systems (n=235)	Large Metro (n=52)	Small Metro (n=60)	Large Non-Metro (n=23)	Small Non-Metro (n=61)	Completely Rural (n=39)
Annual Number of EMS Responses[f]						
Mean (SD)	19,089 (44,943)	42,001*a* (76,406)	23,049*b* (43,250)	19,374*bc* (26,218)	6,055*bc* (4,103)	2,417*c* (3,229)
Median	6,500	17,000	13,000	11,000	4,844	1,500
Inter-Quartile Range	13,300	40,200	17,000	8,000	5,038	1,472
Mean per Thousand Pop'n Ratio (averaged across systems)	153.0	127.1	151.9	208.3	153.9	151.1
Annual Number of EMS Transports[f]						
Mean (SD)	12,566 (30,237)	27,853*a* (56,837)	14,804*b* (19,291)	12,258*b* (14,463)	4,256*b* (2,491)	1,779*b* (2,432)
Median	4,688	9,300	9,500	8,321	3,900	1,200
Inter-Quartile Range	8,582	21,300	11,600	7,282	2,400	1,411
Mean per Thousand Pop'n Ratio (averaged across systems)	112.5	86.7	107.1	152.5	121.7	113.1
Number of EMS Personnel[f]						
Mean (SD)	493 (1,346)	1,032*a* (2,284)	634*ab* (1,349)	470*ab* (816)	147*b* (229)	136*b* (476)
Median	148	283	250	254	91	40
Inter-Quartile Range	250	980	623	353	124	40
Mean per Thousand Pop'n Ratio (averaged across systems)	4.4	3.3	3.6	4.2	3.6	8.4

[a] Defined by Rural-Urban Continuum

[f] Represents significant F at $p<0.05$ based on one-way ANOVA; Mean separation by Duncan's multiple range test

Table 7: Access to the System by State

	All Systems (n=235)	DC (n=2)	DE (n=2)	MD (n=25)	NC (n=90)	PA (n=15)	VA (n=70)	WV (n=31)
Highest level of technical sophistication for system access is…								
Wireless E911	58.6	50.0	0.0	56.0	61.1	66.7	73.9	19.4
Wireless 911 *(but Not Wireless E911)*	16.2	50.0	50.0	12.0	16.7	26.7	11.6	19.4
E911 *(but Not Wireless 911)*	21.4	0.0	50.0	24.0	22.2	6.7	13.0	41.9
911 *(but Not E911)*	3.0	0.0	0.0	0.0	0.0	0.0	1.5	19.4
7- or 10-Digit Number Only	0.9	0.0	0.0	8.0	0.0	0.0	0.0	0.0
Access to the system is available through								
Wireless E 911	58.6	50.0	0.0	56.0	61.1	66.7	73.9	19.4
Wireless 911	31.6	100.0	50.0	28.0	30.0	66.7	29.0	22.6
E911	94.0	50.0	100.0	92.0	97.8	100.0	97.1	77.4
911	25.2	100.0	0.0	36.0	16.7	60.0	17.4	38.7
7- or 10-Digit Number	26.5	50.0	50.0	32.0	26.7	40.0	21.7	22.6

Table 8: Access to the System by Rurality[a] of the Service Area

	All Systems (n=235)	Large Metro (n=52)	Small Metro (n=60)	Large Non-Metro (n=23)	Small Non-Metro (n=61)	Completely Rural (n=39)
Highest level of technical sophistication for system access is…*						
Wireless E 911	58.6	56.9	68.3	69.6	57.4	41.0
Wireless 911 *(but Not E911)*	16.2	21.6	11.7	26.1	14.8	12.8
E911 *(but Not Wireless 911)*	21.4	15.7	18.3	4.4	26.1	35.9
911 *(but Not E911)*	3.0	2.0	1.7	0.0	1.6	10.3
7- or 10-Digit Number Only	0.9	3.9	0.0	0.0	0.0	0.0
Access to the system is available through						
Wireless E 911	58.6	56.9	68.3	69.6	57.4	41.0
Wireless 911*	31.6	51.0	31.7	34.8	21.3	20.5
E911	94.0	92.2	95.0	100.0	95.1	89.7
911	25.2	37.3	18.3	17.4	21.3	30.8
7- or 10-Digit Number	26.5	33.3	28.3	39.1	19.7	18.0

[a] Defined by Rural –Urban Continuum
* Represents significant X^2 at $p<0.05$

Table 9: Access to the System by Size of the System[a]

	All Systems (n=222)	Small (n=74)	Medium (n=75)	Large (n=73)
Highest level of technical sophistication for system access is…*				
Wireless E 911	58.6	50.0	64.0	64.4
Wireless 911 *(but Not E911)*	16.2	13.5	14.7	20.6
E911 *(but Not Wireless 911)*	21.4	28.4	21.3	15.1
911 *(but Not E911)*	3.0	8.1	0.0	0.0
7- or 10-Digit Number Only	0.9	0.0	0.0	0.0
Access to the system is available through				
Wireless E 911	58.6	50.0	64.0	64.4
Wireless 911*	31.6	21.6	28.0	45.2
E911*	94.0	90.5	97.3	98.6
911	25.2	29.7	16.0	26.0
7- or 10-Digit Number*	26.5	23.0	17.3	35.6

[a] Defined by annual number of responses (not available for 13 systems)
* Represents significant X^2 at $p<0.05$

Table 10: Provider Agency Types by State

	All Systems (n=235)	DC (n=2)	DE (n=2)	MD (n=25)	NC (n=90)	PA (n=15)	VA (n=70)	WV (n=31)
Percent with >1 Type of Agency Involved in . . .								
First Response[+]	59.7	50.0	100.0	62.5	66.7	73.3	47.6	53.6
Transport	60.5	50.0	100.0	60.0	64.0	93.3	59.4	35.5
Dispatch	19.0	0.0	50.0	8.0	27.3	26.7	7.3	25.8
First Response: Any Use of . . .								
Private	19.6	0.0	0.0	12.0	27.8	26.7	8.6	25.8
Fire	70.2	100.0	100.0	68.0	64.4	93.3	74.3	64.5
Third Service	28.5	0.0	100.0	25.0	46.0	13.3	9.5	25.0
Volunteer	29.9	0.0	50.0	25.0	31.	26.7	36.5	17.9
Hospital-Based	7.7	0.0	0.0	0.0	9.2	40.0	3.2	3.6
Other	18.3	0.0	50.0	24.0	17.8	46.7	14.3	9.7
No First Response	6.8	0.0	0.0	4.4	4.6	0.0	10.6	11.1
First Response: Primary Responsible Agency								
Private	9.0	0.0	0.0	4.4	9.2	13.3	4.6	22.2
Fire	52.3	100.0	100.0	65.2	39.1	66.7	66.7	33.3
Third Service	18.0	0.0	0.0	17.4	31.0	0.0	3.0	25.9
Volunteer	7.6	0.0	0.0	8.7	8.1	0.0	10.6	3.7
Hospital-Based	3.6	0.0	0.0	0.0	4.6	13.3	1.5	3.7
Other	2.7	0.0	0.0	0.0	3.5	6.7	3.0	0.0
No First Response	6.8	0.0	0.0	4.4	4.6	0.0	10.6	11.1
Transport: Any Use of . . .								
Private	34.9	0.0	50.0	12.0	37.8	80.0	22.9	51.6
Fire	44.7	100.0	100.0	72.0	16.7	93.3	67.1	22.6
Third Service	39.5	0.0	50.0	20.0	68.5	26.7	14.5	35.5
Volunteer	41.2	0.0	100.0	32.0	32.6	93.3	56.5	12.9
Hospital-Based	11.6	0.0	0.0	4.0	12.4	66.7	4.4	6.5
Other	8.5	0.0	50.0	8.0	10.0	13.3	5.7	6.5

[+] Among those using first responders

Table 10: Provider Agency Types by State (continued)

	All Systems (n=235)	DC (n=2)	DE (n=2)	MD (n=25)	NC (n=90)	PA (n=15)	VA (n=70)	WV (n=31)
Transport: Primary Responsible Agency								
Private	17.5	0.0	0.0	8.7	14.0	53.3	6.1	44.8
Fire	27.4	100.0	100.0	60.9	3.5	26.7	54.6	0.0
Third Service	33.6	0.0	0.0	8.7	64.0	0.0	12.1	34.5
Volunteer	13.9	0.0	0.0	17.4	7.0	20.0	24.2	6.9
Hospital-Based	4.5	0.0	0.0	4.4	7.0	0.0	1.5	6.9
Other	3.1	0.0	0.0	0.0	4.7	0.0	1.5	6.9
Dispatch: Any Use of . . .								
Fire	6.5	0.0	0.0	24.0	5.7	6.7	4.4	0.0
Police/Sheriff	20.0	0.0	0.0	4.0	21.1	6.7	34.3	6.5
City/County	51.5	50.0	100.0	32.0	61.1	100.0	22.9	77.4
Public Safety	25.0	50.0	0.0	44.0	18.2	6.7	34.8	16.1
Other	16.2	0.0	0.0	4.0	22.2	20.0	10.0	22.6
Dispatch: Primary Responsible Agency								
Fire	3.9	0.0	0.0	20.8	1.2	0.0	4.4	0.0
Police/Sheriff	16.2	0.0	0.0	0.0	17.2	0.0	31.9	0.0
City/County	48.0	50.0	100.0	33.3	54.0	100.0	21.7	73.3
Public Safety	21.8	50.0	0.0	41.7	12.6	0.0	34.8	13.3
Other	10.0	0.0	0.0	4.2	14.9	0.0	7.3	13.3

Table 11: Provider Agency Types by Rurality[a] of the Service Area

	All Systems (n=235)	Large Metro (n=52)	Small Metro (n=60)	Large Non-Metro (n=23)	Small Non-Metro (n=61)	Completely Rural (n=39)
Percent With >1 Type of Agency Involved in						
First Response[+]	59.7	53.1	63.8	77.3	56.9	55.9
Transport	60.5	55.8	67.2	78.3	57.4	51.3
Dispatch	19.0	9.8	20.0	26.1	21.3	21.6
First Response: Any Use of . . .						
Private*	19.6	5.8	21.7	30.4	19.7	28.2
Fire*	70.2	84.6	85.0	82.6	59.0	38.5
Third Service	28.5	18.4	29.3	18.2	37.9	32.4
Volunteer	29.9	28.6	24.1	27.3	37.9	29.4
Hospital-Based	7.7	6.1	10.3	13.6	6.9	2.9
Other	18.3	19.2	20.0	30.43	6.56	25.6
No First Response	6.8	5.9	3.4	5.0	5.4	16.7
First Response: Primary Responsible Agency*						
Private	9.0	2.0	6.8	15.0	8.9	19.4
Fire	52.3	76.5	61.0	50.0	41.1	22.2
Third Service	18.0	7.8	18.6	10.0	26.8	22.2
Volunteer	7.7	3.9	3.4	10.0	12.5	11.1
Hospital-Based	3.6	2.0	3.4	10.0	3.6	2.8
Other	2.7	2.0	3.4	0.0	1.8	5.6
No First Response	6.8	5.9	3.4	5.0	5.4	16.7
Transport: Any Use of . . .						
Private*	34.9	11.5	38.3	69.6	31.2	46.2
Fire*	44.7	80.8	46.7	39.1	37.7	7.7
Third Service*	39.5	21.2	46.6	26.1	47.5	48.7
Volunteer	41.2	38.4	51.7	43.5	37.7	33.3
Hospital-Based	11.6	9.6	17.2	21.7	6.6	7.7
Other	8.5	7.7	10.0	4.4	4.9	15.4

[a] Defined by Rural-Urban Continuum
[+] Among those using first responders
[*] Represents significant X^2 at $p<0.05$

Table 11: Provider Agency Types by Rurality of the Service Area (continued)

	All Systems (n=235)	Large Metro (n=52)	Small Metro (n=60)	Large Non-Metro (n=23)	Small Non-Metro (n=61)	Completely Rural (n=39)
Transport: Primary Responsible Agency*						
Private	17.5	5.9	10.3	30.0	19.3	35.1
Fire	27.4	64.7	22.0	15.0	21.1	0.0
Third Service	33.6	13.7	41.4	25.0	43.9	37.8
Volunteer	13.9	11.8	17.2	25.0	8.8	13.5
Hospital-Based	4.5	2.0	5.2	5.0	5.3	5.4
Other	3.1	2.0	3.5	0.0	1.8	8.1
Dispatch: Any Use of . . .						
Fire*	6.5	15.7	5.0	8.7	1.6	2.7
Police/Sheriff	20.0	19.2	20.0	17.4	14.8	30.8
City/County*	51.5	36.5	50.0	52.2	70.5	43.6
Public Safety*	25.0	33.3	26.7	43.5	11.5	21.6
Other	16.2	5.8	18.3	26.1	16.4	20.5
Dispatch: Primary Responsible Agency*						
Fire	3.9	14.0	3.3	0.0	0.0	0.0
Police/Sheriff	16.2	18.0	16.7	8.7	10.0	27.8
City/County	48.0	36.0	46.7	47.8	66.7	36.1
Public Safety	21.8	30.0	21.7	39.1	10.0	19.4
Other	10.0	2.0	11.7	4.4	13.3	16.7

