Emergency response and traffic congestion: the dispatcher's perspective

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Abstract

Traffic congestion may impede the ability of emergency vehicles to reach the site of a traffic incident or other disaster in a fast and reliable manner. It is imperative that emergency dispatchers use real time traffic information in order to improve dispatching of Emergency Medical Services (EMS) to the disaster site. Preliminary research indicates, however, that many dispatchers have not been trained to cope with severe congestion nor have they been given the tools that would allow them to consider traffic congestion in the dispatching process. In order to (a) document the extend of this problem in the state of Alabama and (b) understand how traffic congestion impacts emergency dispatching decisions and response, this study developed and conducted a statewide survey of emergency dispatchers on behalf of the University Transportation Center at the University of Alabama at Birmingham. The survey sought feedback from EMS dispatchers in Alabama on current practices, positive and negative experiences, preferences, as well as their perceptions on the use of real time traffic data to help optimize emergency response and transport times. The results of the survey analysis clearly show that there is a disconnect between dispatching decisions and conditions in the field. Traffic congestion was generally not viewed as a major concern among the dispatchers surveyed nor was any real time traffic information used to improve decision making at the dispatching control center. Availability of real-time traffic information for dispatching purposes, and education of dispatchers about the opportunities and benefits that can be realized by using such information are very important steps toward improving Emergency Medical Services (EMS) performance and reliability, which in return can improve survivability of victims requiring medical attention.
Keywords: emergency dispatch, traffic congestion, Alabama.

1   Introduction

Traffic congestion is a primary concern during incident response and can create difficulties for emergency vehicles attempting to enter and exit affected areas. Utilizing real-time information on traffic conditions in support of dispatching decision-making can reduce emergency responders' arrival time to the scene, resulting in faster delivery of medical services, and improved health outcomes of crash victims. However, many of the dispatchers who would be responsible for directing the movements of emergency response units during emergencies have not been trained to cope with congestion nor have they been given the tools that would allow them to consider traffic congestion in the dispatching process.

A review of available literature found that while many computer aided dispatch (CAD) systems have the capability to incorporate real-time traffic data into their dispatch algorithms, few agencies nationwide actually use this feature. Furthermore, an informal survey of emergency response agencies in the Birmingham, Alabama area found that traffic conditions are typically not considered when dispatching a response unit.

1.1 Objective

In an effort to explore these concerns the University of Alabama at Birmingham (UAB) University Transportation Center sought to answer some fundamental questions concerning traffic congestion and emergency response in Alabama, specifically:

- To what degree do emergency dispatchers believe traffic congestion impacts response times in their jurisdiction and how does this compare with the actual experiences of the emergency responders in the field?
- To what degree, if at all, do emergency dispatchers consider traffic conditions when selecting a unit to dispatch?
- Do emergency dispatchers receive training to cope with traffic congestion? Do they have tools that allow them to consider traffic conditions when dispatching a unit?
- What tools would be most useful to dispatchers to enhance the current dispatch process?

In order to gain a better understanding of current dispatching practices as they relate to congestion the UAB University Transportation Center (UTC) undertook two separate surveys of emergency service providers across the state of Alabama. The first was a survey of emergency responders (i.e., the units in the field) to gauge how often they encounter traffic congestion during calls and the extent to which they feel it increases response times. The second was a survey of emergency dispatchers designed to gauge the extent to which they believe traffic congestion impacts emergency response times and what tools they use to address it. This paper presents the results of the dispatcher survey but also includes some findings from the responder survey to allow comparisons between the two.

1.2 Methodology

Initial interviews with emergency responders and dispatchers in the Birmingham area found significant differences in how these two groups perceive traffic congestion and its impacts. In general, our interviews indicated that dispatchers tended to see congestion as less of a problem than responders did. Responders, in turn, expressed a lack of confidence in the accuracy of information conveyed to them by the dispatchers, both with respect to traffic congestion and the nature and location of the emergency.

