

# **NWIRP Research Study of Hurricane Maria (Puerto Rico)**

## **Recovery of Social Functions Project**

**Project Leader: Maria Dillard**

**Objective:** To examine the recovery trajectories of sampled schools and hospitals in order to identify characteristics and conditions associated with recovery of critical social functions from Hurricane Maria in Puerto Rico

# Project Objectives

- To examine the *recovery trajectories* of sampled schools and hospitals
- To identify the underlying *characteristics and conditions associated with recovery* of critical social functions from Hurricane Maria in Puerto Rico
- To study the *interdependencies of the broader community* (e.g., infrastructure, households, businesses) *and the social functions* provided by schools and hospitals





# Background

- The NIST Hurricane Maria Program<sup>^</sup> includes a project focused on the recovery of education and healthcare services associated with critical buildings (schools and hospitals) in Puerto Rico.
- Both education and healthcare services are an important part of understanding the impacts of Hurricane Maria, as well as the long term recovery of Puerto Rico.
- This project will be used to support the development of a methodology to assess community-scale resilience
- The focus is on empirical relationships between social functions and physical systems with an aim to identify predictors of recovery outcomes
- The project relies on a foundational understanding of social functions and buildings and infrastructure systems as linked\*



*A FEMA Disaster Recovery Center in Puerto Rico*

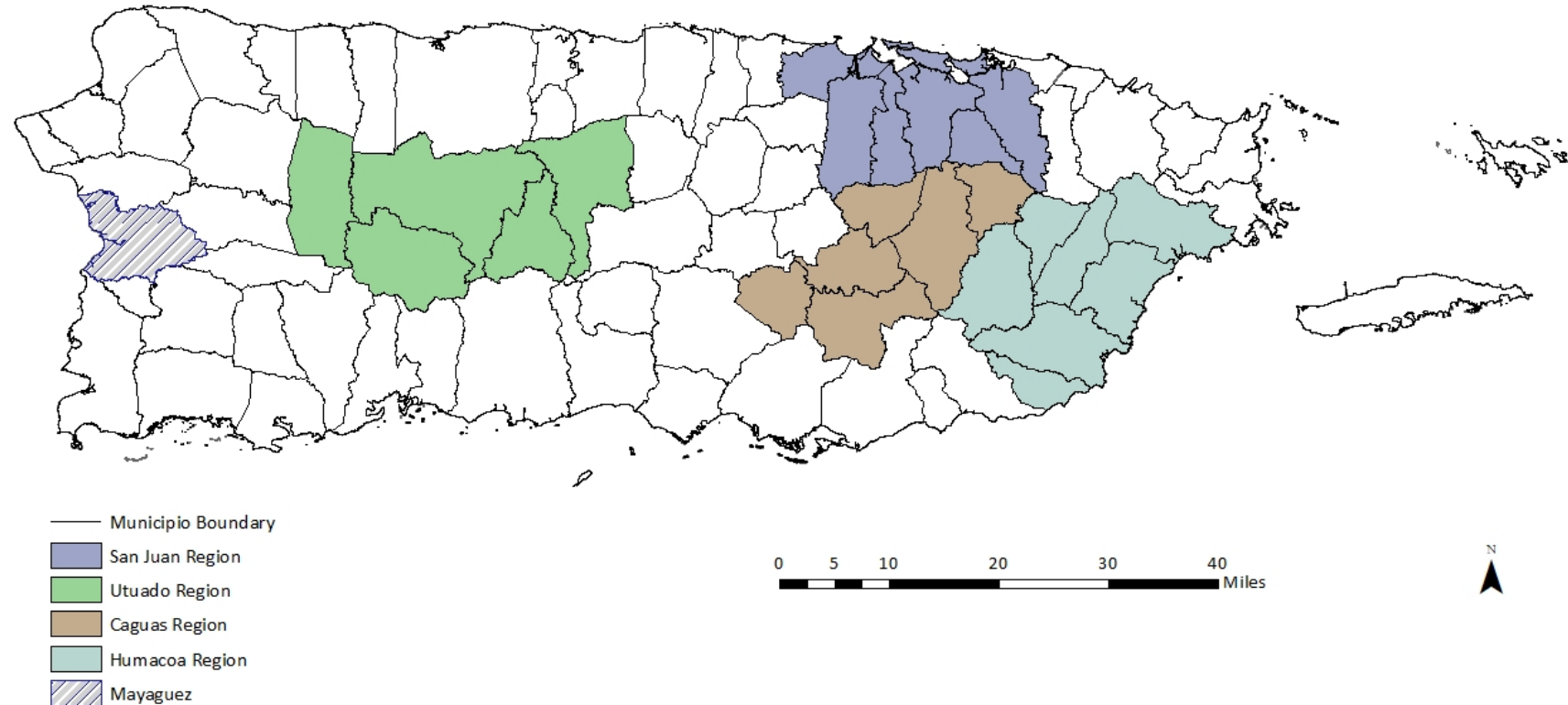
<sup>^</sup>Under the NIST Hurricane Maria Program, NIST is conducting a NCST investigation and a NWIRP study.