* Represents significant X^2 at $p<0.05$

Table 12: Provider Agency Types by Size[a] of System

	All Systems (n=222)	Small (n=74)	Medium (n=75)	Large (n=73)
Percent with >1 Type of Agency Involved in . . .				
First Response[+]	59.7	49.2	63.5	68.1
Transport	60.5	54.8	56.8	71.6
Dispatch	19.0	18.9	13.5	27.4
First Response: Any Use of . . .				
Private	19.6	17.6	26.7	16.2
Fire*	70.2	50.0	77.3	85.1
Third Service	28.5	23.1	33.8	29.2
Volunteer	29.9	30.8	33.8	26.4
Hospital-Based	7.7	4.6	6.8	12.5
Other	18.3	17.6	14.7	21.6
No First Response	6.8	13.2	1.4	4.2
First Response: Primary Responsible Agency*				
Private	9.0	13.2	10.0	5.6
Fire	36.8	52.9	65.3	50.8
Third Service	18.0	17.7	22.9	20.9
Volunteer	7.6	10.3	8.6	4.2
Hospital-Based	3.6	4.4	2.9	4.2
Other	2.7	4.4	1.4	1.4
No First Response	6.8	13.2	1.4	4.2
Transport: Any Use of . . .				
Private	34.9	35.1	33.3	39.2
Fire*	44.7	31.1	37.3	63.5
Third Service	39.5	34.3	41.9	43.2
Volunteer	41.2	43.8	36.5	43.2
Hospital-Based	11.6	8.2	9.5	16.2
Other	8.5	12.2	5.3	8.1

[a] Defined by Annual Number of Responses (not available for 13 systems)
[+] Among those using first responders
[*] Represents significant X^2 at $p<0.05$

Table 12: Provider Agency Types by Size of System (continued)

	All Systems (n=222)	Small (n=74)	Medium (n=75)	Large (n=73)
Transport: Primary Responsible Agency				
Private	17.5	23.5	14.1	15.3
Fire	27.4	16.2	26.8	37.5
Third Service	33.6	30.9	39.4	33.3
Volunteer	13.9	17.7	14.1	9.7
Hospital-Based	4.5	7.4	2.8	2.8
Other	3.1	4.4	2.8	1.4
Dispatch: Any Use of . . .				
Fire	6.5	2.7	5.4	8.2
Police/Sheriff*	20.0	33.8	18.7	10.8
City/County	51.5	43.2	56.0	58.1
Public Safety	25.0	24.3	21.6	30.1
Other	16.2	13.5	13.3	21.6
Dispatch: Primary Responsible Agency				
Fire	3.9	1.4	2.7	4.2
Police/Sheriff	16.2	28.8	15.1	6.9
City/County	48.0	37.0	53.4	55.6
Public Safety	21.8	23.3	19.2	23.6
Other	10.0	9.6	9.6	9.7

* Represents significant X^2 at $p<0.05$

Table 13: Estimated Population Coverage by Primary EMS Agency Type[+]

	All Systems	DC	DE	MD	NC	PA	VA	WV
Primary First Response								
Private	11.6	0.0	0.0	0.6	6.2	24.3	1.1	25.9
Fire department	67.2	100.0	100.0	91.4	49.9	57.6	85.2	42.6
Government-based/third service	8.6	0.0	0.0	3.8	31.6	0.0	1.1	23.7
Independent volunteer	2.4	0.0	0.0	4.1	4.7	0.0	3.7	1.7
Hospital-based	3.6	0.0	0.0	0.0	3.9	6.9	0.3	1.2
Other	4.6	0.0	0.0	0.0	1.2	11.2	0.8	0.0
No separate first response	2.0	0.0	0.0	0.0	2.5	0.0	7.8	5.0
Primary Transport Agency								
Private	31.0	0.0	0.0	2.3	8.1	72.4	1.7	41.8
Fire department	36.1	100.0	100.0	91.2	2.9	12.0	72.8	0.0
Government-based/third service	20.2	0.0	0.0	1.3	75.1	0.0	11.1	44.4
Independent volunteer	9.6	0.0	0.0	5.2	4.0	15.6	10.4	5.8
Hospital-based	2.0	0.0	0.0	0.0	8.5	0.0	0.3	2.1
Other	1.1	0.0	0.0	0.0	1.4	0.0	3.8	5.8
Primary Dispatch								
Fire department	6.1	0.0	0.0	31.1	4.4	0.0	3.8	0.0
Police/Sheriff	6.3	0.0	0.0	0.0	10.4	0.0	22.8	0.0
City/County	63.2	100.0	100.0	29.7	46.3	100.0	20.5	79.9
Public safety	16.9	0.0	0.0	38.5	13.4	0.0	45.7	13.3
Other	7.4	0.0	0.0	0.7	25.4	0.0	7.2	6.8
Primary Configuration (see Table 14)								
BLS 1st response/BLS transport	7.9	100.0	76.2	21.6	1.3	0.0	4.1	0.7
BLS 1st response/ALS transport	40.9	0.0	0.0	26.4	54.3	48.7	28.9	42.6
ALS 1st response/BLS transport	7.6	0.0	23.8	6.0	5.1	12.3	2.0	3.4
ALS 1st response/ALS transport	36.0	0.0	0.0	29.5	27.0	38.2	55.9	45.8
BLS transport only	1.6	0.0	0.0	1.5	1.5	0.9	4.0	0.0
ALS transport only	5.9	0.0	0.0	15.1	10.8	0.0	5.1	7.5

[+] Percentage denominators based on those study areas responding to a particular question

Table 14: Response Configurations and Use of Volunteer Providers by State

	All Systems (n=235)	DC (n=2)	DE (n=2)	MD (n=25)	NC (n=90)	PA (n=15)	VA (n=70)	WV (n=31)
% using first responders	98.3	100.0	100.0	100.0	100.0	100.0	95.7	96.8
% in which first responders are most commonly dispatched for all 911 Calls[+]	36.4	0.0	0.0	37.5	35.0	66.7	35.3	28.0
% in which first responders are most commonly simultaneously dispatched with transport ambulance[+]	93.4	50.0	100.0	79.2	98.7	100.0	94.0	88.0
Most commonly used response configuration								
BLS 1st response, BLS transport	8.7	50.0	50.0	12.5	4.5	0.0	14.5	3.6
BLS 1st response, ALS transport	31.0	0.0	0.0	16.7	41.6	46.7	26.1	17.9
ALS 1st response, BLS transport	7.0	0.0	50.0	12.5	3.4	20.0	4.4	10.7
ALS 1st response, ALS transport	37.6	50.0	0.0	50.0	32.6	26.7	36.2	53.6
BLS transport only	4.4	0.0	0.0	4.2	2.3	6.7	8.7	0.0
ALS transport only	11.4	0.0	0.0	4.2	15.7	0.0	10.1	14.3
% with operating procedures that allow response without use of lights and sirens	69.5	0.0	100.0	64.0	83.0	80.0	61.4	51.6
% with operating procedures that allow transports without use of lights and sirens	91.5	50.0	100.0	88.0	95.5	93.3	90.0	87.1
% with operating procedures that transports to non-hospital destinations (e.g. urgent care centers)	19.2	0.0	50.0	12.0	27.0	0.0	18.6	12.9
% using volunteer providers	85.9	0.0	100.0	76.0	85.4	100.0	92.9	77.4
Average percent (and SD) of providers who serve as volunteers[¶]	44.7 (34.1)	N/A	40.5 (55.9)	62.3 (34.0)	43.1 (32.3)	40.5 (22.1)	53.2 (35.7)	15.0 (20.5)
% inwhich volunteers typically respond to calls from fire or EMS station houses[¶]	38.5	N/A	50.0	52.6	25.0	20.0	54.7	37.5
% indicating call coverage is of major concern due to staffing shortages	69.6	0.0	50.0	62.5	66.3	80.0	69.6	83.3

[+] Among those using first responders
[¶] Among those using volunteers

Table 15: Response Configurations and Use of Volunteer Providers by Rurality[a] of the Service Area

	All Systems (n=235)	Large Metro (n=52)	Small Metro (n=60)	Large Non-Metro (n=23)	Small Non-Metro (n=61)	Completely Rural (n=39)
% using first responders	98.3	100.0	98.3	95.7	98.4	97.4
% in which first responders are most commonly dispatched for all 911 calls[+]	36.4	42.2	18.9	22.7	47.1	51.9
% in which first responders are most commonly simultaneously dispatched with transport ambulance[+]	93.4	88.9	94.3	95.5	94.0	96.2
Most commonly used response configuration						
BLS 1st response, BLS transport	8.7	5.8	8.5	13.6	6.7	13.9
BLS 1st response, ALS transport	31.0	28.9	45.8	27.3	23.3	25.0
ALS 1st response, BLS transport	7.0	5.8	5.1	9.1	10.0	5.6
ALS 1st response, ALS transport	37.6	51.9	25.4	40.9	38.3	33.3
BLS transport only	4.4	0.0	8.5	0.0	6.7	2.8
ALS transport only	11.4	7.7	6.8	9.1	15.0	19.4
% with operating procedures that allow response without use of lights and sirens*	69.5	67.3	78.3	78.3	72.9	48.7
% with operating procedures that allow transports without use of lights and sirens*	91.5	94.2	93.3	100.0	91.7	79.5
% with operating procedures that transports to non-hospital destinations (e.g. urgent care centers) *	19.2	13.5	23.3	4.6	16.4	34.2
% using volunteer providers	85.9	78.9	90.0	95.7	85.3	84.2
Average percent (and SD) of providers who serve as volunteers[¶]	44.7 (34.1)	39.4 (34.0)	44.3 (34.8)	46.6 (33.7)	48.7 (33.0)	43.7 (36.5)
% in which volunteers typically respond to calls from fire or EMS station houses[¶]*	38.5	68.3	50.0	40.9	19.6	9.4
% indicating call coverage is of major concern due to staffing shortages*	69.6	58.0	56.7	78.3	81.4	81.6

[a] Defined by Rural-Urban Continuum
[+] Among those using first responders
[*] Represents significant X^2 at $p<0.05$
[¶] Among those using volunteers

Table 16: Response Configurations and Use of Volunteer Providers by Size[a] of the System

	All Systems (n=222)	Small (n=74)	Medium (n=75)	Large (n=73)
% using first responders*	98.3	94.6	100.0	100.0
% in which first responders are most commonly dispatched for all 911 calls[+]	36.4	50.0	32.9	28.8
% in which first responders are most commonly simultaneously dispatched with transport ambulance[+]	93.4	96.1	95.7	90.9
Most commonly used response configuration				
BLS 1st response, BLS transport	8.7	14.1	6.9	5.5
BLS 1st response, ALS transport	31.0	21.1	32.9	39.7
ALS 1st response, BLS transport	7.0	8.5	4.1	6.9
ALS 1st response, ALS transport	37.6	36.6	35.6	39.7
BLS transport only	4.4	5.6	5.5	2.7
ALS transport only	11.4	14.1	15.1	5.5
% with operating procedures that allow response without use of lights and sirens*	69.5	57.5	69.3	81.1
% with operating procedures that allow transports without use of lights and sirens*	91.5	82.4	93.3	97.3
% with operating procedures that transports to non-hospital destinations (e.g. urgent care centers)	19.2	20.6	16.0	21.6
% using volunteer providers	85.9	89.0	86.7	87.8
Average percent (and SD) of providers who serve as volunteers[¶f]	44.7 (34.1)	49.1*a* (35.6)	50.2*a* (35.8)	34.3*b* (29.0)
% in which volunteers typically respond to calls from fire or EMS station houses[¶]*	38.5	29.2	32.8	56.9
% indicating call coverage is of major concern due to staffing shortages*	69.6	86.3	63.0	58.1

[a] Defined by Annual Number of Responses (not available for 13 systems)
[*] Represents significant X^2 at $p<0.05$
[+] Among those using first responders
[¶] Among those using volunteers
[f] Represents significant F at $p<0.05$ based on one-way ANOVA; Mean separation by Duncan's multiple range test

Table 17: Response to Calls Outside Primary Service Areas by State

	All Systems (n=235)	DC (n=2)	DE (n=2)	MD (n=25)	NC (n=90)	PA (n=15)	VA (n=70)	WV (n=31)
Percent with mutual aid agreements	94.4	100.0	50.0	92.0	95.5	73.3	98.6	96.8
Percent with mutual aid agreements that address. . .								
Service coverage	87.9	50.0	50.0	88.0	85.2	80.0	94.2	90.3
Communication linkage	55.6	100.0	50.0	64.0	54.6	40.0	55.1	58.1
Licensure or certification of providers	34.9	50.0	50.0	48.0	37.5	13.3	27.5	41.9
Financial reimbursement	31.0	0.0	50.0	28.0	37.5	40.0	24.6	25.8
Liability	35.8	0.0	0.0	28.0	40.9	20.0	39.1	32.3
How often does first response agency respond to calls outside primary service area[+]								
Never	9.8	0.0	0.0	8.0	11.4	13.3	9.4	7.1
Seldom	36.2	50.0	0.0	12.0	52.3	33.3	29.7	25.0
Sometimes	38.8	0.0	100.0	48.0	27.3	40.0	40.6	60.7
Often	11.6	50.0	0.0	32.0	3.4	13.3	17.2	3.6
How often does the transport agency respond to calls outside primary service area								
Never	3.1	0.0	0.0	0.0	4.7	0.0	3.1	3.3
Seldom	24.1	50.0	50.0	8.3	43.0	0.0	15.4	10.0
Sometimes	44.2	0.0	0.0	45.8	39.5	60.0	41.5	60.0
Often	28.6	50.0	50.0	45.8	12.8	40.0	40.0	26.7

[+] Among those using first responders

Table 18: Response to Calls Outside Primary Service Areas by Rurality[a] of the Service Area

	All Systems (n=235)	Large Metro (n=52)	Small Metro (n=60)	Large Non-Metro (n=23)	Small Non-Metro (n=61)	Completely Rural (n=39)
Percent with mutual aid agreements	94.4	94.1	93.2	95.7	95.0	94.9
Percent with mutual aid agreements that address. . .						
Service coverage	87.9	86.3	88.1	95.7	86.7	87.2
Communication linkage	55.6	70.6	54.2	47.8	53.3	46.2
Licensure or certification of providers	34.9	39.2	40.7	43.5	28.3	25.6
Financial reimbursement	31.0	25.5	37.3	43.5	28.3	25.6
Liability	35.8	33.3	37.3	43.5	30.0	41.0
How often does first response agency respond to calls outside primary service area*+						
Never	9.8	1.9	10.3	19.1	6.9	20.0
Seldom	36.2	32.7	48.3	23.8	27.6	42.9
Sometimes	38.8	40.4	25.9	42.9	55.2	28.6
Often	11.6	23.1	12.1	9.5	6.9	2.9
How often does the transport agency respond to calls outside primary service area						
Never	3.1	2.0	1.7	0.0	1.7	11.8
Seldom	24.1	15.7	27.6	21.7	24.1	32.4
Sometimes	44.2	39.2	44.8	47.8	53.5	32.4
Often	28.6	43.1	25.9	30.4	20.7	23.5

