Natural Disasters in the United States: Hurricane Risk, Hospital Closures, and Healthcare Finance

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Abstract

Background: Climate change globally has increased the likelihood of natural disasters including hurricanes, floods, wildfires, tornadoes, and earthquakes represent acute socioecological disturbances that generate cascading impacts across healthcare systems, social structures, and economic frameworks. The southeastern United States experiences 43% of Atlantic hurricanes making U.S. landfall, and their increasing intensity threatens the healthcare infrastructure. Hospital cost-to-charge ratios (CCR) vary between rural and urban facilities, but hurricane risk impacts on hospital financial performance remain poorly understood.

Objective: To examine relationships between hurricane risk, geographic location, and hospital CCR among southeastern hospitals.

Methods: Cross-sectional analysis merged 2021 CMS Cost Report data with 2023 FEMA National Risk Index data for 1,030 hospitals across eight southeastern states. All hospitals within this region were included, accept for federal funded hospitals due to the unique funding model of federally funded hospitals. Multivariate regression examined associations between log-transformed CCR and hurricane risk percentile, rural/urban location, and hospital quick ratio.

Results: Among 1,030 hospitals analyzed, 52% were rural and 48% urban. The regression model explained 24.7% of CCR variation (adjusted R^2=0.2465, F=85.18, p<0.0001). All predictors were statistically significant (p<0.0001). Counter to expectations, each 1-point increase in hurricane risk percentile was associated with a 0.1% decrease in CCR, indicating improved cost efficiency in higher-risk areas. LOGCCR=-.75714-.00840(NAPCT)-.26551(RURAL)+.01491(QUICK)-.00011(QUICK2). Rural hospitals as indicated by the CMS Cost Report demonstrated 26.5% lower CCR compared to urban hospitals. Hospital quick ratio showed a curvilinear relationship with CCR; at the mean quick ratio (3.819), each 1-unit increase was associated with a 1.4% increase in CCR. No significant multicollinearity was detected among predictor variables.

Conclusions: Hurricane risk paradoxically associates with lower hospital CCR, suggesting complex financial adaptations in high-risk areas. Rural hospitals maintain more favorable cost structures than urban facilities. Policymakers should consider these geographic variations in disaster preparedness strategies.

Keywords

Hurricane risk, hospital finance, cost-to-charge ratio, rural hospitals, disaster preparedness.