



# **Florida Rural County EMS Response Time Report**

**Florida Department of Health**

**Bureau of Emergency Medical Services**

**Release Date: March 15, 2012**



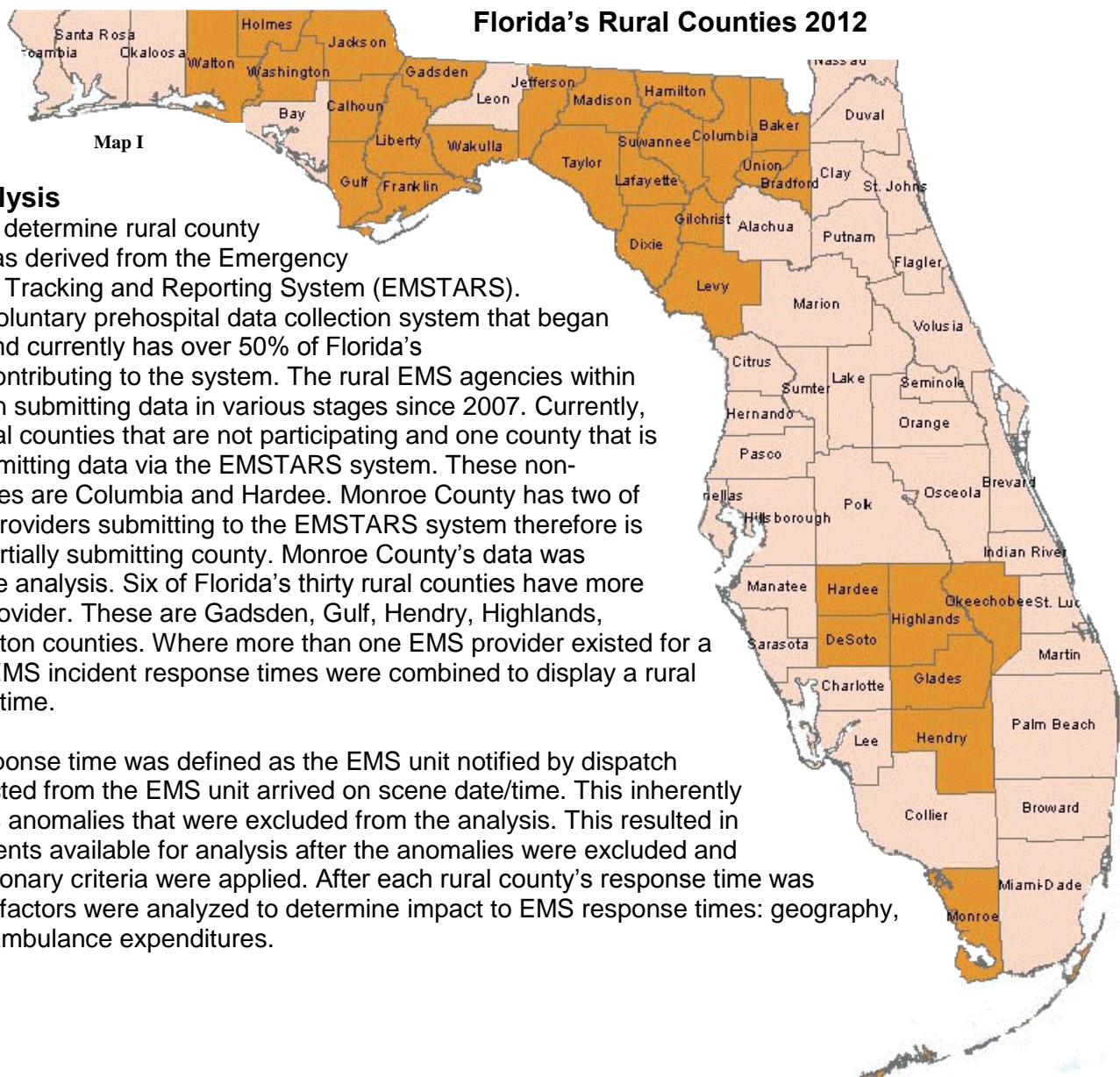


## Emergency Medical Service Response Time for Rural Florida Counties

### Introduction

As of the 2010 Census, 30 of Florida's 67 counties are considered rural based on the statutory definition of an area with a population density of less than 100 individuals per square mile or an area defined by the most recent United States Census as rural. In area, these 30 counties cover just over 34.3 percent of Florida's nearly 54,000 square miles of land area.<sup>9</sup> Rural counties are located primarily in the Florida Panhandle, north central Florida, the south central portion of the state, and the Florida Keys. Approximately 770,000 of Florida's 19 million citizens live in those rural counties.<sup>9</sup>

Portions of other Florida counties also contain large, rural areas but are not classified as rural. Many of the counties bordering on the Atlantic and Gulf have densely-populated coastal areas with thinly populated interiors (e.g., Collier, Palm Beach, or Escambia counties.) Those areas are not included in this report. In addition, areas such as Walton and Orange counties have fluctuations in population based on seasonal changes, which are not taken into consideration for this report. The purpose of this report is to analyze the response times of Emergency Medical Services (EMS) from rural counties to determine best practices for system improvements.