To investigate these differences it was decided to administer separate but similar surveys for each group. The responder and dispatcher surveys were developed in parallel and designed to obtain similar information from each group. Initial meetings were held with responders and dispatchers in the Birmingham region to better understand current dispatch and response practices and identify the types of issues each group feels are important to their jobs. Meetings with the groups were scheduled separately (i.e., dispatchers and responders were not present at the same meetings) and this made the research group aware of differences in how each group perceives the impacts of traffic congestion. Survey questions were developed based on these meetings and in part designed to clarify some of these differences.

The dispatcher survey solicited the following types of information:

- Employing agency, type of area served (urban or rural), typical volume of calls handled;
- Dispatcher duties, typical work shifts, types of dispatching and monitoring equipment used;
- Dispatcher experience and training;
- Views of congestion and its impact on response times;
- Systems available to monitor or consider congestion in dispatching;
- Suggestions for improving the dispatch process.

Alabama has numerous medium and small-sized urban areas as well as large portions that are rural. It was decided to survey dispatchers in both urban and rural areas in order to gain an understanding of how congestion impacts emergency response under different levels of population. It was also decided that while the survey would focus on Emergency Medical Service (EMS) dispatchers, we would also survey police and fire dispatchers since these duties are shared in many smaller cities and rural areas.

The survey tool used in this study was electronic and is available online at: https://spreadsheets.google.com/viewform?formkey=dHI5RFE5NVlBbkladTJrZjJyYUEyV3c6MA The initial surveys were broadcast via listservs used by emergency dispatchers in the state.

The response rate for this initial solicitation, however, was poor. To increase the response rate, selected public safety access points (PSAPs) in the state were contacted to solicit their participation in the survey. The PSAP's are the primary 9-1-1 call centers serving police, fire, and rescue services in a given area. In many cases the PSAP's serve only as an initial contact point and transfer calls to secondary centers where the emergency response units are actually dispatched.

There is, however, no directory of these secondary dispatch centers available, so the research team obtained information about the emergency departments served by selected PSAP's and attempted to contact the secondary EMS, fire, and police dispatch centers directly. This effort did improve the response rate.

2 Survey results

2.1 Summary survey results

We received a total of 54 survey responses from agencies in both urban and rural areas. The sample size was deemed acceptable to draw conclusions. Responses to selected questions, particularly those that relate to the impacts of congestion on emergency response, are discussed in the following sections. Most of the results have been summarized according to whether the agency serves a predominantly urban or rural area. This distinction was made because traffic congestion impacts urban and rural areas differently and we expected there might be differences in how congestion is perceived in each.

2.1.1 Training

100% of respondents stated that they have received some type of training to prepare them to serve as dispatchers, but less than a quarter reported that they have received training specifically on ways to cope with traffic congestion. This was true in both urban and rural areas.
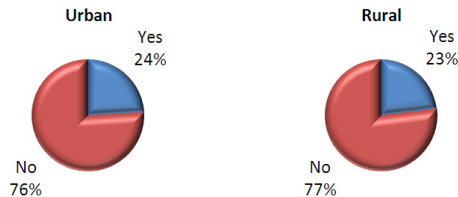

Figure 1: Have you received training to cope with traffic congestion?

2.1.2 Use of computer aided dispatch systems (CAD)

Respondents were asked whether their agency uses a computer aided dispatch (CAD) system. This is important because most CAD systems have the capability to incorporate real-time traffic information into the dispatch process. 81% of the agencies serving urban areas and 74% of those serving rural areas indicated that they use a CAD system. However, none of the respondents surveyed in either urban or rural areas said that their CAD system currently incorporates real-time traffic data into the dispatch process.

2.1.3 Impacts of congestion

Dispatchers were asked how often emergency vehicles in their jurisdiction are impeded by traffic congestion. 52% of urban dispatchers and 42% of rural dispatchers responded "Some of the time". Perhaps more interesting, 48% of

urban and 54% of rural dispatchers responded that traffic congestion rarely or never impacts vehicle response times. The data were checked to see whether these respondents worked primarily on shifts where traffic levels are typically low (e.g., overnight). It was found that overnight shift workers accounted for half the "Rarely" responses in urban areas and 20% of the "Rarely" responses in rural areas.
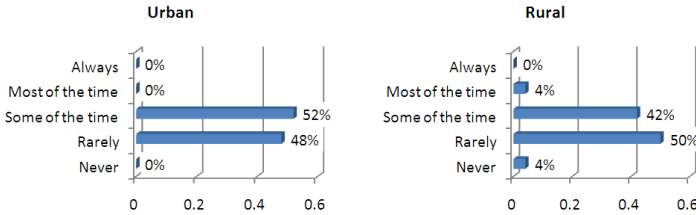
Urban