[a] Defined by Rural-Urban Continuum
[*] Represents significant X^2 at $p<0.05$
[+] Among those using first responders

Table 19: Response to Calls Outside Primary Service Areas by Size[a] of the System

	All Systems (n=222)	Small (n=74)	Medium (n=75)	Large (n=73)
Percent with mutual aid agreements	94.4	96.0	97.3	93.2
Percent with mutual aid agreements that address. . .				
Service coverage	87.9	91.9	90.5	84.9
Communication linkage*	55.6	43.2	62.2	60.3
Licensure or certification of providers*	34.9	27.0	31.1	48.0
Financial reimbursement	31.0	25.7	33.8	35.6
Liability	35.8	39.2	35.1	35.6
How often does first response agency respond to calls outside primary service area[+]				
Never	9.8	9.1	10.8	9.6
Seldom	36.2	37.9	28.4	45.2
Sometimes	38.8	43.9	40.5	32.9
Often	11.6	4.6	16.2	9.6
How often does the transport agency respond to calls outside primary service area				
Never	3.1	4.6	1.4	2.7
Seldom	24.1	23.1	27.0	23.0
Sometimes	44.2	52.3	41.9	44.6
Often	28.6	20.0	29.7	29.7

[a] Defined by Annual Number of Responses (not available for 13 systems)
[*] Represents significant X^2 at $p<0.05$
[+] Among those using first responders

Table 20: Medical Control by State

	All Systems (n=235)	DC (n=2)	DE (n=2)	MD (n=25)	NC (n=90)	PA (n=15)	VA (n=70)	WV (n=31)
Primary responsibility for medical control of the system rests with . . .								
Systemwide, in-house medical director	39.7	50.0	50.0	52.0	39.3	33.3	31.4	51.6
External (e.g., hospital-based) medical director	50.0	50.0	0.0	36.0	58.4	40.0	54.3	35.5
Medical advisory board	1.3	0.0	0.0	0.0	1.1	6.7	1.4	0.0
EMS regulatory agency	5.1	0.0	50.0	8.0	1.1	0.0	7.1	9.7
Systemized medical direction, but provided at individual agency level	3.9	0.0	0.0	4.0	0.0	20.0	5.7	3.2

Table 21: Medical Control by Rurality[a] of the Service Area

	All Systems (n=235)	Large Metro (n=52)	Small Metro (n=60)	Large Non-Metro (n=23)	Small Non-Metro (n=61)	Completely Rural (n=39)
Primary responsibility for medical control of the system rests with . . .						
Systemwide, in-house medical director	39.7	51.9	45.0	30.4	36.7	25.6
External (e.g., hospital-based) medical director	50.0	34.6	45.0	60.9	56.7	61.5
Medical advisory board	1.3	0.0	1.7	4.4	1.7	0.0
EMS regulatory agency	5.1	7.7	3.3	0.0	3.3	10.3
Systemized medical direction, but provided at individual agency level	3.9	5.8	5.0	4.4	1.7	2.6

[a] Defined by Rural-Urban Continuum

Table 22: Medical Control by Size[a] of the System

	All Systems (n=222)	Small (n=74)	Medium (n=75)	Large (n=73)
Primary responsibility for medical control of the system rests with . . .				
Systemwide, in-house medical director	39.7	32.4	33.8	54.1
External (e.g., hospital-based) medical director	50.0	59.5	55.4	35.1
Medical advisory board	1.3	0.0	2.7	1.4
EMS regulatory agency	5.1	5.4	6.8	4.1
Systemized medical direction, but provided at individual agency level	3.9	2.7	1.4	5.4

[a] Defined by Annual Number of Responses (not available for 13 systems)

Table 23: Financing of the System by State

	All Systems (n=235)	DC (n=2)	DE (n=2)	MD (n=25)	NC (n=90)	PA (n=15)	VA (n=70)	WV (n=31)
Percent receiving funds from . . .								
Tax subsidies	81.3	50.0	100.0	84.0	90.0	66.7	87.1	48.4
Fees/bill for services	79.6	0.0	100.0	64.0	90.0	100.0	62.9	93.6
Homeland Security grants	36.6	50.0	100.0	60.0	40.0	40.0	34.3	6.5
Other grants	56.2	50.0	50.0	72.0	40.0	93.3	72.9	35.5
Donations/fundraisers	55.3	0.0	100.0	64.0	34.4	100.0	72.9	48.4
Primary source of funding[a]								
Tax subsidies	52.5	50.0	100.0	68.2	63.2	0.0	62.1	10.3
Fees/bill for services	39.9	0.0	0.0	22.7	33.3	100.0	22.7	86.2
Homeland Security grants	0.9	0.0	0.0	4.6	0.0	0.0	1.5	0.0
Other grants	0.9	0.0	0.0	4.6	0.0	0.0	1.5	0.0
Donations/fundraisers	4.0	0.0	0.0	0.0	0.0	0.0	12.1	3.5

[a] Percentages may not sum to 100% across all categories due to other funding sources (not shown), including hospital, Indian Health Service, and airline fees.

Table 24: Financing of the System by Rurality[a] of the Service Area

	All Systems (n=235)	Large Metro (n=52)	Small Metro (n=60)	Large Non-Metro (n=23)	Small Non-Metro (n=61)	Completely Rural (n=39)
Percent receiving funds from . . .						
Tax subsidies*	81.3	88.5	91.7	78.3	77.1	64.1
Fees/bill for services*	79.6	61.5	80.0	82.6	88.5	87.2
Homeland Security grants	36.6	44.2	41.7	34.8	32.8	25.6
Other grants*	56.2	67.3	56.7	78.3	45.9	43.6
Donations/fundraisers	55.3	55.8	55.0	60.9	49.2	61.5
Primary source of funding						
Tax subsidies	52.5	72.0	55.4	33.3	45.8	43.2
Fees/bill for services	39.9	18.0	39.3	57.1	45.8	51.4
Homeland Security grants	0.9	4.0	0.0	0.0	0.0	0.0
Other grants	0.9	2.0	0.0	4.8	0.0	0.0
Donations/fundraisers	4.0	2.0	3.6	4.8	6.8	2.7

[a] Defined by Rural-Urban Continuum
* Represents significant X^2 at $p<0.05$

Table 25: Financing of the System by Size[a] of the System

	All Systems (n=222)	Small (n=74)	Medium (n=75)	Large (n=73)
Percent receiving funds from . . .				
Tax subsidies*	81.3	73.0	88.0	87.8
Fees/bill for services	79.6	79.7	81.3	79.7
Homeland Security grants	36.6	27.0	42.7	41.9
Other grants	56.2	60.8	56.0	52.7
Donations/fundraisers	55.3	67.6	50.7	50.0
Primary source of funding				
Tax subsidies	52.5	44.3	58.0	57.5
Fees/bill for services	39.9	50.0	33.3	38.4
Homeland Security grants	0.9	0.0	0.0	1.4
Other grants	0.9	0.0	1.5	0.0
Donations/fundraisers	4.0	5.7	5.8	1.4

[a] Defined by Annual Number of Responses (not available for 13 systems)
* Represents significant X^2 at $p<0.05$

Table 26: Subjective Assessments by State

	All Systems (n=235)	DC (n=2)	DE (n=2)	MD (n=25)	NC (n=90)	PA (n=15)	VA (n=70)	WV (n=31)
Percent who agree or strongly agree with the following . . .								
Resource levels								
a. Our system is adequately staffed to meet demand.	30.2	50.0	0.0	24.0	40.0	33.3	22.9	22.6
b. Our system has enough resources (vehicles, equipment) to meet demand.	57.5	50.0	50.0	52.0	45.6	86.7	71.4	51.6
Public participation								
c. The population served by our system has a high level of EMS awareness, participation, or support.	28.5	0.0	0.0	24.0	36.7	13.3	22.9	32.3
d. Defibrillators, available for public access, can be found in many public places within our system.	43.8	50.0	100.0	72.0	31.1	86.7	42.9	35.5
e. Bystanders often provide CPR prior to EMS arrival at cardiac arrest calls.	25.1	50.0	0.0	36.0	24.4	26.7	20.0	29.0
f. The public is satisfied with our EMS services.	70.1	50.0	100.0	76.0	68.5	80.0	67.1	71.0
System support								
g. Our system has a high level of physician involvement.	59.2	100.0	100.0	64.0	63.3	33.3	55.7	58.1
h. Hospitals in our system are supportive of our EMS agencies/providers.	74.5	50.0	100.0	76.0	75.6	73.3	74.3	71.0
i. Patient flow through the EMS system is generally smooth.	79.2	50.0	100.0	64.0	86.7	80.0	71.4	87.1
j. Our EMS system/participating agencies collaborate with non-EMS organizations.	75.5	50.0	100.0	70.8	83.3	73.3	67.1	76.7
System environment								
k. Turf wars are a problem for our EMS providers.	24.7	0.0	50.0	8.0	16.7	46.7	32.9	32.3
l. Politics are a problem within our EMS system.	40.9	50.0	100.0	44.0	30.0	60.0	47.1	41.9
m. EMS providers enjoy working in our EMS system.	77.0	0.0	100.0	84.0	81.1	80.0	74.3	67.7

Table 26: Subjective Assessments by State (cont.)

	All Systems (n=235)	DC (n=2)	DE (n=2)	MD (n=25)	NC (n=90)	PA (n=15)	VA (n=70)	WV (n=31)
System change								
n. Our EMS system looks much the same as 10 years ago	17.5	0.0	50.0	24.0	17.8	13.3	18.6	9.7
o. Our EMS system will look much the same 10 years from now	8.1	0.0	0.0	12.0	5.6	6.7	10.0	9.7
p. Our system adapts well to change.	45.5	0.0	50.0	44.0	60.0	20.0	32.9	48.4
Mean score (standard deviation) - Resource levels	2.97 (0.91)	3.00 (1.41)	2.75 (1.06)	2.78 (1.03)	2.96 (0.94)	3.27 (0.56)	2.98 (0.92)	3.03 (0.83)
Mean score (standard deviation) - Public participation	3.06 (0.70)	3.25 (1.41)	3.38 (0.53)	3.35 (0.65)	2.97 (0.71)	3.15 (0.51)	3.05 (0.67)	3.02 (0.78)
Mean score (standard deviation) - System support	3.76 (0.64)	3.25 (1.41)	4.25 (0.35)	3.68 (0.49)	3.88 (0.61)	3.55 (0.51)	3.66 (0.75)	3.79 (0.56)
Mean score (standard deviation) - System environment	3.41 (0.82)	3.33 (0.94)	2.67 (0.47)	3.44 (0.80)	3.64 (0.78)	2.87 (0.63)	3.30 (0.89)	3.30 (0.67)

Table 27: Subjective Assessments by Rurality[a] of the System

	All Systems (n=235)	Large Metro (n=52)	Small Metro (n=60)	Large Non-Metro (n=23)	Small Non-Metro (n=61)	Completely Rural (n=39)
Percent who agree or strongly agree with the following . . .						
Resource levels						
a. Our system is adequately staffed to meet demand.	30.2	34.6	33.3	17.4	27.9	30.8
b. Our system has enough resources (vehicles, equipment) to meet demand.	57.5	65.4	55.0	52.2	49.2	66.7
Public participation						
c. The population served by our system has a high level of EMS awareness, participation, or support.	28.5	26.9	31.7	17.4	24.6	38.5
d. Defibrillators, available for public access, can be found in many public places within our system.*	43.8	65.4	48.3	34.8	29.5	35.9
e. Bystanders often provide CPR prior to EMS arrival at cardiac arrest calls.	25.1	26.9	28.3	13.0	19.7	33.3
f. The public is satisfied with our EMS services.	70.1	80.8	71.7	52.2	66.7	69.2
System support						
g. Our system has a high level of physician involvement.	59.2	67.3	61.7	65.2	52.5	51.3
h. Hospitals in our system are supportive of our EMS agencies/providers.	74.5	75.0	71.7	91.3	72.1	71.8
i. Patient flow through the EMS system is generally smooth.	79.2	67.3	78.3	78.3	86.9	84.6
j. Our EMS system/participating agencies collaborate with non-EMS organizations.*	75.5	60.8	72.9	91.3	85.3	74.4

[a] Defined by Rural-Urban Continuum
* Represents significant X^2 at $p<0.05$

Table 27: Subjective Assessments by Rurality[a] of the System (cont.)