### Method of Analysis

The data used to determine rural county response time was derived from the Emergency Medical Services Tracking and Reporting System (EMSTAR). EMSTAR is a voluntary prehospital data collection system that began in July of 2007 and currently has over 50% of Florida's EMS providers contributing to the system. The rural EMS agencies within EMSTAR began submitting data in various stages since 2007. Currently, there are two rural counties that are not participating and one county that is only partially submitting data via the EMSTAR system. These non-submitting counties are Columbia and Hardee. Monroe County has two of the seven EMS providers submitting to the EMSTAR system therefore is considered as partially submitting county. Monroe County's data was excluded from the analysis. Six of Florida's thirty rural counties have more than one EMS provider. These are Gadsden, Gulf, Hendry, Highlands, Monroe, and Walton counties. Where more than one EMS provider existed for a rural county, all EMS incident response times were combined to display a rural county response time.

Rural county response time was defined as the EMS unit notified by dispatch data/time subtracted from the EMS unit arrived on scene date/time. This inherently produced various anomalies that were excluded from the analysis. This resulted in 230,780 EMS events available for analysis after the anomalies were excluded and additional exclusionary criteria were applied. After each rural county's response time was calculated, three factors were analyzed to determine impact to EMS response times: geography, population, and ambulance expenditures.



*Emergency Medical Service  
Response Time for Rural Florida Counties*

## **Exclusionary Criteria**

The following exclusionary criteria were applied to produce records relevant to the purpose of this report.

- EMSTAR D01\_05 Primary Type of Service not equal to 911 Response (Scene) with Transport Capability or 911 Response (Scene) without Transport Capability
- EMSTAR E02\_04 Type of Service Requested not equal to 911 Response (EMS Scene Call)
- EMSTAR E02\_20 Response Mod to Scene not equal to Lights and Siren
- Response time less than zero
- Response time greater than 2 hours

## **Additional Data Sources**

In addition to the EMSTAR system, four additional databases were utilized for this report. The United States Census Bureau State and County Quickfacts database was used to determine county square mileage, persons per square mile, and population. The ambulance and rescue service expenditure data was derived from the Florida Department of Financial Services' (FDFS) Local Government Electronic Reporting System (LOGER). All data that reference permitted vehicles or station density originated from the Florida Department of Health (FDOH) Customer Oriented Medical Practitioner Administration System (COMPAS). The COMPAS database is populated from EMS licensure data submitted by EMS agencies. In addition, the reference to national EMS data were analyzed from the National Emergency Medical Services Information System (NEMSIS).

## **Data Discoverability**

Beyond protected patient information, the EMSTAR system also contains confidential information on Florida's EMS system and the delivery of services by local provider agencies. The information contained within the system and its reports is intended for use by Florida's local and state emergency medical review committees (EMRC) and/or Quality Assurance Committees.<sup>10</sup> Pursuant to § 401.425(5) Florida Statutes, the records obtained or produced by the EMRC providing quality assurance activities are exempt from the provisions of § [119.07](#)(1) and s. 24(a), Art. I of the State Constitution, and EMRC proceedings and meetings regarding quality assurance activities are exempt from the provisions of s. [286.011](#) and s. 24(b), Art. I, of the State Constitution.<sup>8</sup> Due to the data's confidentiality and exemption from public records laws, the identity of EMSTAR agencies and rural counties remain concealed in this report.

## **Overall Rural County EMS Response Time**

Analysis of 230,780 EMS response incidents from 27 of Florida's 30 rural counties shows an average response time of 9 minutes and 15 seconds. 90 percent of the time, a rural response was less than 16 minutes and 18 seconds. The shortest average response time was 6 minutes and 30 seconds. The longest average was 12 minutes and 39 seconds. This was a range of 6 minutes and 9 seconds.

The NEMSIS database was used to compare Florida's rural response time to a national average. The NEMSIS Technical Assistance Center uses urbanicity codes to categorize response areas throughout the country. The urbanicity index is determined by the United States Department of Agriculture (USDA) and the Office of Management and Budget (OMB).<sup>6</sup> Currently, NEMSIS has placed various urbanicity codes into the four categories of urban, suburban, rural, and wilderness. Comparable data reveals a response time of 10 minutes and 5 seconds for nationally recognized rural EMS response areas.<sup>6</sup>



*Emergency Medical Service  
Response Time for Rural Florida Counties*

This comparison indicates that rural Florida counties have a response time that is 50 seconds faster than the national average. The NEMSIS database indicates a 90<sup>th</sup> percentile response time of 18 minutes. This is 1 minute and 42 seconds slower than rural Florida's 16 minute and 18 second 90<sup>th</sup> percentile calculation.

