

RURAL-KG: A Cross-Domain Knowledge Graph to Integrate Health and Justice for Rural Resilience
 Jiaqi Gong, Hee Yun Lee, Xiaoyan Hong, James Geyer, Matthew Hudnall
 The University of Alabama

Use case description and societal challenge being addressed.

Substance use disorders (SUDs) are a major issue in rural Alabama and Mississippi, particularly in the Black Belt, marked by health and justice disparities. Alabama saw overdose deaths rise to 1,408 in 2021, with fentanyl-related deaths increasing from 121 in 2018 to 835 in 2022, and 7.2% of adolescents reported illicit drug use. In Mississippi, 9.9% of those aged 12 and older have SUDs, with over 2.3 million opioid prescriptions in 2022. These statistics highlight the need for targeted prevention, treatment, and recovery efforts. Rural residents face barriers like limited healthcare access, transportation issues, and inadequate mental health support, worsened by poor coordination between health and justice systems. Linking health and justice datasets is crucial for addressing substance abuse and enabling effective interventions. This project will create a cross-domain knowledge graph (Rural-KG) to integrate health and justice data for rural resilience. Rural-KG will serve as a resource for researchers, practitioners, educators, and policymakers, enhancing insights into rural risk landscapes and strengthening resilience. It will collate, organize, and link information from agencies like the CDC, NIMHD, SAMHSA, and ICPSR, using existing ontologies such as the social determinants of health ontology, and expand them to include justice data. Rural-KG enables an integrative view of the public health crisis with systematic visibility in health and justice. It provides policymakers with data-driven insights to inform strategic decisions and also provides community members with accessible information and resources to support their health and well-being.

The data sets that are the source of their KG's

Dataset	Source	Public or Private	Type
National Surveys of Health Care, Social Determinants, Crimes, and Drug Use	Data repositories and agencies (e.g., CDC, NIMHD, SAMHSA)	Public	Structured
National Reporting and Surveillance Systems and Programs of Risks, Incidents, and Justice	Data repositories and agencies (e.g., ICPSR)	Public	Structured
Medicare/Medicaid	Public health agencies (e.g., ADPH)	Private	Unstructured
Environmental Influencing factors, such as water, climate, and land use	Environmental agencies (e.g., NOAA)	Public	Structured
Community context, statistics and narratives	Community organizations and administrations	Public	Unstructured
Public services and providers	Websites of agencies and providers	Public	Unstructured

User queries / competency queries for the use case.

Community Resources Guidance: "What substance abuse treatment centers are available within 50 miles of [specific rural town]?" "Are there any community support groups for opioid addiction in [county name]?" "Which pharmacies in [specific region] provide naloxone without a prescription?"

Evidence-Based Skill-Building Strategies: "Can you provide evidence-based intervention programs for families dealing with substance abuse?" "What educational programs are available for teaching coping skills to teenagers at risk of substance abuse?"

Referral to Appropriate Providers: "Where can I find providers for diagnostic evaluations for substance abuse in [county]?" "List therapy services specializing in addiction treatment near [specific town]."

Individual and Family Assistance: "What home-based support services are available for families dealing with substance abuse in [region]?" "Are there community programs that assist with case management for substance abuse recovery?"

Community Engagement and Empowerment: "How do changes in healthcare access impact crime rates related to substance abuse in [region]?" "Which community-based interventions have shown significant impacts on reducing both substance abuse and related criminal activities?"