

Caribbean Strong

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During the last decades, hurricanes have grown in intensity and frequency in the Caribbean and the coastal areas of the United States. The most recent hurricanes have brought significantly more destruction compared to prior hurricanes in the 21st century and most in the 20th century. A lesson learned from these events is that the level of preparedness and resiliency needs to be strengthened throughout the Caribbean if we aim to be Caribbean Strong. The recent Hurricane Dorian that severely hit Grand Bahama and Abaco islands in the Bahamas is a stark reminder of this urgent and on-going need.

Hurricanes Irma and Maria developed in the North Atlantic in September 2017, one within two weeks of the other, and provided a great wake-up call about the unique challenges faced by islands in planning for, responding to and recovering from major disasters as compared to continental areas such as the Eastern coast of the United States. The northeastern Caribbean islands, including Puerto Rico and the US Virgin Islands, are over 1,000 miles from Miami and even farther from other east coast ports. Cargo ships take three days to travel from Jacksonville to San Juan assuming favorable weather. Both Hurricane Irma and Maria followed a westerly track towards Florida and the eastern seaboard, limiting the availability of sea lanes to Puerto Rico and the Caribbean. Therefore, islands need larger reserves in resilient warehouses than what may be needed in areas connected by highway and rail.

Puerto Rico suffered major devastation following Hurricane Maria with many homes and buildings destroyed or damaged. Over 95% of households lost electrical power and wireless telephone service, and half lost water services. The lack of wireless telephone service further complicated the initial response and recovery. Morbidity and mortality associated with Hurricane Maria was high. Although there was not a systematic collection of death and injury data post-hurricane, two independent studies estimated hurricane-related excess deaths. One estimated 2,975 excess deaths and the other based on home survey data estimated 4,645.^{1,2} The actual number may never be established.

The Puerto Rico Science, Technology & Research Trust, established in 2004 as a private, non-profit

entity, is charged with stimulating innovation, technology commercialization and the creation of high-technology jobs in Puerto Rico. The mission of the Trust is to invest, facilitate and build capacity to continually advance Puerto Rico's economy and its citizens' well-being through innovation-driven enterprises, science and technology and its industrial base. The loss of electric power in Puerto Rico following Hurricane Maria was a major challenge to emerging entrepreneurs and many budding enterprises supported by Trust. We realized the need to offer a safe and well-connected environment for these groups and opened our Innovation Center to them over the course of nearly three months. This allowed these enterprises to continue operations by being connected to internet and having reliable electric power for their operations.

In partnership with the Medtronic Foundation we conducted a rapid needs assessment in six municipalities in Puerto Rico and learned much about the priorities of these communities after the Hurricanes and how they changed from before to after those events. Housing was a major priority before the events that became an even greater priority after Hurricane Maria. Perhaps the most important lesson was the link of the priorities to health issues, directly and indirectly. For instance, transportation became a major challenge in accessing care and obtaining needed medications. Food security was another challenge and again it was mostly a challenge for adults with chronic diseases, such as hypertension and diabetes, seeking appropriate food to manage their conditions. In short, the needs assessment underscored the perspective of a "culture of health" as developed by the Robert Wood Johnson Foundation. Literally every sector of society was impacted by the hurricanes, and all inter-connected with and affected both individual and population health.

There were a number of exemplars of resiliency and recovery that emerged following the hurricanes, such as many major manufacturing facilities throughout the island that were able to continue operations the day after the Hurricane and opened their doors to the community, providing their neighbors with access to telephones and food from their cafeterias, some even assembling washers and driers to support population needs. In the research environment, university-based research activities were able to continue in some sites that opened their doors to local investigators whose

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laboratories were negatively affected, so that they could continue their research. Thanks to the assistance of the Caribbean Division of the American Association for the Advancement of Science (AAAS), and Ciencia Puerto Rico, the Trust was able to support researchers in continuing their research.

It became clear to us in the Trust that there was a need to bring together all sectors of society in Puerto Rico and the Caribbean to share the experiences before, during and after the hurricanes and collect the many lessons learned. The partnership with Dr. James James, and the Society for Disaster Medicine and Public Health, made possible through the support of the Robert Wood Johnson Foundation, offered the unique opportunity to convene Caribbean Strong: Building Resilience with Equity, a conference that brought together nearly 500 participants over three days. Following two days of presentations and roundtables, participants worked in groups to develop recommendations for addressing preparedness and resiliency.

This issue includes a small sample of the presentations at the conference and a short summary of recommendations developed. A more detailed report on the full recommendations and the methodology to collect and prioritize them will be presented in a future issue of this journal.

Our hope is that what we have learned will be translated into action that that will make a more resilient Puerto Rico and Caribbean where all sectors of society are well prepared and resilient to future hurricanes and other major disasters. That is the vision of Caribbean Strong.

References

1. Santos-Burgoa C, Sandberg J, Suárez E, et al. Differential and persistent risk of excess mortality from Hurricane Maria in Puerto Rico: a time-series analysis. *Lancet Planet Health*. 2018;2:478–488.
2. Kishore N, Marqués D, Mahmud A, et al. Mortality in Puerto Rico after Hurricane Maria. *N Engl J Med*. 2018;379(2):162–170.



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On the Cover: The aftermath of hurricane Maria in Puerto Rico.
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