. .	All Systems	Large Metro (n=52)	Small Metro (n=60)	Large Non-Metro (n=23)	Small Non-Metro (n=61)	Completely Rural (n=39)
System environment						
k. Turf wars are a problem for our EMS providers.	24.7	15.4	20.0	26.1	27.9	38.5
l. Politics are a problem in our EMS system.	40.9	38.5	40.0	47.8	41.0	41.0
m. EMS providers enjoy working in our EMS system.	77.0	65.4	85.0	69.6	75.4	87.2
System Change						
n. Our EMS system looks much the same as 10 years ago	17.5	11.5	15.0	17.4	23.0	20.5
o. Our EMS system will look much the same 10 years from now	8.1	9.6	8.3	13.0	8.2	2.6
p. Our system adapts well to change.	45.5	42.3	53.3	30.4	42.6	51.3
Mean score (standard deviation) - Resource levels	2.97 (0.91)	3.07 (1.00)	3.03 (0.90)	2.72 (1.01)	2.89 (0.85)	3.05 (0.86)
Mean score (standard deviation) - Public participation[f]	3.06 (0.70)	3.31*a* (0.67)	3.08*ab* (0.67)	2.83*b* (0.60)	2.91*b* (0.77)	3.06*ab* (0.63)
Mean score (standard deviation) - System support	3.76 (0.64)	3.73 (0.67)	3.70 (0.71)	3.83 (0.55)	3.80 (0.64)	3.79 (0.55)
Mean score (standard deviation) - System environment	3.41 (0.82)	3.43 (0.85)	3.58 (0.92)	3.26 (0.66)	3.33 (0.75)	3.36 (0.78)

[a] Defined by Rural-Urban Continuum

[f] Represents significant F at p<0.05 based on one-way ANOVA; Mean separation by Duncan's multiple range test

Table 28: Subjective Assessments by Size of the System[a]

	All Systems (n=222)	Small (n=74)	Medium (n=75)	Large (n=73)
Percent who agree or strongly agree with the following . . .				
Resource levels				
a. Our system is adequately staffed to meet demand.*	30.2	17.6	30.7	39.2
b. Our system has enough resources (vehicles, equipment) to meet demand.	57.5	62.2	52.0	54.1
Public participation				
c. The population served by our system has a high level of EMS awareness, participation or support.	28.5	29.7	26.7	27.0
d. Defibrillators, available for public access, can be found in many public places in our system.*	43.8	39.2	26.7	63.5
e. Bystanders often provide CPR prior to EMS arrival at cardiac arrest calls.*	25.1	28.4	13.3	32.4
f. The public is satisfied with our EMS services.	70.1	65.8	65.3	78.4
System support				
g. Our system has a high level of physician involvement.	59.2	54.1	57.3	66.2
h. Hospitals in our system are supportive of our EMS agencies/providers.	74.5	68.9	74.7	78.4
i. Patient flow through the EMS system is generally smooth.	79.2	79.7	82.7	74.3
j. Our EMS system/participating agencies collaborate with non-EMS organizations.*	75.5	67.6	86.5	78.1

[a] Defined by annual number of responses (not available for 13 systems)
* Represents significant X^2 at $p<0.05$

Table 28: Subjective Assessments by Size of the System[a] (continued)

	All Systems (n=222)	Small (n=74)	Medium (n=75)	Large (n=73)
System environment				
k. Turf wars are a problem for our EMS providers. *	24.7	32.4	25.3	14.9
l. Politics are a problem within our EMS system.	40.9	44.6	36.0	39.2
m. EMS providers enjoy working within our EMS system.	77.0	78.4	77.3	78.4
System change				
n. Our EMS system looks much the same as 10 years ago	17.5	18.9	17.3	16.2
o. Our EMS system will look much the same 10 years from now	8.1	8.1	6.7	9.5
p. Our system adapts well to change.	45.5	43.2	46.7	46.0
Mean score (standard deviation) - Resource levels	2.97 (0.91)	2.86 (0.89)	2.93 (0.79)	3.04 (1.05)
Mean score (standard deviation) - Public participation[f]	3.06 (0.70)	3.01*b* (0.70)	2.88*b* (0.75)	3.27*a* (0.59)
Mean score (standard deviation) - System support	3.76 (0.64)	3.70 (0.59)	3.78 (0.60)	3.80 (0.74)
Mean score (standard deviation) - System environment	3.41 (0.82)	2.31 0.83)	3.44 (0.78)	3.53 (0.81)

[a] Defined by annual number of responses (not available for 13 systems)
[*] Represents significant X^2 at $p<0.05$
[f] Represents significant F at $p<0.05$ based on one-way ANOVA; Mean separation by Duncan's multiple range test

Figure 1. Counties by Rural-Urban Continuum

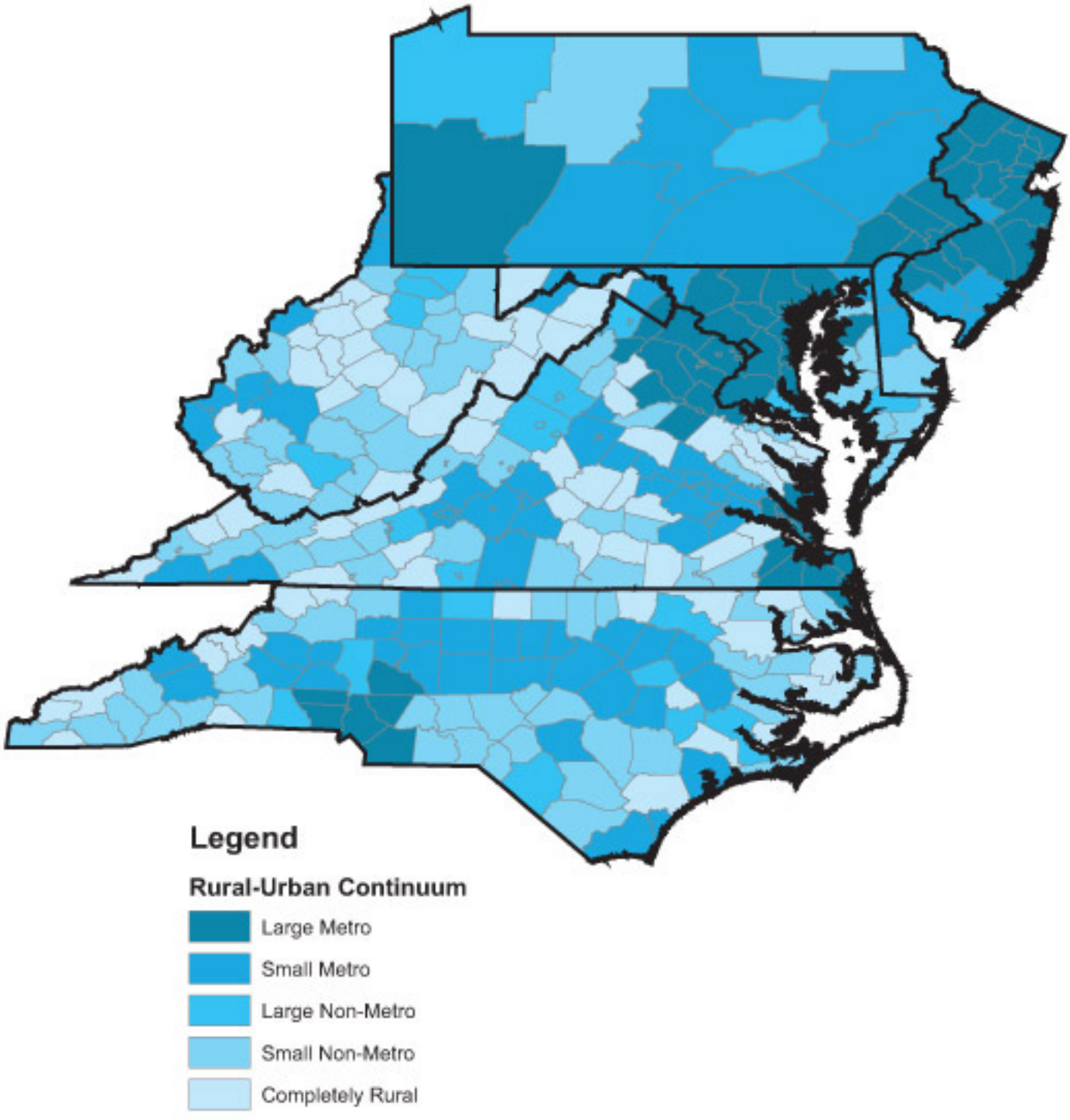


Figure 2. Counties by System Status and Response Status

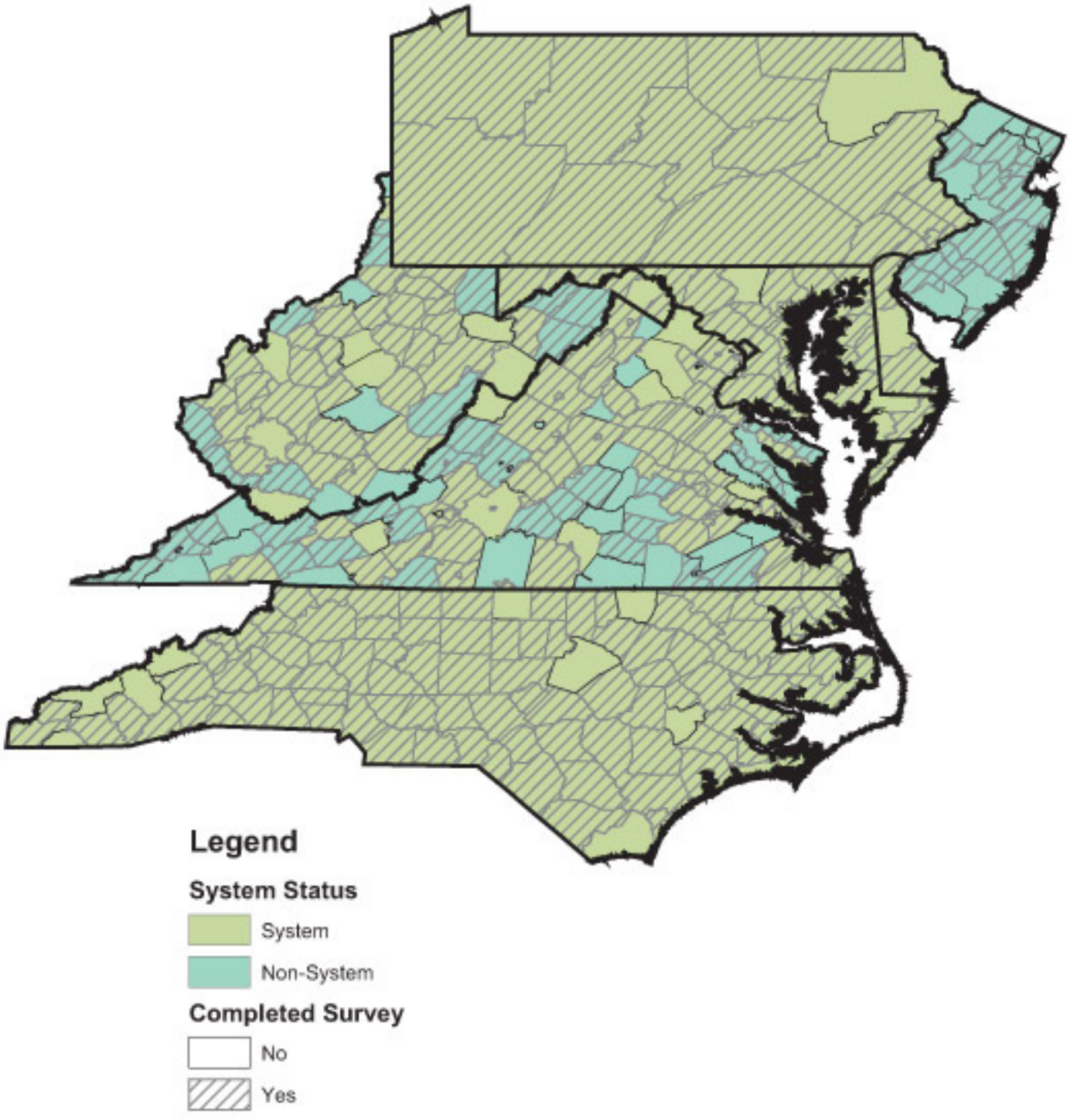


Figure 3. EMS Systems Categorized by Size of Service: Number of EMS Responses

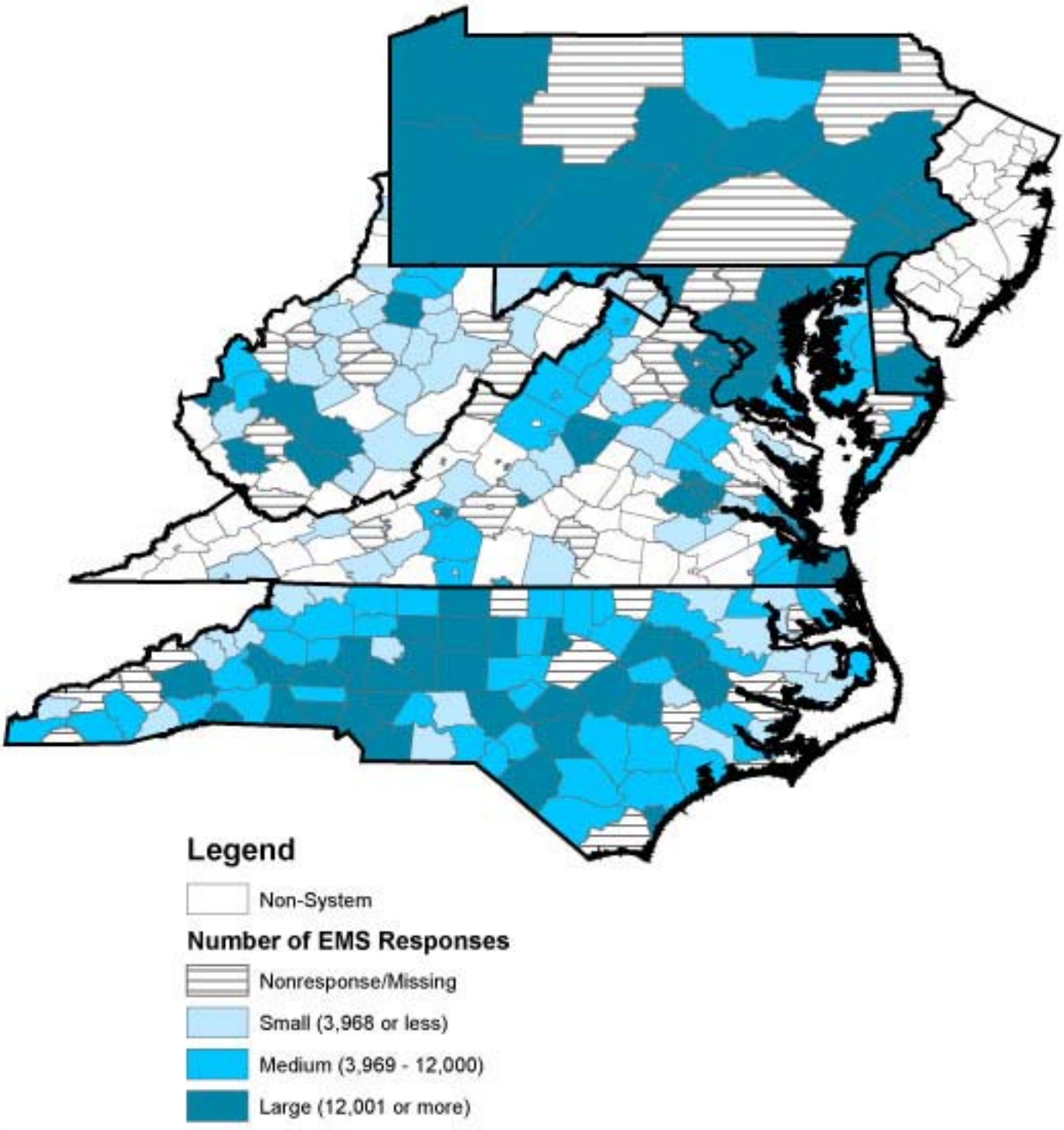


Figure 4. EMS Systems Categorized by Size of Service: Number of EMS Responses Per 1,000 Population