Always	0%
Most of the time	0%
Some of the time	52%
Rarely	48%
Never	0%

Rural

Always	0%
Most of the time	4%
Some of the time	42%
Rarely	50%
Never	4%

Figure 2:   How often are emergency vehicles impeded by traffic congestion when responding?

2.1.4 Is congestion perceived as a significant problem?

When asked if they view traffic congestion as a significant problem that contributes to increased response times, only 33% of urban dispatchers and 31% of rural dispatchers have said that they "agree" or "somewhat agree". In fact, 48% of urban dispatchers and 50% of rural dispatchers said that they "disagree" or "somewhat disagree".

Urban

Agree	9%
Somewhat agree	24%
No opinion	19%
Somewhat disagree	19%
Disagree	29%

Rural

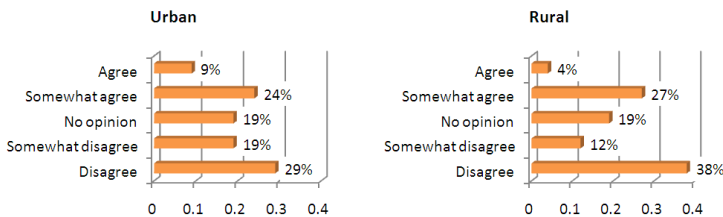|	
Agree	4%
Somewhat agree	27%
No opinion	19%
Somewhat disagree	12%
Disagree	38%

Figure 3:   Traffic congestion is a significant problem that causes increased emergency response times (all respondents).

The data were checked to see what portion of the latter responses came from dispatchers who worked primarily overnight or weekend shifts when traffic volumes are typically lower. When these respondents were removed from the sample the distributions shown in Figure 4 were computed. Still, only 40% of weekday dispatchers responded "Agree" or "Somewhat Agree", while for rural dispatchers the percentages was 37%.

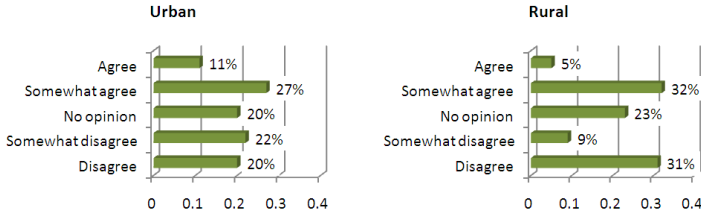Figure 4: Traffic congestion is a significant problem that causes increased emergency response times (weekday morning and afternoon shifts only).

2.1.5 Consideration of traffic conditions when dispatching

Dispatchers were asked if they consider traffic conditions when selecting a vehicle to dispatch. In both urban and rural areas only about 15% replied that they do. The most likely reason is that the dispatchers do not have access to real-time traffic information in the dispatching centers.
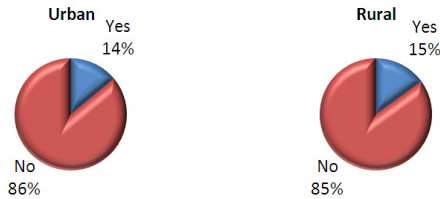

Figure 5: Do you consider traffic conditions when selecting a vehicle to dispatch?

2.1.6 Availability of real-time traffic information in the dispatch center

None of the 54 survey respondents reported that they had access to real-time traffic information in the dispatch center. This is consistent with the interviews we held with local dispatchers, who stated that the dispatchers are largely unaware of existing traffic conditions and congestion. The primary source for traffic information appears to be information relayed by the emergency responders in the field.

2.1.7 Would real-time traffic information be helpful to dispatching?

Dispatchers were asked if having access to real-time traffic information in the dispatch center would be helpful to the dispatching process. 72% of urban dispatchers responded that it would be "very helpful" or "helpful" and 54% of rural dispatchers said the same.

