Evaluating how Disruptions in the Roadway System Affect Accessibility to Essential Services in Vermont

David Novak
Business Administration

James Sullivan
Transportation Research Center

Abstract:
This proposal extends previous research related to rural accessibility and the development and implementation of a link-based accessibility measure called critical closeness accessibility (CCA). CCA is derived from concepts in network science, location science, and transportation accessibility and is used to identify the roadway links in a transportation network that are the most important in facilitating system-wide access to essential services such as hospitals and fire/rescue services. The CCA accounts for the spatial distribution of essential facilities, the topology of the road network (relative locations and connections between roadway links and essential locations), geographical topography (the shape and features of the service area), and the engineering characteristics of the road network such as road types, capacities, volumes, and travel speeds. The CCA can be applied at different geographical scales and to disconnect networks. The approach is implemented using geographic information system (GIS) mapping and travel-demand modeling software and the state of Vermont’s road network. The specific areas of the state that are highly vulnerable to disruptions in the network due to events such as heavy rain, flooding, snow/ice, traffic accidents, and roadway maintenance projects are identified. Vulnerable areas include regions of the state and the surrounding populations that are at risk of becoming isolated from essential services as the result of a disruptive event.