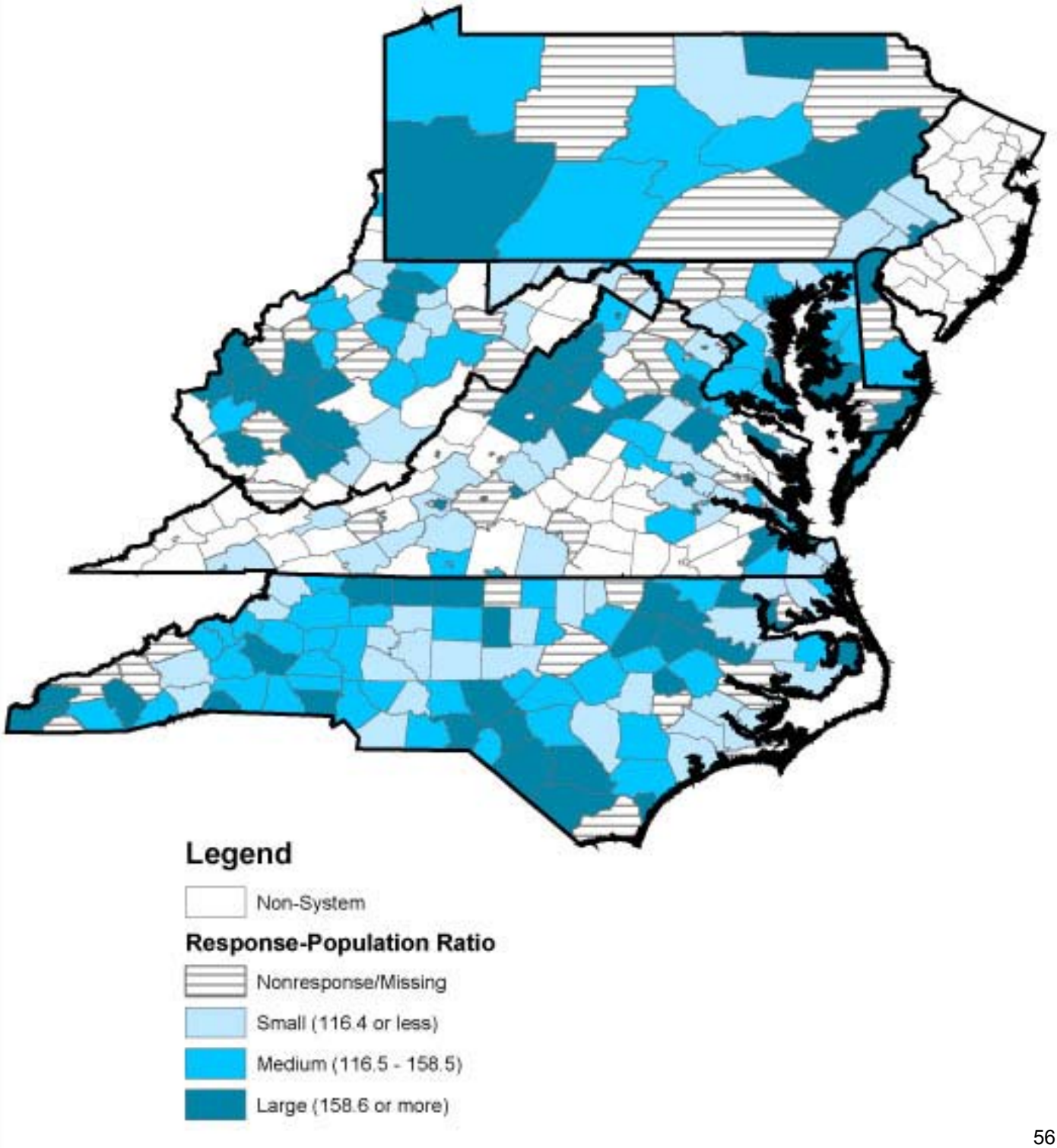


Figure 5. EMS Systems Categorized by Number of Providers Per 1,000 Population

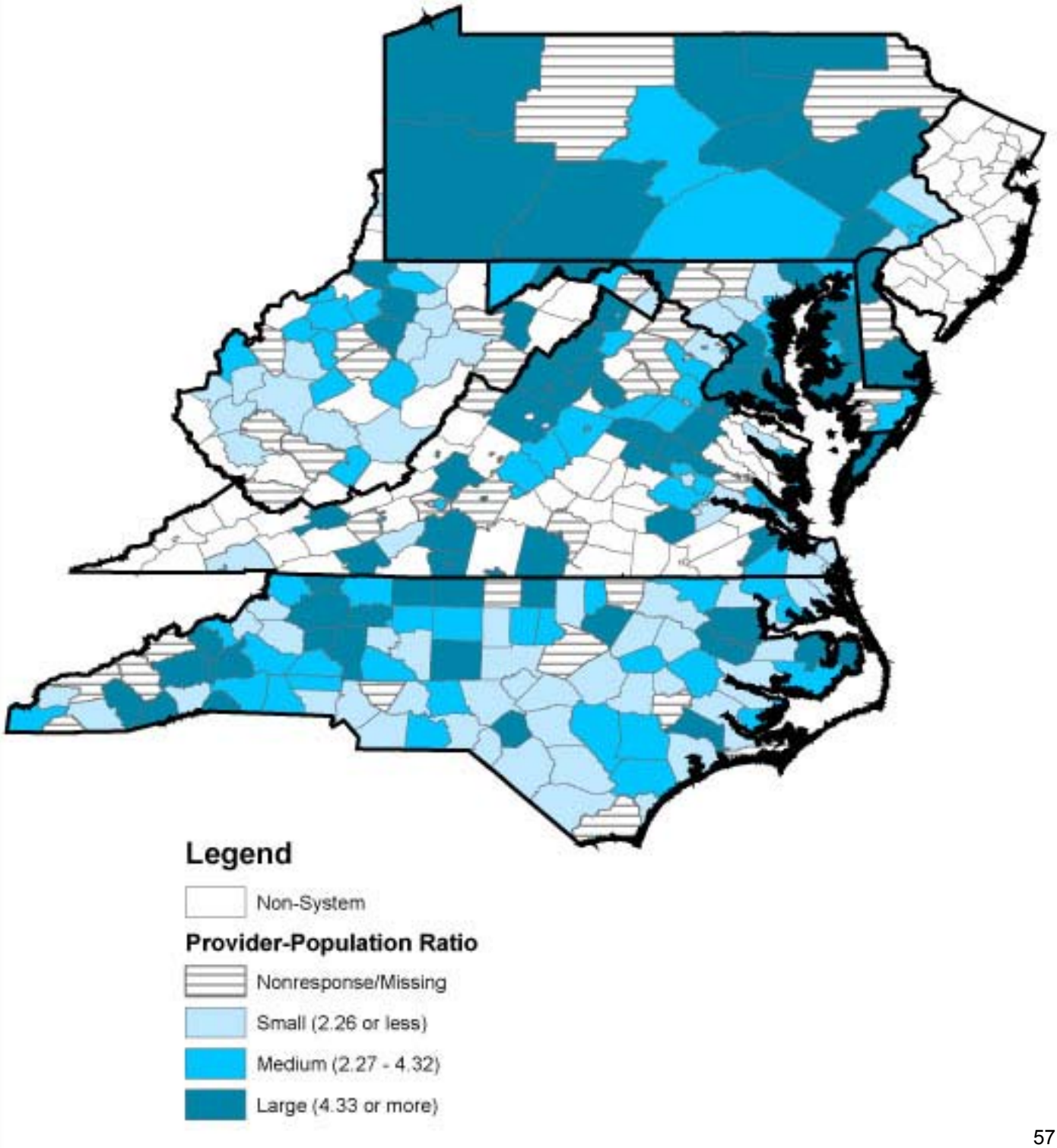


Figure 6. EMS Systems Categorized by Wireless 911 Access

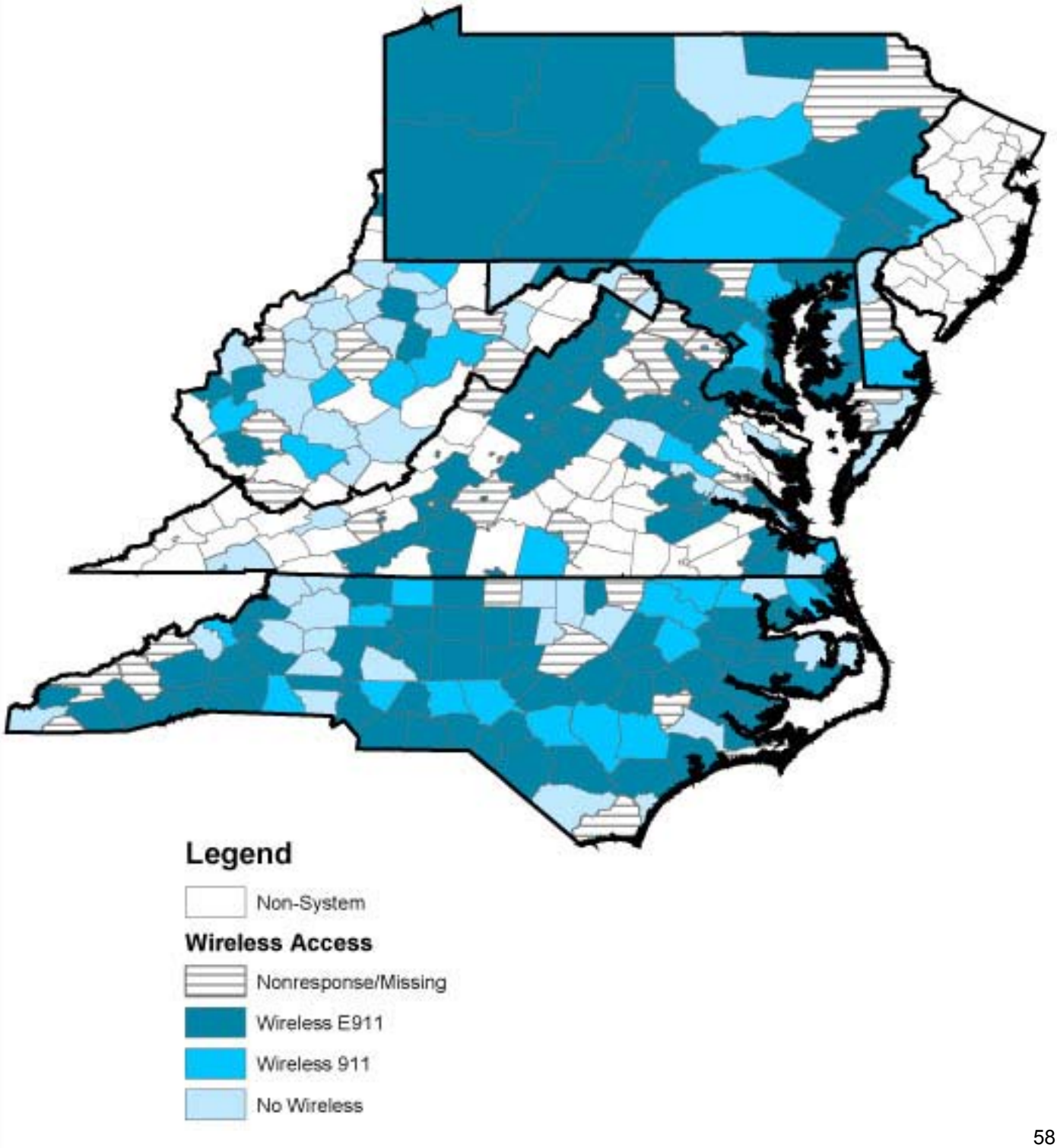


Figure 7. EMS Systems Categorized by Agency Type: First Response

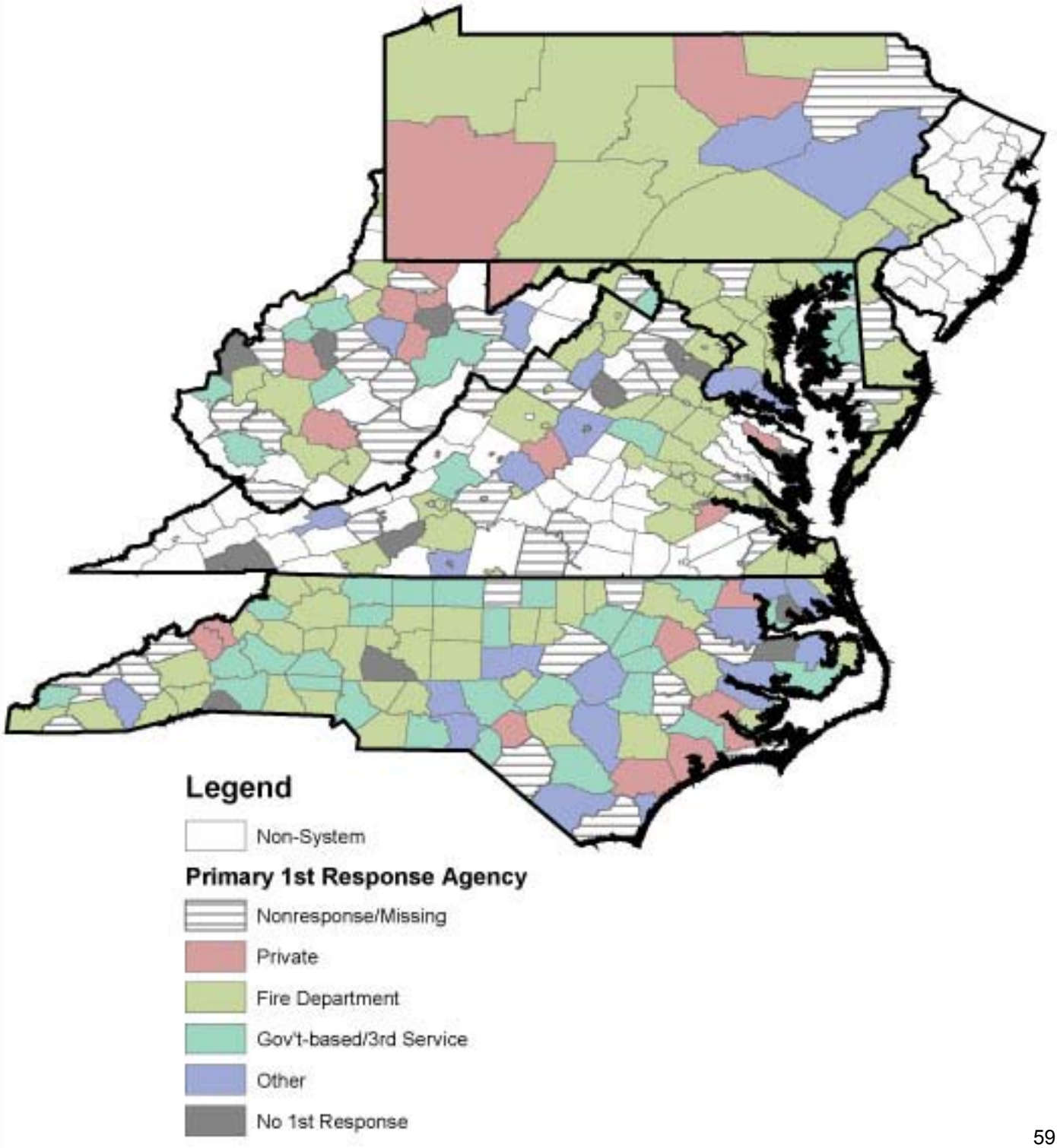