Table I

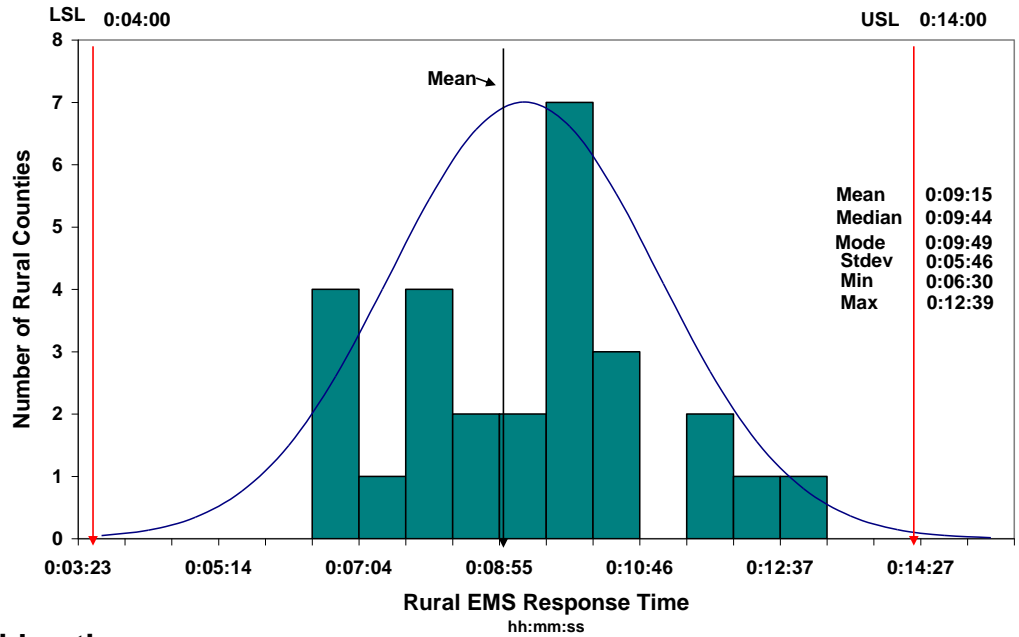
Rural County	N	Response Time Mean (H:MM:SS)	Response Time Median (H:MM:SS)	Response Time 90th % Fractile	Response Time StdDev	# of EMS stations and substations per 100 sq. miles	# of permitted vehicles per 100 sq. miles	# of permitted Vehicles per 10,000 Pop	# of Stations/Response Areas per 10,000 Pop
1st	475	0:06:30	0:06:00	0:11:00	0:03:32	0.785	1.099	2.01	1.43
2nd	12,597	0:06:34	0:06:00	0:11:00	0:03:44	0.650	0.910	1.75	1.25
3rd	40,873	0:06:35	0:06:00	0:11:00	0:03:19	0.688	2.852	2.94	0.71
4th	8,845	0:06:37	0:06:00	0:12:00	0:04:03	0.342	0.684	1.48	0.74
5th	27,329	0:07:22	0:07:00	0:13:00	0:04:17	0.775	2.132	2.37	0.86
6th	8,828	0:07:45	0:06:00	0:16:00	0:06:03	0.347	1.561	4.60	1.02
7th	2,596	0:07:55	0:06:00	0:15:00	0:05:23	0.353	1.058	4.10	1.37
8th	12,059	0:07:59	0:07:00	0:14:00	0:04:13	1.020	2.041	2.10	1.05
9th	3,963	0:08:12	0:05:00	0:17:00	0:07:42	0.096	0.671	3.10	0.44
10th	14,799	0:08:19	0:07:35	0:14:00	0:04:24	0.578	2.697	5.09	1.09
11th	4,517	0:08:51	0:08:00	0:15:00	0:05:25	0.820	1.230	1.93	1.29
12th	6,928	0:09:00	0:07:00	0:17:00	0:06:04	0.167	1.003	4.06	0.68
13th	7,327	0:09:11	0:09:00	0:15:00	0:04:48	0.537	1.073	2.94	1.47
14th	6,560	0:09:44	0:09:00	0:15:00	0:04:44	0.726	1.161	1.93	1.20
15th	9,506	0:09:46	0:09:00	0:17:00	0:05:55	0.567	0.993	4.26	2.44
16th	1,638	0:09:49	0:08:00	0:20:00	0:07:34	0.748	1.121	5.20	3.46
17th	7,306	0:09:49	0:08:00	0:18:00	0:05:57	0.355	1.418	5.04	1.26
18th	8,731	0:09:55	0:10:00	0:16:00	0:04:44	0.218	0.871	1.61	0.40
19th	1,151	0:09:56	0:10:00	0:18:00	0:07:02	0.120	0.239	2.39	1.20
20th	2,279	0:10:06	0:08:00	0:20:00	0:07:31	0.184	0.552	3.38	1.13
21st	6,152	0:10:10	0:09:00	0:17:00	0:05:12	0.495	1.320	2.60	0.97
22nd	5,776	0:10:35	0:10:00	0:19:00	0:06:14	0.195	0.973	3.38	0.68
23rd	5,302	0:10:37	0:09:00	0:18:00	0:08:07	0.287	0.575	2.08	1.04
24th	7,223	0:11:27	0:10:00	0:20:00	0:07:43	0.626	1.253	3.01	1.51
25th	2,922	0:11:54	0:11:00	0:18:00	0:05:16	0.248	0.496	3.10	1.55
26th	6,351	0:12:23	0:10:00	0:23:00	0:10:23	0.343	0.686	1.61	0.80
27th	8,747	0:12:39	0:12:00	0:20:00	0:06:13	0.571	1.714	3.54	1.18
<b>All</b>	<b>230,780</b>	<b>0:09:15</b>	<b>0:08:08</b>	<b>0:16:18</b>	<b>0:05:46</b>	<b>0.446</b>	<b>1.212</b>	<b>2.90</b>	<b>1.06</b>



