

An Application of Quantile Regression to Large-Scale Disaster Research

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Abstract : Background and significance: The following disaster, population-based screening programs are routinely established to assess physical and psychological consequences of exposure. These data sets are highly skewed as only a small percentage of trauma-exposed individuals develop health issues. Commonly used statistical methodology in post-disaster mental health generally involves population-averaged models. Such models aim to capture the overall response to the disaster and its aftermath; however, they may not be sensitive enough to accommodate population heterogeneity in symptomatology, such as post-traumatic stress or depressive symptoms. Methods: We use an archival longitudinal data set from Weill-Cornell 9/11 Mental Health Screening Program established following the World Trade Center (WTC) terrorist attacks in New York in 2001. Participants are rescue and recovery workers who participated in the site cleanup and restoration (n=2960). The main outcome is the post-traumatic stress symptoms (PTSD) severity score assessed via clinician interviews (CAPS). For a detailed understanding of response to the disaster and its aftermath, we are adapting quantile regression methodology with particular focus on predictors of extreme distress and resilience to trauma. Results: The response variable was defined as the quantile of the CAPS score for each individual under two different scenarios specifying the unconditional quantiles based on: 1) clinically meaningful CAPS cutoff values and 2) CAPS distribution in the population. We present graphical summaries of the differential effects. For instance, we found that the effect of the WTC exposures, namely seeing bodies and feeling that life was in danger during rescue/recovery work was associated with very high PTSD symptoms. A similar effect was apparent in individuals with prior psychiatric history. Differential effects were also present for age and education level of the individuals. Conclusion: We evaluate the utility of quantile regression in disaster research in contrast to the commonly used population-averaged models. We focused on assessing the distribution of risk factors for post-traumatic stress symptoms across quantiles. This innovative approach provides a comprehensive understanding of the relationship between dependent and independent variables and could be used for developing tailored training programs and response plans for different vulnerability groups.

Keywords : disaster workers, post traumatic stress, PTSD, quantile regression

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