

MOUNTAIN-PLAINS CONSORTIUM

RESEARCH BRIEF | MPC 22-458 (project 569) | June 2022

Traffic Resilience Modeling and Planning of Emergency Medical Response



the **ISSUE**

The efficient and timely rescue of injured people by emergency medical services (EMS) is essential to saving as many lives as possible following disasters. Disrupted traffic networks due to the failures of transportation infrastructure (e.g., bridges) following major hazards like earthquakes affect the accessibility and travel time of the disrupted transportation network during the emergency. Currently, a rational prediction methodology of the traffic network resilience performance in terms of EMS is not available by considering various post-hazard disruptions.

the **RESEARCH**

A framework to assess the resilience performance of a typical traffic network in terms of post-earthquake EMS is developed by considering the complex interactions between building infrastructures, injured people, vulnerable medical centers, EMS vehicles, disrupted traffic networks, and natural hazards. Two resilience performance indicators are introduced, characterizing the relative importance of different links in a traffic network and overall EMS resilience for the whole network. A virtual community is selected as the prototype to demonstrate the proposed framework, which is followed by a parametric study of the earthquake magnitude, different types of bridges, location and number of medical centers, and optimal location for a new medical center facility.

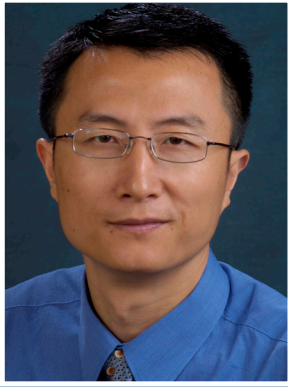


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Project Title

Traffic Performance Modeling and Planning of Emergency Medical Response in Rural Areas

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the **FINDINGS**

The proposed framework and resilience performance indicators can help establish a more efficient pre-disaster improvement plan of critical links, prioritize post-disaster recovery, and optimize the strategic placement and resource allocation of EMS medical centers.

the **IMPACT**

This project has offered new modeling techniques in terms of EMS planning and performance considering post-hazard disruptions. The new technique offers potential on being applied in emergency response planning.

For more information on this project, download the Main report at <https://www.ugpti.org/resources/reports/details.php?id=1074>

For more information or additional copies, visit the Web site at www.mountain-plains.org, call (701) 231-7767 or write to Mountain-Plains Consortium, Upper Great Plains Transportation Institute, North Dakota State University, Dept. 2880, PO Box 6050, Fargo, ND 58108-6050.



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