

Background: Motor vehicle collisions (MVCs) result in 50 million injuries and 1.35 million deaths globally, with the vast majority occurring in low- and middle-income countries (LMICs). Road safety authorities in high-income countries use geospatial MVC data for planning hazard reduction. However, such geospatial analyses are rarely conducted in LMICs. Ghana has maintained a database of all MVCs, injuries, and deaths and is uniquely positioned to lead data-informed road injury prevention and control initiatives.

Aim: We aimed to demonstrate how geospatial data can be used to develop a contextually relevant understanding of high-risk areas for targeted injury prevention and control within Ghana. We provide a case study of what can be achieved in other LMICs that could benefit from targeted interventions where they are needed most.

Methods: We identified and mapped geospatial patterns of hotspots of MVCs, injuries, and deaths using a validated injury severity index with geographic information systems statistical methods (Getis-Ord G_i^*) for four time periods (2005-2008; 2009-2012; 2013-2016; and 2017-2020). We stratified analyses into urban and rural areas and identified the 100-meter locations along national, inter-regional, and regional roads of greatest risk.

Results: Our findings indicate that the number of unique locations reporting MVCs, injuries and deaths and the number of hotspots decreased across the periods. We observed hotspots concentrated along specific roads (e.g., National Road 6, National Road 1) and near major road/road-user interactions in urban areas. In contrast, rural hotspots were often isolated and far from one another. A few specific road sections are responsible for most of the severe injuries in the country and should be targeted urgently. One striking finding was the consistency in the location of hotspots across the four studied periods indicating that existing measures are insufficient in reducing MVCs.

Conclusions: These findings arm road safety authorities with data to evaluate and implement evidence-based interventions at hotspots. Similar analyses should be conducted in other LMICs seeking to reduce the burden of road traffic injuries and deaths.