ABSTRACT

Earthquakes strike without warning and leave a trail of devastation. To better prepare for these disastrous events, government agencies must have a comprehensive emergency management plan based on current spatial and non-spatial data. Applications such as HAZUS-MH, developed by the Federal Emergency Management Agency (FEMA), can be used with ArcGIS software to model loss estimations for many natural disaster scenarios. However, HAZUS-MH does not supply the necessary data to analyze losses at geographic units smaller than the census tract level, limiting its effectiveness for an urban area earthquake casualty study. Focusing on the Central Business District (CBD) of Lexington (Kentucky), this study developed a new methodology to test alternate input such as locally sourced LiDAR remote sensing data and Geographic Information System (GIS) -based parcels data to predict earthquake casualties within an urban area. The Urban Daytime Seismic Casualty Estimation (UDSCE) method was applied at a census tract level and casualty estimations validated using the HAZUS-MH model results from three simulated earthquake scenarios. The UDSCE methodology was then applied at the census block and parcel level to refine estimates counts at higher resolution. The results show compelling evidence that working at the census block and parcel level can provide focalized casualty counts within the urban context, thus providing emergency planners crucial information to better prepare for earthquake events in commercial/urban densely populated areas.