

Research Project Name: Incident Response: Addressing Rural Road Safety Challenges Through Data Driven Solutions
Recipient/Grant (Contract) Number: 69A3552348321
Center Name: Rural Safe Efficient Advanced Transportation (R-SEAT) Center
Research Priority: Improving rural roadway safety and emergency response
Principal Investigator(s): Emmanuel Kidando and Thobias Sando
Research Project Funding: \$107,680 (Federal request); \$53,840 (Non-Federal cost share)
Project Start and End Date: 12/19/2025 to 12/18/2026
Project Description: Rural roadways face heightened safety challenges due to factors such as limited infrastructure, hazardous driving behaviors, and delayed incident management. This project seeks to reduce the disproportionate risk of traffic fatalities in rural areas by addressing systemic gaps in crash prevention and emergency response. This project employs a multi-phase methodology integrating crash data analysis, incident management system evaluations, and technology driven strategies to improve response efficiency. We analyze crash patterns and incident response times using traffic incident management data, including emergency dispatch records, scene arrival metrics, and clearance timelines. The project will develop targeted interventions by identifying high-risk rural corridors and systemic barriers such as sparse responder resources, communication gaps, and geographic isolation. These include deploying advanced surveillance technologies for real-time incident detection and optimizing resource allocation through predictive analytics. The outcomes of this project will provide evidence-based guidelines for infrastructure upgrades, policy recommendations to reduce response disparities, and scalable frameworks for better incident management. This project aims to bridge the rural-urban safety gap by aligning with national safety initiatives, ensuring timely emergency care and fostering resilient transportation systems in underserved communities.
US DOT Priorities*:
Outputs: The primary output of this study is a comprehensive assessment of the factors contributing to elevated crash fatality rates in rural road networks, with a focus on roadway conditions, crash characteristics, and EMS response performance. Findings will quantify gaps in safety infrastructure and emergency response coverage, providing a data-driven foundation for improving rural transportation systems. The study will deliver actionable outputs including crash severity profiles, response time benchmarks, and spatial models highlighting high-risk corridors and underperforming regions. Predictive analytics and geospatial tools will be applied to evaluate EMS station placement, hospital coverage, and roadway safety features, ensuring evidence-based recommendations. These outputs will inform policy and investment decisions, support development of improved EMS deployment strategies, and guide infrastructure upgrades to reduce rural crash fatalities and enhance roadway resilience.
Outcomes/Impacts: This research will generate a strategic framework to reduce rural roadway fatalities by addressing gaps in crash prevention, EMS response times, and resource allocation. The framework will enable state and local agencies to prioritize investments in roadway safety infrastructure, EMS station placement, and trauma care access. Other outcomes include

improved emergency response protocols, reduced delays in patient transport, and enhanced deployment of technology such as automated crash notification and predictive analytics for incident management. These improvements are expected to shorten response times, mitigate severe crash outcomes, and lower overall fatality rates in rural regions. The project will also provide operational and policy guidance, supporting agencies in optimizing limited resources and strengthening rural emergency preparedness. Ultimately, this research will offer a standardized methodology for evaluating rural roadway safety and EMS system performance, serving as a tool for policymakers, researchers, and practitioners to guide future safety improvements. Overall, the project aims to build safer and more resilient rural transportation networks, ensuring that residents receive timely emergency care and reducing the survival gap between rural and urban crash victims.

Final Research Report: N/A

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