Figure 8. EMS Systems Categorized by Agency Type: Transport

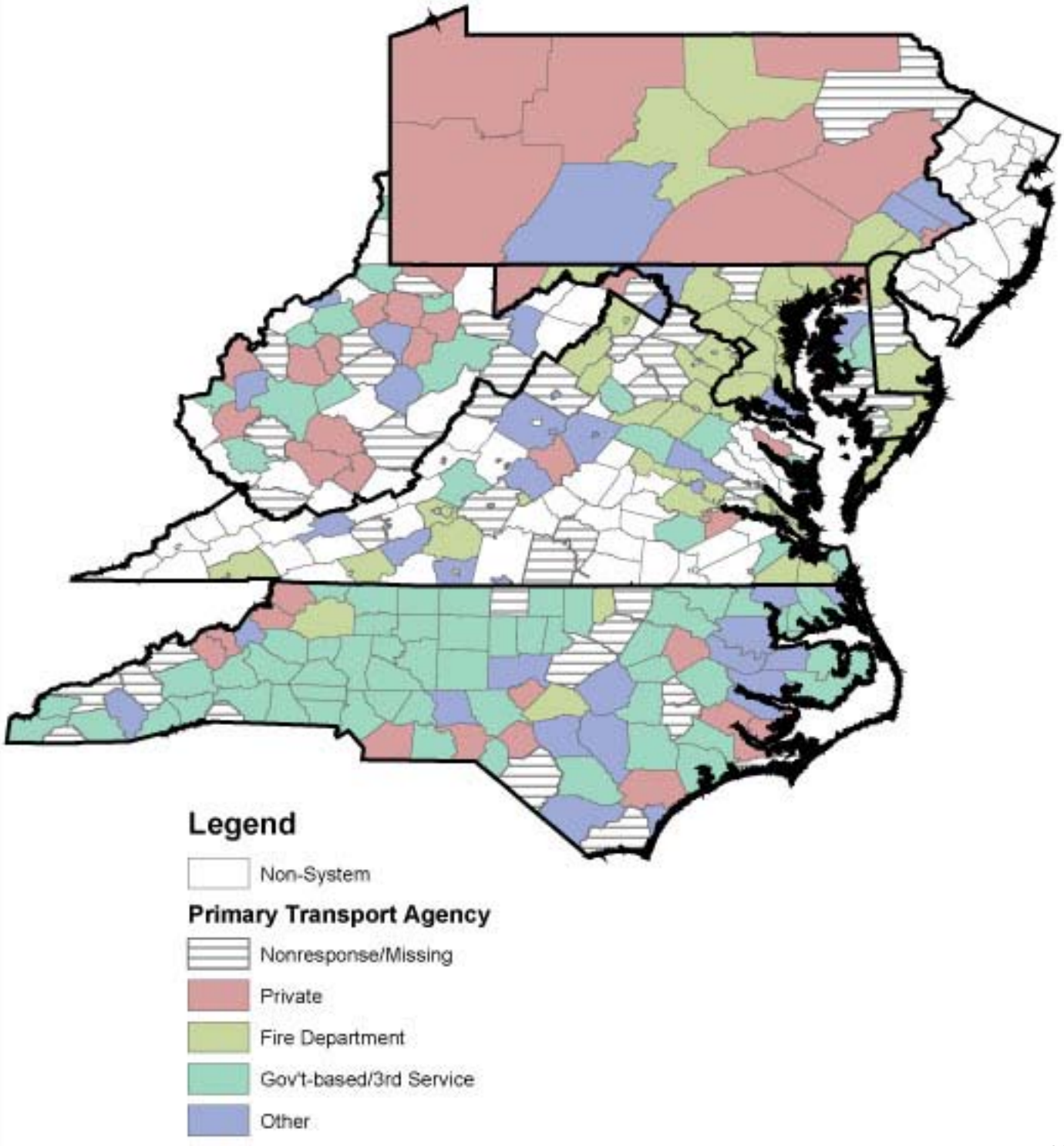


Figure 9. EMS Systems Categorized by Agency Type: Dispatch

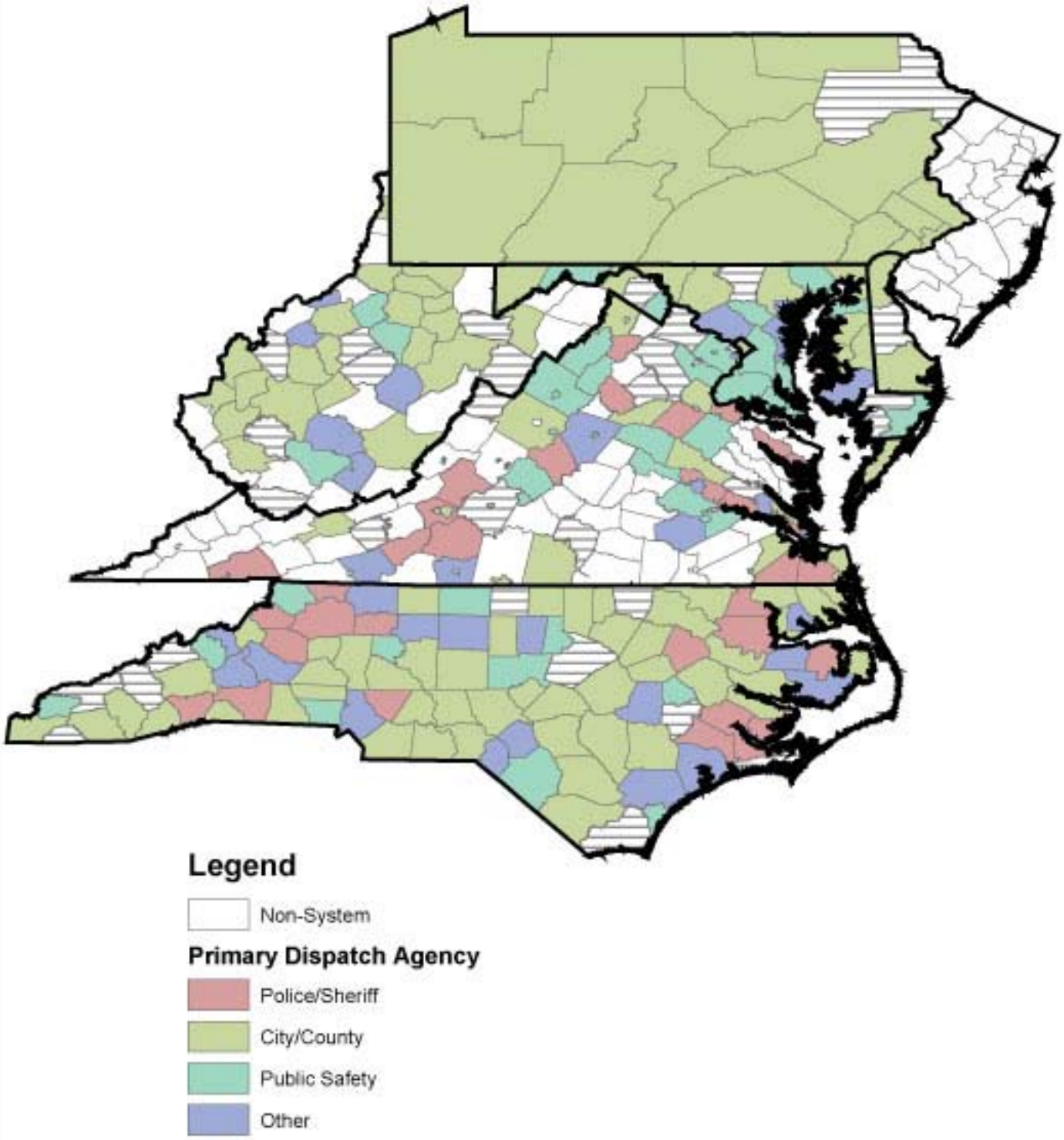


Figure 10. EMS Systems Categorized by Response Configurations

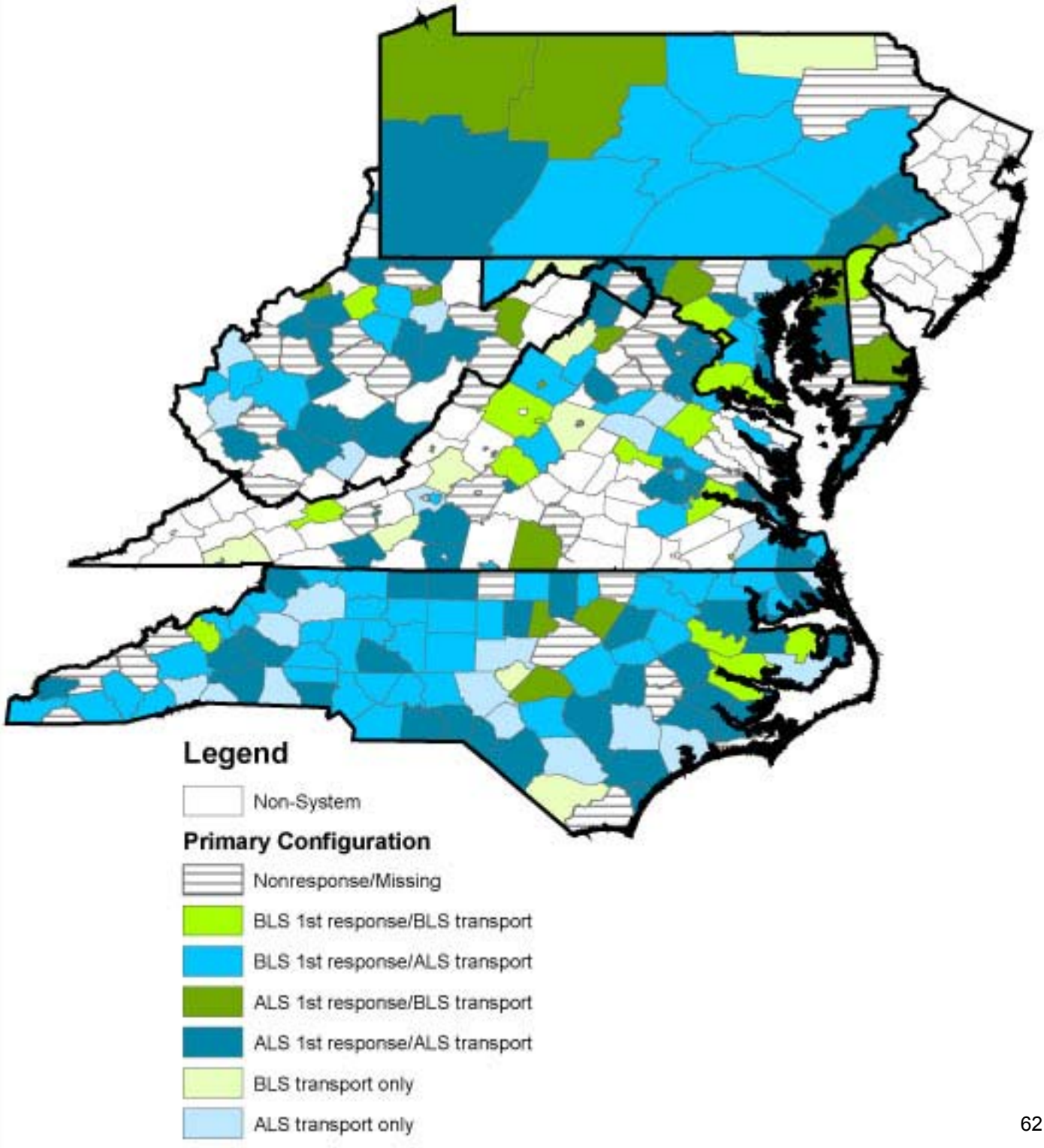


Figure 11. EMS Systems Categorized by How Often Transport Agency Responds to Outside Primary Service Area