2.1.8 Do dispatchers alert emergency units to congestion in their area?

Dispatchers were asked whether they ever alert emergency units to congestion in their area. Despite the fact that none of the respondents said they have access to real-time traffic data, over 50% of dispatchers said that they do, at least on

occasion, alert units in the field to traffic congestion in their vicinity. Based on other survey results, it is assumed that most of this information is provided by other units in the field.

2.1.9 Quality of information provided by 9-1-1 callers

In interviews emergency responders expressed some frustration with the quality of information provided by dispatchers, both with respect to the location and nature of emergencies. Dispatchers indicated in interviews that they are usually just relaying information provided by 9-1-1 callers and cannot always verify its accuracy. The survey asked dispatchers to rate the accuracy of information provided by 9-1-1 callers. The responses show that over 75% of respondents stated that they either 'agree' or 'somewhat agree' with the statements that the information provided 9-1-1 callers regarding the location and nature of emergencies is accurate. Less than 20% answered 'somewhat disagree' or 'disagree', reflecting general confidence in the information provided.
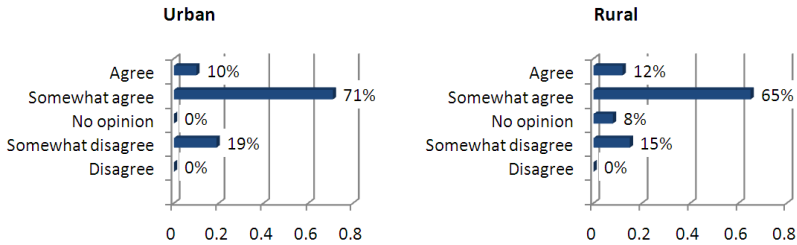
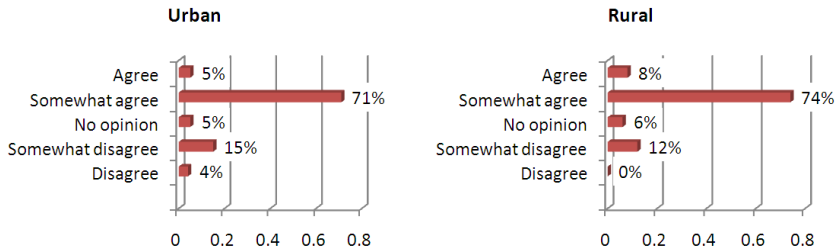Figure 6: Callers to 9-1-1 provide accurate information concerning the *location* of the emergency.

Figure 7: Callers to 9-1-1 provide accurate information concerning the *nature* of the emergency.

2.1.10 The role of education on emergency response times reduction

Dispatchers were asked whether they believed public education about how to provide accurate information to 9-1-1 call takers and emergency dispatchers would help to decrease response times to emergency scenes. Despite the fact that they generally felt that the public provides accurate information, 100% or

Urban

Agree	72%
Somewhat agree	28%
No opinion	0%
Somewhat disagree	0%
Disagree	0%

0   0.2   0.4   0.6   0.8

Rural

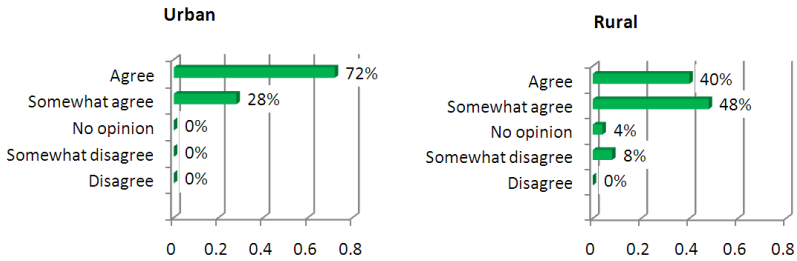|	
Agree	40%
Somewhat agree	48%
No opinion	4%
Somewhat disagree	8%
Disagree	0%

0   0.2   0.4   0.6   0.8

Figure 8:   Public education about how to provide accurate information to dispatchers would help to decrease response times to emergency scenes.

urban dispatchers and 88% of rural dispatchers either 'agreed' or 'somewhat agreed' that some type of public education could help reduce response times.

