In recent years, many disasters have occurred which resulted in damage to critical community functions. The Christchurch, Bio-Bío, and Nepal earthquakes, Hurricanes Sandy and Katrina, and tornadoes in Joplin, MO and Moore, OK all resulted in severe damage to local hospitals, putting great strain on the healthcare systems of these regions. The continued functionality of critical infrastructure, such as healthcare facilities, is necessary following a major event. Healthcare delivery facilities are essential in disasters: they provide emergency medical care related to the event and regular health services required to maintain the health of the community they serve. In order to provide adequate services to patients, healthcare facilities rely on a wide range of internal and external functions, each of which are part of a complex network of interacting systems. The loss of a single function can severely disrupt the ability to provide care during the critical first hours.

In order to improve the resilience of facilities like these, decision makers first need a way to quantify their performance due to extreme loading from natural hazards, both predictively and retrospectively. This presentation will show a risk analysis framework for quantifying and predicting the loss, recovery, and resilience of critical facilities. The theoretical framework accounts for loss of service due to building and utility damage, as well as impacts to key personnel and resources/supplies needed to provide clinical and non-clinical services. The presentation will also show a standardized methodology to collect and analyze field data of critical building systems to better correlate physical damage with loss of functionality of healthcare facilities. The talk will conclude with ongoing collaborative work with the University of Maryland, focused on the resilience of critical infrastructure-based societal systems (ClbS$).