## Emergency Medical Service Response Time for Rural Florida Counties

Chart I

### Dispersion of Rural EMS Response Times



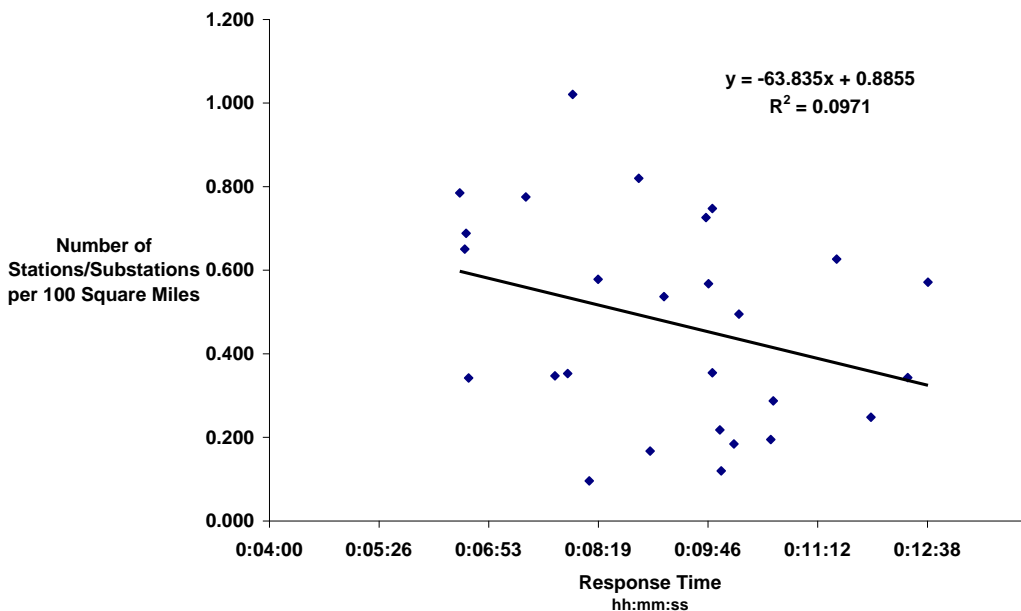
The overall dispersion of rural county response times ranged from 6 minutes and 30 seconds to 12 minutes and 39 seconds. While this range nearly doubled, all remained within two standard deviations from the mean.

### Geographical Resource Considerations

The average size of a rural Florida county is 682 square miles. The majority of Florida's rural counties are landlocked while nine have various portions of coastal areas. These rural counties are primarily located in North West and North Central Florida. These areas include rolling hills and deep swamps along the Gulf coast. Six of the rural counties are in South Central Florida, an area that includes Lake Okeechobee and the Everglades. It is a unique wilderness region that extends across the center of the southern part of the peninsula.

#### Correlation Between Station/Substation Count per 100 Square Miles and the Rural EMS Response Time

Chart II



In considering the effect of geography on response time, the portion of each county's allocated EMS resources per 100 square miles was analyzed. The portions of allocated EMS resources examined are limited to permitted advanced and basic life support vehicles and to the count of indicated base or substations listed in each service's licensure file. The quantities of these EMS resources were calculated by area (per 100 square miles) for each county, and then the correlation between those resources and rural EMS response time was examined.