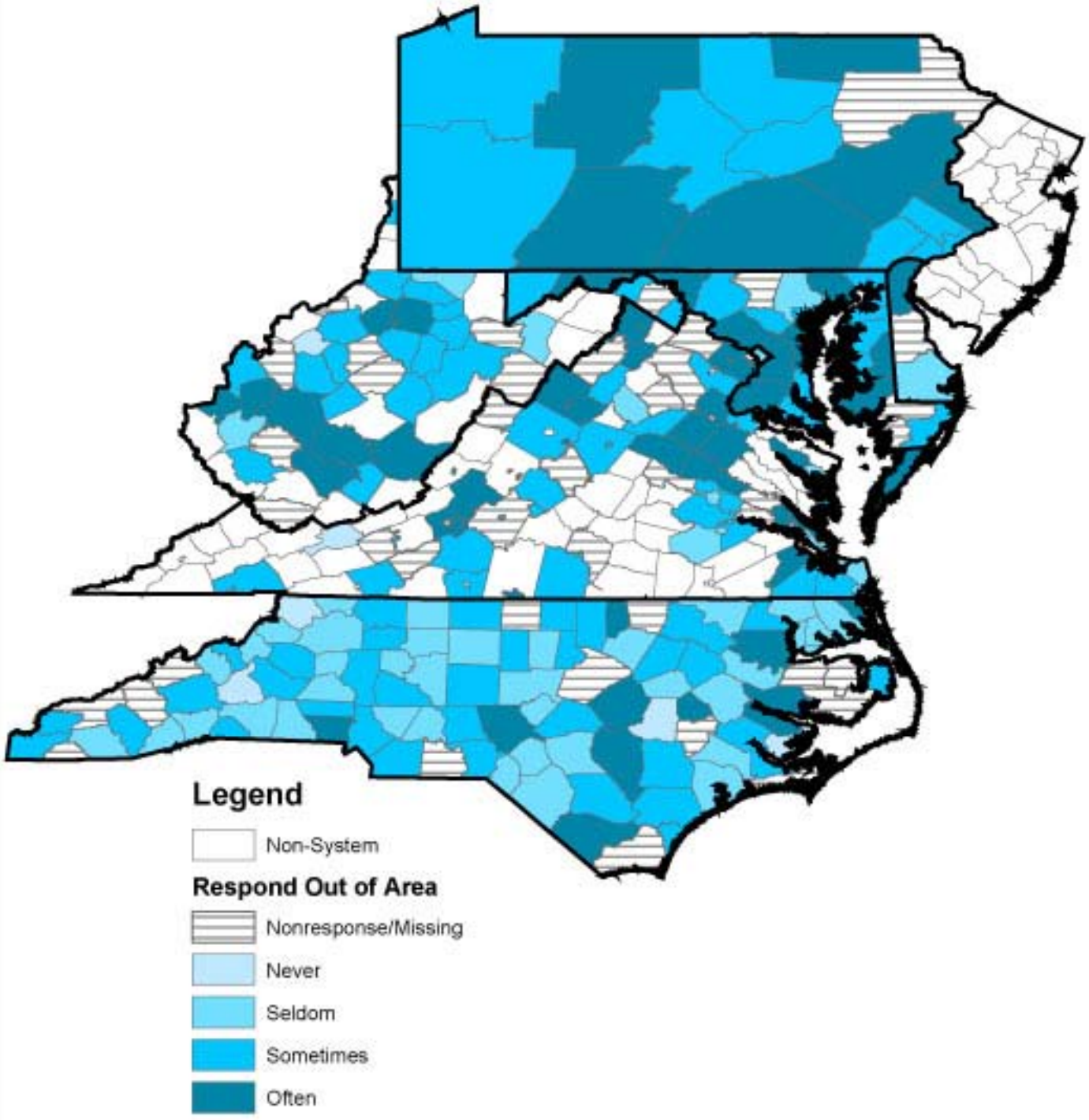


Figure 12. EMS Systems Categorized by Medical Control

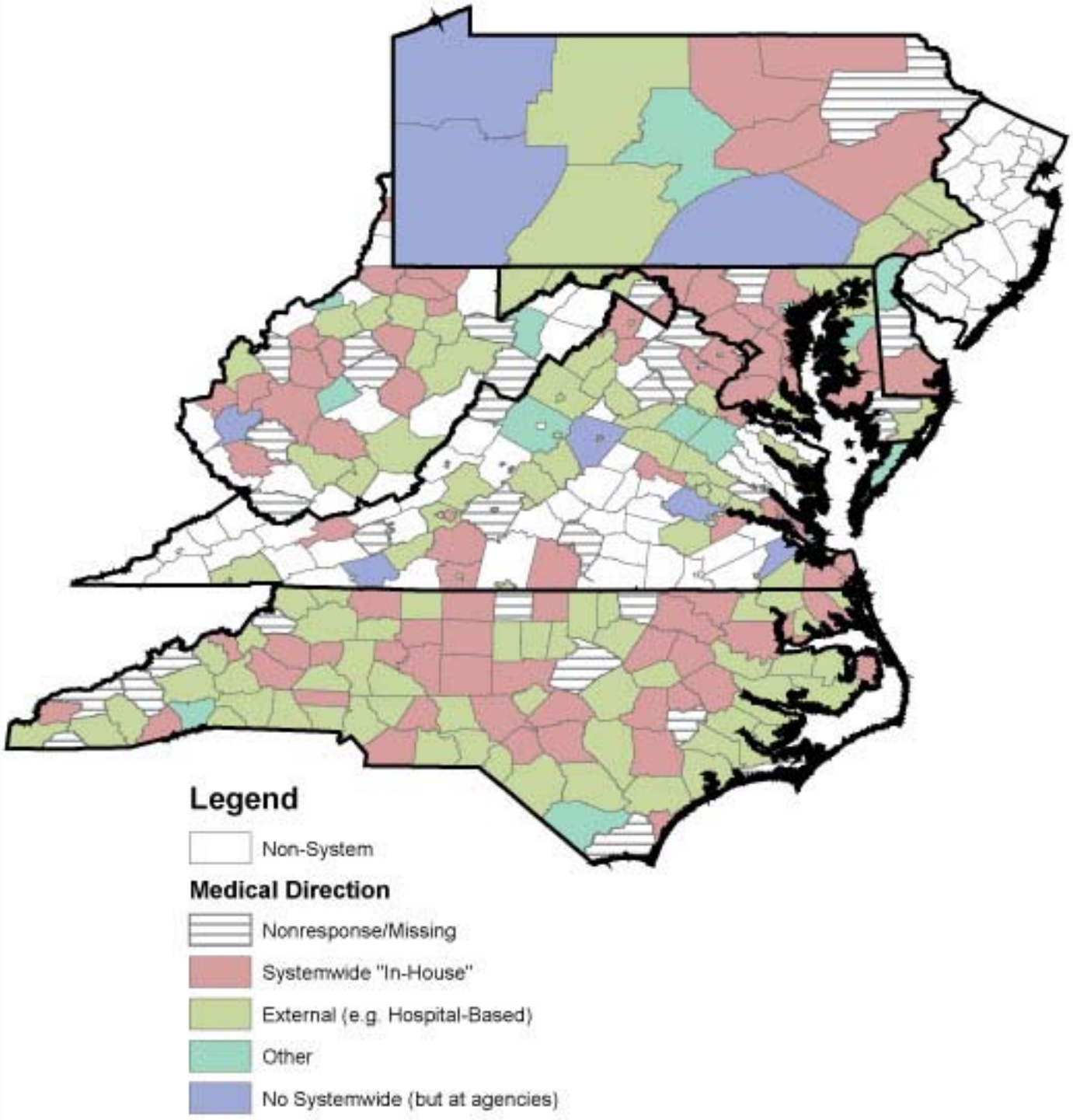


Figure 13. EMS Systems Categorized by Primary Source of Funding

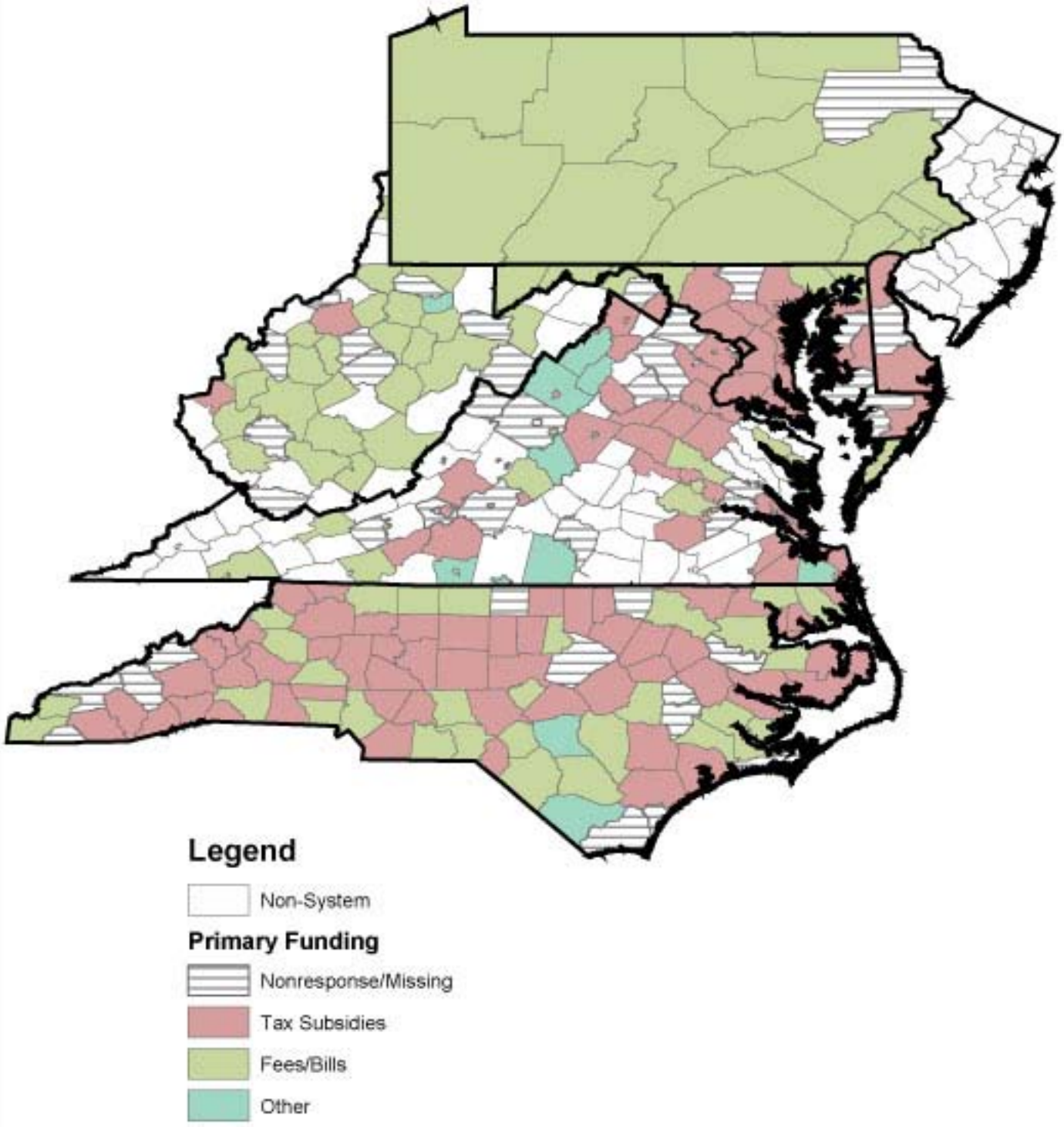
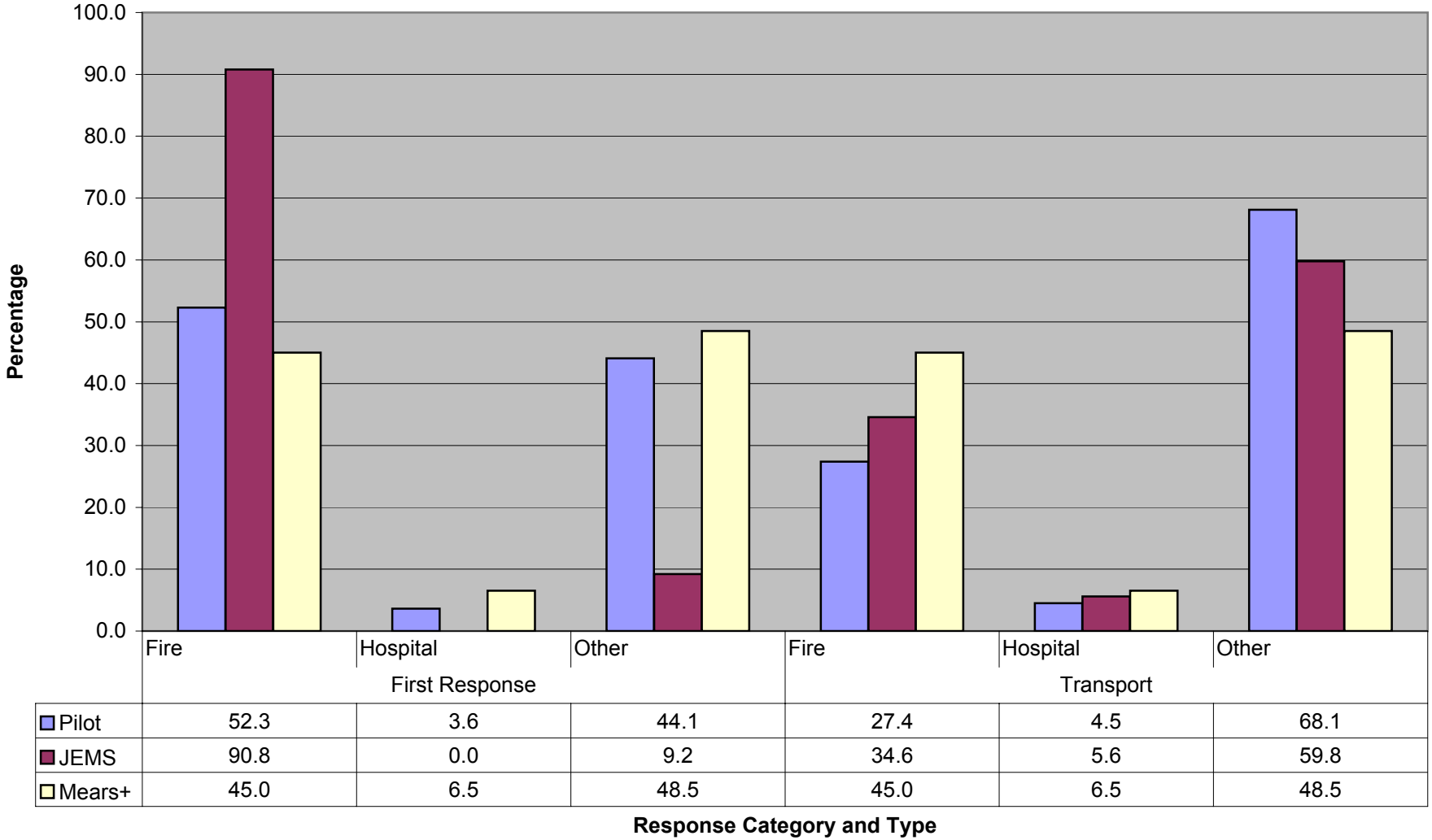