2.1.11 Impacts of automatic crash notification systems on response

Dispatchers were asked whether they felt automatic crash notification systems such as On-Star would have a beneficial effect on the timeliness of emergency response. Large majorities of both urban and rural dispatchers felt that it would.

Urban

Beneficial	87%
No impact	9%
Negative	4%

0   0.5   1

Rural

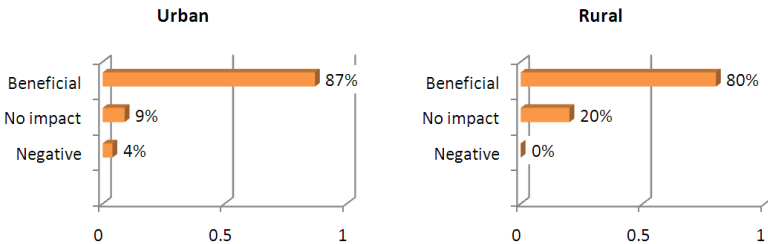|	
Beneficial	80%
No impact	20%
Negative	0%

0   0.5   1

Figure 9:   Do you feel that Automatic Crash Notification systems (e.g., OnStar) have a beneficial, negative, or no impact on the timeliness of EMS response?

2.1.12 Accuracy of cell phone location information

Dispatchers were also asked whether 9-1-1 caller location information provided by cell phone companies is accurate. In interviews, some dispatchers had expressed frustration with the quality of the cell phone location data provided. At times the location information was inaccurate or merely provide the location of the nearest cellular tower. This concern was confirmed in the survey, more so among urban dispatchers, 62% of whom said that cell phone location information is correct only some of the time or rarely. By contrast, 60% of rural dispatchers said cell phone location information is accurate always or most of the time.
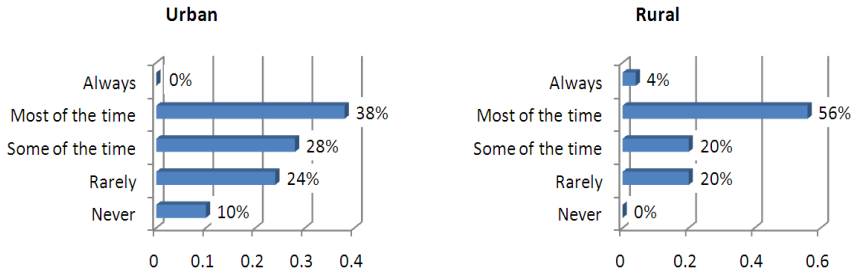
Urban

Rural

Figure 10: When the caller is using a cell phone, the location information provided by the cell phone carrier is accurate.

2.1.13 Training for large-scale emergencies

The survey also asked dispatcher whether they have received training to deal with large scale emergencies (e.g., natural disasters or evacuations) and whether their agency drills/trains for such emergencies. The response in both urban and rural areas was that most agencies do train and practice for large scale emergencies.

2.1.14 Suggestions for improving dispatching

Dispatchers were asked to name two enhancements they felt would most enhance their current dispatch processes. The most commonly suggested enhancement was the deployment of automatic vehicle location systems (AVL) which would allow dispatchers to track the location of units in the field. Other common suggestions included improved caller location information for both cell phone and voice-over-IP (VOIP) systems, more efficient call transfers from the 9-1-1 centers to the secondary agencies, and consolidating police/fire/rescue dispatch systems. Rural dispatchers also cited the need for better CAD systems and installation of mobile data terminals in the response units. Having real-time traffic information available in the dispatch center ranked very low in both urban and rural agencies. Traffic congestion was generally not viewed as a major concern among the dispatchers surveyed.

Table 1:   Suggested enhancements (most suggested to least suggested).