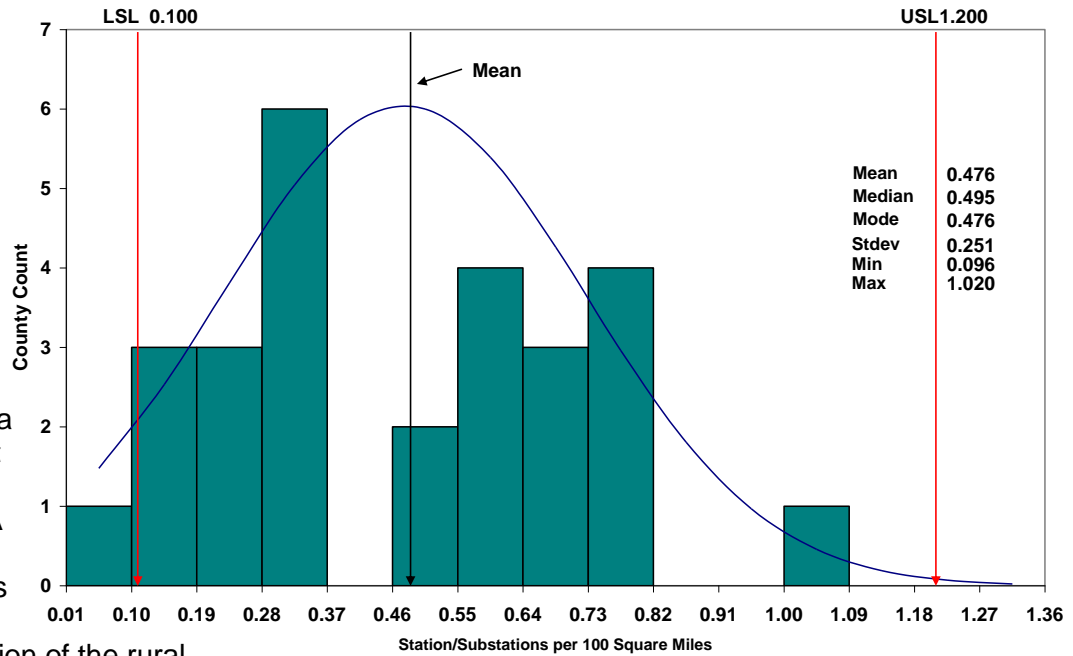


## Emergency Medical Service Response Time for Rural Florida Counties

Chart III

Dispersion of Rural EMS Station/Substation Count per 100 Square Miles

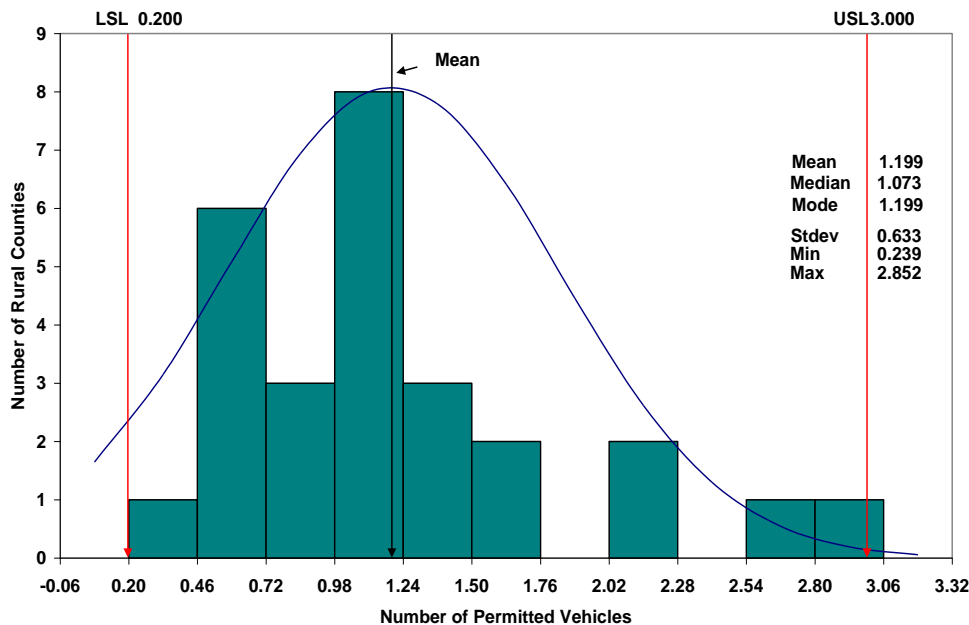
The first analysis of geographical resources was the number of stations/substations per 100 square miles. For the purposes of this report, the count of station/substations was derived from agency licensure files within the FDOH/Bureau of EMS. Each agency must submit an application for licensure to become an ALS or BLS service within Florida. Once approved as a service, each agency must submit a renewal application every two years with updated information. A station or substation is typically a permanent location that EMS units respond from to request for emergency services. The dispersion of the rural



county station/substations range from .096 to 1.02 per 100 square miles. The average for rural counties overall is 0.446 stations/substations per 100 square miles. The county with the highest number of stations per 100 square miles is one of the smallest counties in Florida with 3 stations and substations. The county with the lowest number of stations per 100 square miles is one of the largest rural counties and has only one EMS station. As it appears in chart II, there is very little strength of correlation ( $R^2 = 0.121$ ) between the number of stations/substations and the rural county EMS response times.

Chart IV

Dispersion of the Number of Permitted Vehicles per 100 Square Miles

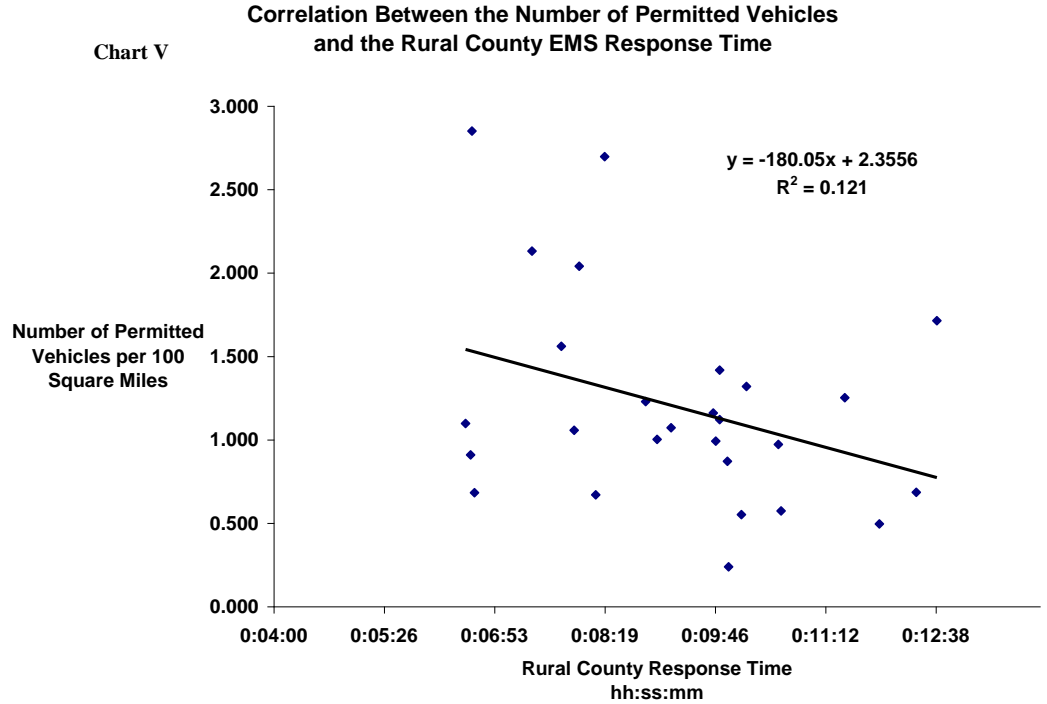


The second part of the geographical resource analysis relates the number of permitted EMS vehicles per 100 square miles to response time. Pursuant to section 401.26 (1) Florida Statutes, every licensed EMS agency shall possess a valid permit for each transport vehicle and advanced life support non-transport vehicle in use. This requires the EMS agency to apply for a vehicle permit and allows the department to track these vehicles via the COMPAS database. However, the number of permitted vehicles does not indicate the total number of vehicles that are in-service at an EMS agency. A portion of an agency's permitted vehicles could be contributed a reserve fleet that is used in the case of frontline vehicle failure.