Figure 14. EMS System* Type by Study



	First Response			Transport		
	Fire	Hospital	Other	Fire	Hospital	Other
Pilot	52.3	3.6	44.1	27.4	4.5	68.1
JEMS	90.8	0.0	9.2	34.6	5.6	59.8
Mears+	45.0	6.5	48.5	45.0	6.5	48.5

* Primary agency type used for pilot data, study specific definitions for JEMS and Mears

\+ Since Mears did not break down systems into first response and transports, percentages are assumed to be the same for both.

Appendices

Configurations of EMS Systems

Instructions: *Please answer the following questions regarding your EMS system as a whole. Since our goal is to learn more about EMS in your area, please be sure to consider all the agencies, activities, and components that make up your system, excluding those related to interfacility or aeromedical EMS operations.*

1. Of the following types of EMS agencies, please indicate which types provide **emergency first response** (dispatch of medical personnel to scene in a non-transport vehicle) within your system and which is most often used. If your system does not use first responders, please check "No separate first response" under "Primary Type."

Agency Type	**Present Within System (check all that apply)**	**Primary Type (check only one)**
Private, for-profit ambulance service	☐	☐
Private, not-for-profit ambulance service	☐	☐
Fire dept, single-role (EMS only) personnel	☐	☐
Fire dept, multi-role (EMS/FF cross-train) personnel	☐	☐
Govt.-based / third service (non-police, non-fire)	☐	☐
Independent volunteer ambulance service	☐	☐
Public safety dept. / Joint police-fire-EMS	☐	☐
Public-utility model	☐	☐
Hospital-based	☐	☐
Police	☐	☐
University	☐	☐
Other (specify)_____	☐	☐
No separate first response		☐

2. Of the following types of EMS agencies, please indicate which types provide **emergency transport** (from scene to a health care facility) within your system and which is most often used.

Agency Type	**Present Within System (check all that apply)**	**Primary Type (check only one)**
Private, for-profit ambulance service	☐	☐
Private, not-for-profit ambulance service	☐	☐
Fire dept, single-role (EMS only) personnel	☐	☐
Fire dept, multi-role (EMS/FF cross-train) personnel	☐	☐
Govt.-based / third service (non-police, non-fire)	☐	☐
Independent volunteer ambulance service	☐	☐
Public safety dept. / Joint police-fire-EMS	☐	☐
Public-utility model	☐	☐
Hospital-based	☐	☐
Police	☐	☐
University	☐	☐
Other (specify)_____	☐	☐

3. Of the following types of agencies, please indicate which agency types provide **emergency medical dispatch** of response vehicles for your system and which is most often used.

Agency Type	**Present Within System (check all that apply)**	**Primary Type (check only one)**
Public safety dept. / Joint police-fire-EMS	☐	☐
Fire department	☐	☐
Police department	☐	☐
Sheriff's department	☐	☐
Private ambulance service	☐	☐
Govt.-based / third service EMS	☐	☐
Hospital	☐	☐
City communications department	☐	☐
County communications department	☐	☐
Other (specify) _____	☐	☐

4. Please indicate which of the following common response configurations are utilized by your system's provider agencies and indicate which is the most frequently used by those agencies.

Response Configuration	**Present Within System (check all that apply)**	**Most Frequently Used (check only one)**
BLS first response, BLS transport	☐	☐
BLS first response, ALS transport	☐	☐
ALS first response, BLS transport	☐	☐
ALS first response, ALS transport	☐	☐
BLS transport only	☐	☐
ALS transport only	☐	☐
Other (specify) _____	☐	☐

IF YOUR SYSTEM USES FIRST RESPONDERS, PLEASE COMPLETE QUESTIONS 5 AND 6. OTHERWISE, PLEASE SKIP TO QUESTION 7.

5. For which calls are first responders ***most commonly*** dispatched within your system?
   - ☐ All 911 calls
   - ☐ Certain calls based on assessment by priority dispatch or other call taking system
   - ☐ Specified emergencies only
   - ☐ Non-emergency assessments
   - ☐ Other (specify) _____

6. When first responders are used, how are they ***most commonly*** dispatched?
   - ☐ First response followed by transport ambulance if necessary
   - ☐ Simultaneous first response and transport ambulance
   - ☐ Other (specify) _____

7. Are there operating procedures within your system that allow vehicles to respond to calls without the use of lights and sirens, based on information received by the dispatch agency?
   - ☐ Yes
   - ☐ No

8. Are there operating procedures within your system that allow vehicles to transport non-emergent patients without the use of lights and sirens, based on information gathered at the scene?
   - ☐ Yes
   - ☐ No

9. Does your system allow providers to transport patients from the scene to non-hospital destinations, such as urgent care centers?
   - ☐ Yes
   - ☐ No

10. Please indicate how often your system's primary emergency first response and transport agencies respond to calls beyond the boundaries of their primary service areas

Routinely Respond Out of Area?	**Never**	**Seldom**	**Sometimes**	**Often**	**Not applicable**
Primary 1st Response Agency	☐	☐	☐	☐	☐
Primary Transport Agency	☐	☐	☐	☐	

11. Please indicate which of the following are addressed in your mutual aid agreements with the EMS systems and/or agencies that border yours (check all that apply).
   - ☐ Service coverage
   - ☐ Communication linkage
   - ☐ Licensure or certification of providers
   - ☐ Financial reimbursement
   - ☐ Liability
   - ☐ Other (specify) _____
   - ☐ Not applicable (no mutual aid agreements)

12. Does your EMS system utilize volunteer providers?
   - ☐ No (skip to question 13)
   - ☐ Yes

   a. Please estimate the percentage of providers that serve as volunteers. _____ %
   b. From where do volunteers ***typically*** respond to calls while on duty?
      - ☐ From their homes, work, or other locations within the designated response area
      - ☐ From fire or EMS station houses

13. Are there areas within your system where call coverage is a major concern due to significant staffing shortages?
    - ☐ Yes
    - ☐ No

14. How can individuals within your system access EMS (check all that apply)?
    - ☐ Basic 9-1-1 (all information transmitted verbally)
    - ☐ Enhanced 9-1-1 (caller's phone number & location appear on screen)
    - ☐ 7 or 10 digit number
    - ☐ Wireless 9-1-1 (no geographic information or caller's phone number available)
    - ☐ Wireless Enhanced 9-1-1 (geographic information & caller's phone number available)
    - ☐ Other (specify) _____

15. Do any of your system's dispatch agencies offer pre-arrival instructions to callers for certain types of calls?
    - ☐ Yes
    - ☐ No

16. On a day-to-day basis, who is ***primarily*** responsible for medical control for your system as a whole?
    - ☐ Systemwide, "in-house" medical director
    - ☐ External (e.g. hospital based) medical director
    - ☐ Medical advisory board
    - ☐ EMS regulatory agency
    - ☐ No systemwide medical direction, but provided at the individual agency level
    - ☐ Other (specify) _____
    - ☐ No medical direction at all

17. Thinking of your system as a whole, how is EMS financed? From the following list of funding sources, please indicate how EMS receives the funds necessary to provide its services and please indicate the primary funding source.

Funding Sources	**Present Within System (check all that apply)**	**Primary Source (check only one)**
Tax subsidies	☐	☐
Fees/bill for services	☐	☐
Homeland security grants	☐	☐
Other grants	☐	☐
Donations/fundraisers	☐	☐
Other (specify)_____	☐	☐

18. Please provide the following information about your EMS system:
    a. Number of EMS care providers, including volunteers, at all levels _____
    b. Number of 9-1-1 calls for service annually _____
    c. Number of EMS responses annually _____
    d. Number of EMS transports annually _____

19. Please indicate the level with which you agree or disagree with the following statements. (**SD**=Strongly disagree, **D**=Disagree, **N**=Neutral, **A**=Agree, **SA**=Strongly Agree)

Resource Levels					
a. Our system is adequately staffed to meet demand.	**SD**	**D**	**N**	**A**	**SA**
b. Our system has enough resources (vehicles, equipment) to meet demand.	**SD**	**D**	**N**	**A**	**SA**
Public Participation					
c. The population served by our system has a high level of EMS awareness, participation or support.	**SD**	**D**	**N**	**A**	**SA**
d. Defibrillators, available for public access, can be found in many public places within our system.	**SD**	**D**	**N**	**A**	**SA**
e. Bystanders often provide CPR prior to EMS arrival at cardiac arrest calls.	**SD**	**D**	**N**	**A**	**SA**
f. The public is satisfied with our EMS services.	**SD**	**D**	**N**	**A**	**SA**
System Support					
g. Our system has a high level of physician involvement.	**SD**	**D**	**N**	**A**	**SA**
h. Hospitals in our system are supportive of our EMS agencies/providers.	**SD**	**D**	**N**	**A**	**SA**
i. Patient flow through the EMS system is generally smooth.	**SD**	**D**	**N**	**A**	**SA**
j. Our EMS system / participating agencies collaborate with non-EMS organizations.	**SD**	**D**	**N**	**A**	**SA**
System Environment					
k. “Turf wars” are a problem for our EMS providers.	**SD**	**D**	**N**	**A**	**SA**
l. Politics are a problem within our EMS system.	**SD**	**D**	**N**	**A**	**SA**
m. EMS providers enjoy working within our EMS system.	**SD**	**D**	**N**	**A**	**SA**
System Change					
n. Our EMS system looks much the same as 10 years ago	**SD**	**D**	**N**	**A**	**SA**
o. Our EMS system will look much the same 10 years from now	**SD**	**D**	**N**	**A**	**SA**
p. Our system adapts well to change.	**SD**	**D**	**N**	**A**	**SA**

20. If you would like to provide any additional information about your system, including unique characteristics or special situations/arrangements for the organization and provision of EMS in your area, please enter it in the space below.

Thank you for your participation.
Please return your completed survey in the prepaid envelope included.

Surveying Configurations of EMS Systems

1. Do you have a county department, division or agency responsible for the oversight of EMS in your county?

   - If yes, please provide contact information in the box below.

Organization:	
Contact Person:	
Title:	
Address:	
Phone:	
Fax:	
E-mail:	

   - If no, is there a ***single*** organization outside of the county government that provides oversight of EMS in your county or serves as a "lead" organization for providers in your county (e.g.,a large EMS service)? Please provide contact information in the box below.

Organization:	
Contact Person:	
Title:	
Address:	
Phone:	
Fax:	
E-mail:	

2. How can individuals within your county access EMS (check all that apply)?
   - ☐ 911
   - ☐ Wireless 911
   - ☐ 7 or 10 digit number
   - ☐ Don't know

- over please -

3. Please indicate who provides EMS within your county from the following list of predominant types of EMS agencies (check all that apply):
   - ☐ Fire departments
   - ☐ Private ambulance service
   - ☐ Volunteer ambulance service / rescue squad
   - ☐ Police
   - ☐ Hospital
   - ☐ Other (specify) _____
   - ☐ Don't know

4. Thinking of your county as a whole, how is EMS financed? From the following list of funding sources, please indicate how EMS receives the funds necessary to provide its services (check all that apply).
   - ☐ Tax subsidies
   - ☐ Fees/bill for services
   - ☐ Donations/fundraisers
   - ☐ Other (specify) _____
   - ☐ Don't know

5. Are there areas within your county serviced by EMS providers who respond to a scene without an ambulance or vehicle used to transport patients (known as first responders)?
   - ☐ Yes
   - ☐ No
   - ☐ Don't know

6. Are there areas within your county serviced by EMS providers with advanced training (i.e., the ability to use defibrillators and administer medications)?
   - ☐ Yes
   - ☐ No
   - ☐ Don't know

Thank you for your participation.
Please return your completed survey in the prepaid envelope included.

DOT HS 810 911
March 2008

U.S. Department of Transportation
National Highway Traffic Safety Administration