Urban Dispatchers	Rural Dispatchers
Automatic Vehicle Location (AVL)	Automatic Vehicle Location (AVL)
Better 9-1-1 call transfer	Consolidated fire/police/rescue dispatch
Improved caller ID for VOIP services	Improved caller location for cell phones
Improved caller location for cell phones	Mobile Data Terminals in vehicles
Consolidated fire/police/rescue dispatch	Better CAD system
Public education	Better 9-1-1 call transfer
Better CAD system	Improved training
Improved training	Improved caller ID for VOIP services
Multi-jurisdictional 9-1-1 Center	More dispatchers
Real-time traffic information	Real-time traffic information
Upgraded equipment (general)	More dispatchers

3   Discussion and study conclusions

3.1 Summary of results related to traffic congestion

The survey results lead to several interesting conclusions as they relate to traffic congestion and emergency response:

- A majority of dispatchers, even those who work during peak traffic periods in urban areas, do not perceive traffic congestion to be a significant problem that causes increased emergency response times. Over 90% of dispatchers said that emergency vehicles are impeded by congestion only 'some of the time' or 'rarely'.
- None of the dispatchers who responded to the survey have access to real-time traffic information in their dispatch center. Only about 15% of dispatchers say that they consider current traffic conditions when dispatching a vehicle.
- A majority of dispatchers agreed that having access to real-time traffic information would be helpful to the dispatching process. 72% of urban dispatchers felt it would be helpful to take under account real traffic conditions when making dispatching decisions.
- The improvements dispatchers felt would most benefit the dispatching process related to:
    - In-vehicle equipment such as automatic vehicle location (AVL) systems so that they can better track units in the field,
    - Improved coordination between dispatching agencies, in particular smoother transfer of calls from primary 9-1-1 call centers (PSAPs) to secondary dispatch centers, and
    - Improved accuracy for the location of 9-1-1 callers, particularly those using cell phones and voice-over-IP (VOIP) services.
- Access to real-time traffic information ranked low on the list of improvements most commonly recommended by dispatchers. Addressing traffic congestion does not appear to be a high priority for most dispatching agencies.

The reported lack of access to real-time traffic information was not unexpected, given that there is currently limited real-time traffic information available in Alabama. The systems required to collect and disseminate that information are only now being brought on line and if dispatchers do not have access to real-time traffic information they are less likely to perceive congestion as a problem. The broader concern for this study is that dispatchers do not have access to either information or systems that would allow them to manage a large scale emergency that involve severe traffic congestion or congestion over a broad area and this may inhibit their ability to minimize the emergency response time to an incident site.

3.2 Comparison to the results of the emergency responders survey

The design of the modern, centralized dispatch center offers many benefits in terms of improved communication and cooperation among response agencies. However, one issue that still remains unresolved is the disconnect between dispatching decisions and conditions in the field. The full results of the emergency responder survey (also being performed under the UAB UTC) have not yet been published. There are, however, preliminary results available that allow us to make some comparisons.

- While approximately 60% of emergency responders reported that they encounter traffic congestion during an emergency call only 'sometimes' or 'rarely', over 90% of dispatchers believed that responders encounter congestion only 'sometimes' or 'rarely'. This would indicate that congestion is a more common issue than dispatchers are aware.
- Only 12% of emergency responders reported using Alabama Department of Transportation (ALDOT) web-cams for information on traffic conditions and just 7% of dispatchers reported the same.
- 50% of dispatchers in urban areas and over 60% in rural areas report that they have provided information in congestion to units in the field. However, only 28% of emergency responders stated that they have received congestion information from a dispatcher.
- Similar percentages of dispatchers and responders (about 86%) felt that automatic crash notifications systems such as On-Star will help to reduce emergency response times.

Documentation of perceptions and practices of emergency services dispatchers in Alabama provided useful insights on current practices, positive and negative experiences, preferences, and perceptions on the use of real time traffic data to help optimize emergency response and transport times. The results of the survey analysis clearly show that dispatching decisions do not consider traffic conditions in the field. To improve current practices and procedures real-time traffic information should be come readily available to dispatchers in the near future. Moreover, education of dispatchers about the opportunities and benefits that can be realized by considering traffic congestion presence in the dispatching process can help improve EMS performance and reliability, which in return can improve survivability of victims requiring medical attention at incident sites.

Acknowledgements