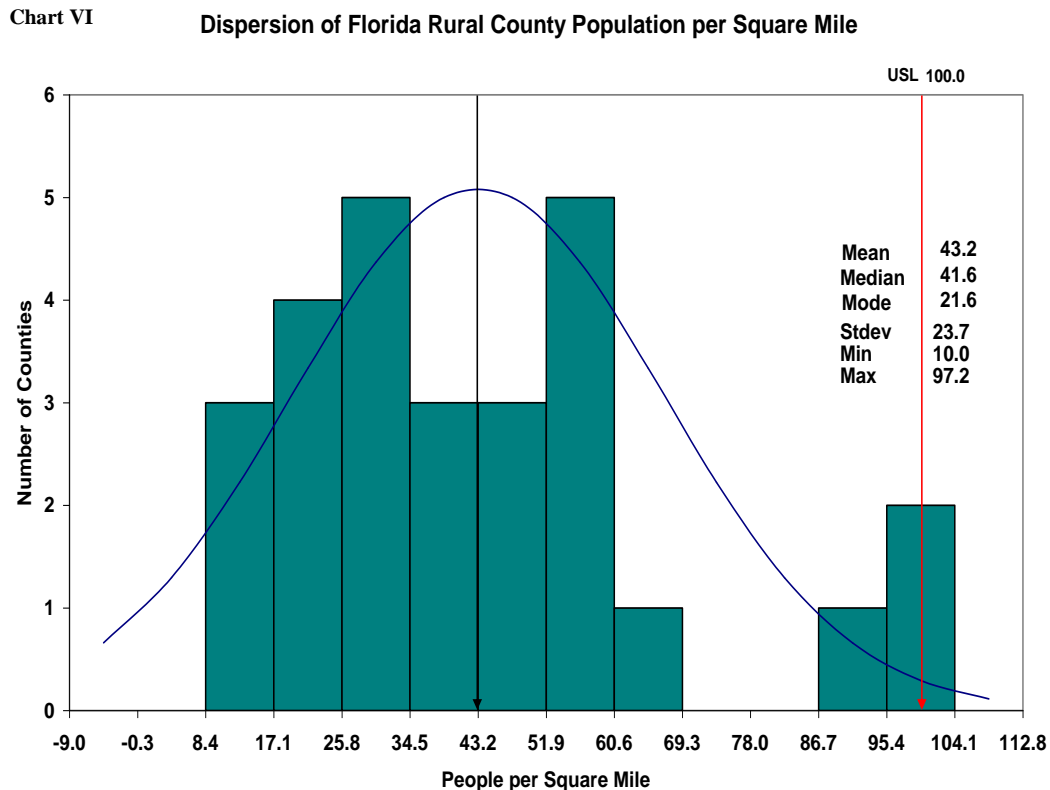
## Emergency Medical Service Response Time for Rural Florida Counties

The determination between a rural county's total number of permitted EMS vehicles to the EMS response time revealed a positive but weak determination. The average number of permitted vehicle among rural counties is 1.212 per 100 square miles. The lowest number of permitted vehicles per 100 square miles was .239. (Further review of this county revealed data below the mean in other areas as well). The most saturated county had 2.852 permitted EMS vehicles per 100 square miles.



## Population Considerations

In this report, population per square mile is the population variable used for analysis. Revealing a county's exact population allows a reader to identify the county and therefore would circumvent the confidentiality requirements of the data. Chart VI shows the dispersion of people per square mile in Florida's rural counties. The average population per square mile in the 27 rural Florida counties included in this report is 43.2 persons. Three counties had 86 or more people per square mile. These three counties contain 23% of the entire population (769,954) represented in this report and 4% of Florida's total population (18,801,310).

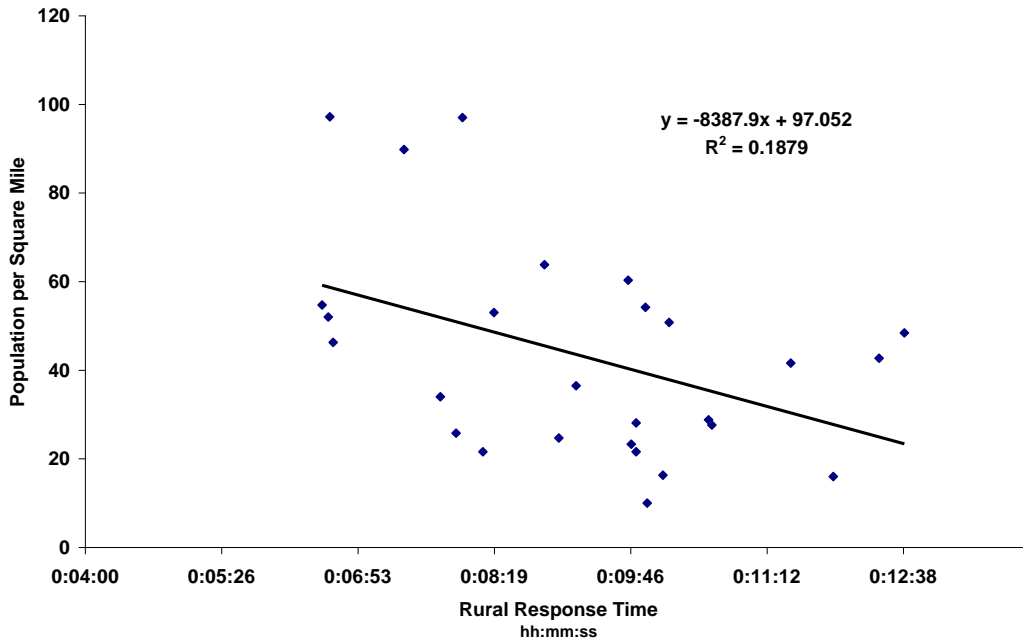




## Emergency Medical Service Response Time for Rural Florida Counties

Chart VII

Correlation of Population per Square Mile to Rural EMS Response Time



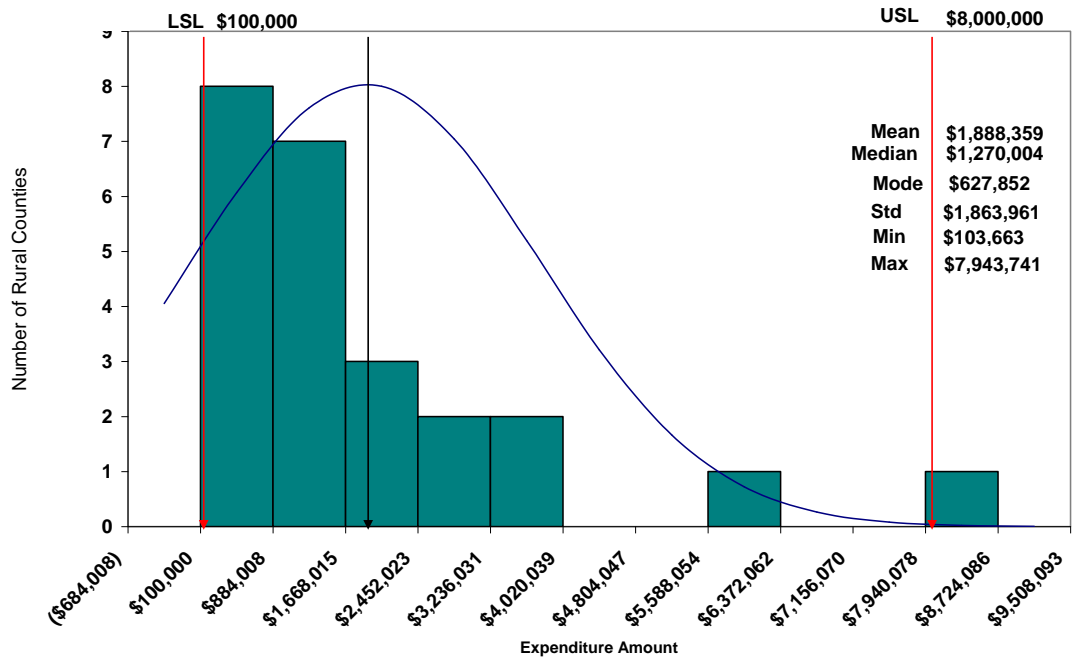
The determination between population per square mile and the EMS response time revealed a positive but weak relationship between the two variables. The county with the largest population per square mile had the 3<sup>rd</sup> best response time of all rural counties. The county with the fewest people per square mile had the 19<sup>th</sup> best response time among the 27 rural counties.

## Ambulance and Rescue Service Expenditure Considerations

The third variable considered in this report was the ambulance expenditures. The purpose of analyzing ambulance and rescue service expenditures is to determine if the amount of monies spent on this service affect the rural EMS response time. Ambulance expenditures include ambulance and rescue service expenditures reported from each county's Annual Financial Report, which statutorily requires each county to submit various expenditures and revenues to the Department of Financial Services. The Annual Financial Report defines expenditures as a "governmental fund accounting context as all decreases in fund net assets - for current operations, capital outlay or debt service - except those arising from operating and residual equity transfers to other funds".<sup>4</sup>

Chart VIII

Dispersion of Ambulance and Rescue Service Expenditures for 2010





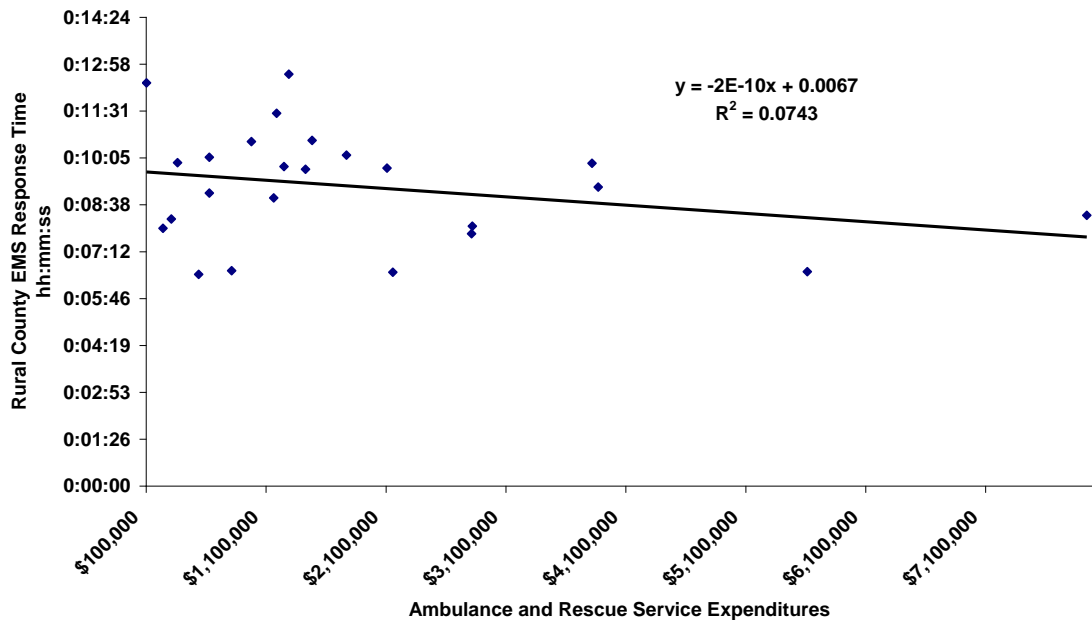


Emergency Medical Service
Response Time for Rural Florida Counties

Expenditures are classified by fund, organizational unit, function, activity and object. The code used to determine ambulance and rescue service expenditures was 526.00. This function is defined as the cost of providing rescue and ambulance services for the sick and injured where such services are not more directly related to highway safety purposes. The Annual Financial Report separates fire control from ambulance and rescue services. Chart XX presents expenditure data for the 24 counties in this analysis that reported financial data to the Department of Financial Services. As it appears in chart VIII, the lowest expense on ambulance service and rescue services was \$103,663 and the highest amount spent was \$7,943,741. The county with the lowest expenditures had the 24th best response time. The rural county with the highest amount of expenditures had the 10th best response time with an expenditure amount of \$7,943,741. The average expenditure amount among Florida's rural counties was \$1,888,359.

A weak correlation is seen between expenditures and the rural county EMS response time. On average, an expenditure amount of \$1,888,359 correlates to a response time average of 9 minutes and 11 seconds. EMS financial reporting is very multi faceted and complex due to variations in cost accounting techniques, cost allocations by governmental bodies, in kind services and operational variations that are unique to each agency. Prior to any comparative conclusions from agency to agency a more exhaustive side by side cost analysis must be conducted to assure an accurate assessment.

Chart IX Correlation Between Ambulance and Rescue Service Expenditures and Rural EMS Response Time



Conclusion

This analysis represents a beginning of evidence-based decision making that could positively affect EMS patient care and response. By analyzing this rural EMS data, we attempted to quantify the variables that affect Florida's rural county EMS response time. The strongest correlation seen in this analysis is the number of permitted vehicles per 100 square mile with response time. The more permitted vehicles a county has, the faster EMS response time will be. The weakest relationship was the reported expenditures of ambulance and rescue services to the rural EMS response time. Overall, the Florida rural counties have a 50 second faster average response time than the national average for rural counties.



*Emergency Medical Service  
Response Time for Rural Florida Counties*

Sources:

1. *2010 Florida Emergency Medical Providers Licensure and Call Volume Report* (Rep.). (2011, February 02). Retrieved February 29, 2012, from Florida Emergency Medical review Committee website: <http://www.fl-ems.com/Providers/DataPDFs/Final2010LicensureandCallVolumeReport.pdf>
2. *Customer Oriented Medical Practitioner Administration System* [Licensure and Permitted Vehicle Report]. (2012). Florida Department of Health, Tallahassee.
3. EMSTAR - Emergency Medical Services Tracking And Reporting System. (2008). *EMSTAR*. Retrieved February 29, 2012, from <http://www.floridaemstars.com/>
4. *Florida Department of Financial Services* [Uniform Accounting System Manual]. (2010, August 08). Division of Accounting & Auditing, Tallahassee.
5. *Local Government Electronic Reporting System*. (2012). Retrieved February 29, 2012, from <https://apps.fldfs.com/LocalGov/Reports/AdHoc.aspx>.
6. *National Elapsed Patient Care Times by Urbanicity* (pp. 1-2, National Emergency Medical Services Information System). (n.d.). Retrieved February 29, 2012, from <https://www.utahdcc.org/Reports/Pages/Report.aspx?ItemPath=%2fNEMESIS%2fView+National+Reports%2fElapsed+Time+Reports%2fNational+Elapsed+Patient+Care+Times+by+Urbanicity>.
8. Online Sunshine. (2012). §§ 401.26(1) *Vehicle Permits for Basic Life Support and Advanced Life Support Services*. Retrieved February 29, 2012, from [http://www.leg.state.fl.us/Statutes/index.cfm?App\\_mode=Display\\_Statute&Search\\_String=&URL=0400-0499/0401/Sections/0401.26.html](http://www.leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=0400-0499/0401/Sections/0401.26.html)
9. State&County Quickfacts. (2012). *U.S. Census Bureau*. Retrieved February 29, 2012, from <http://quickfacts.census.gov/qfd/states/12000.html>
10. The Basic Facts: Prehospital Tracking and Reporting System. (2007, January 15). *EMSTAR*. Retrieved February 29, 2012, from [http://www.floridaemstars.com/docs/EMSTARFactSheet\\_0809.pdf](http://www.floridaemstars.com/docs/EMSTARFactSheet_0809.pdf)

**Report Authors:** Steve McCoy, Florida Bureau of EMS Quality Manager  
Karen Card, Florida Bureau of EMS, Epidemiologist

**Report Contributors and Editors:** Florida Emergency Medical Review Committee