\*NIST SP 1190 2016. <https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1190v1.pdf>

# Background: Study Areas

- Includes 4 regions common across all NIST Hurricane Maria Program projects:
  - San Juan Region
  - Utua Region
  - Caguas Region
  - Humacao Region
- Additionally, includes the municipio of Mayaguez where Hospital Bella Vista is located

Study Areas for NIST Hurricane Maria Program



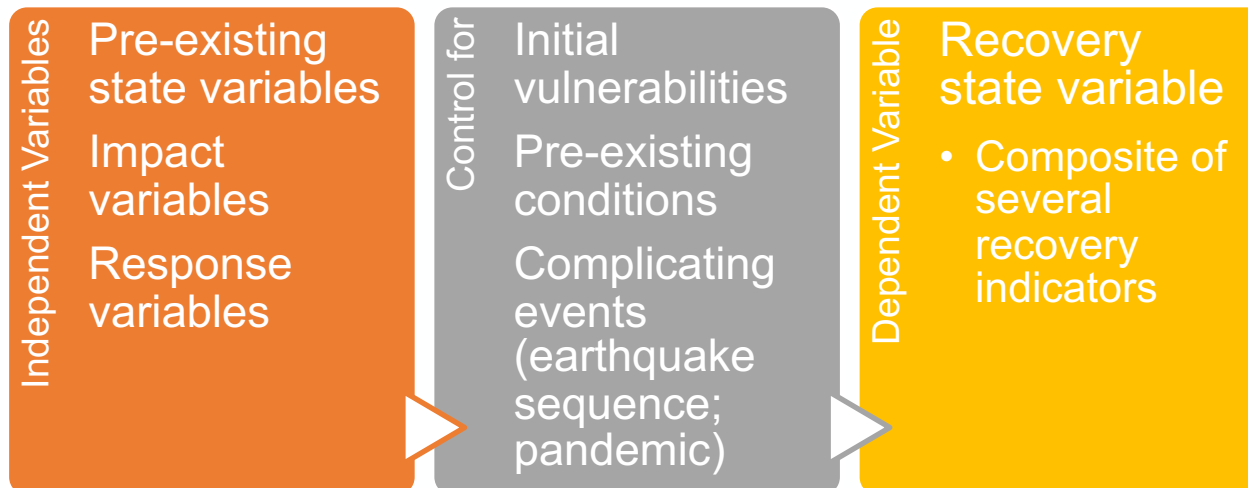
Data Source: US Census Bureau TIGER/Line 2016, FEMA 2017  
 Developed: NIST 2020; using ESRI software  
 Coordinate System: GCS NAD 1983  
 Datum: NAD 1983  
 Scale: 1:700,000



# Project Plans: Data Collection & Analysis

Project methods include structured surveys of representatives of hospitals and school institutions and semi-structured interviews with a subset of the sample

- Data collection
  - Longitudinal design for surveys
    - Allows the same cases to be observed over time
    - Enables measurement of the recovery process
  - Single time point for interviews
    - Allows in depth questioning on particular topics
    - Informs remaining waves of survey data collection
- Data analysis

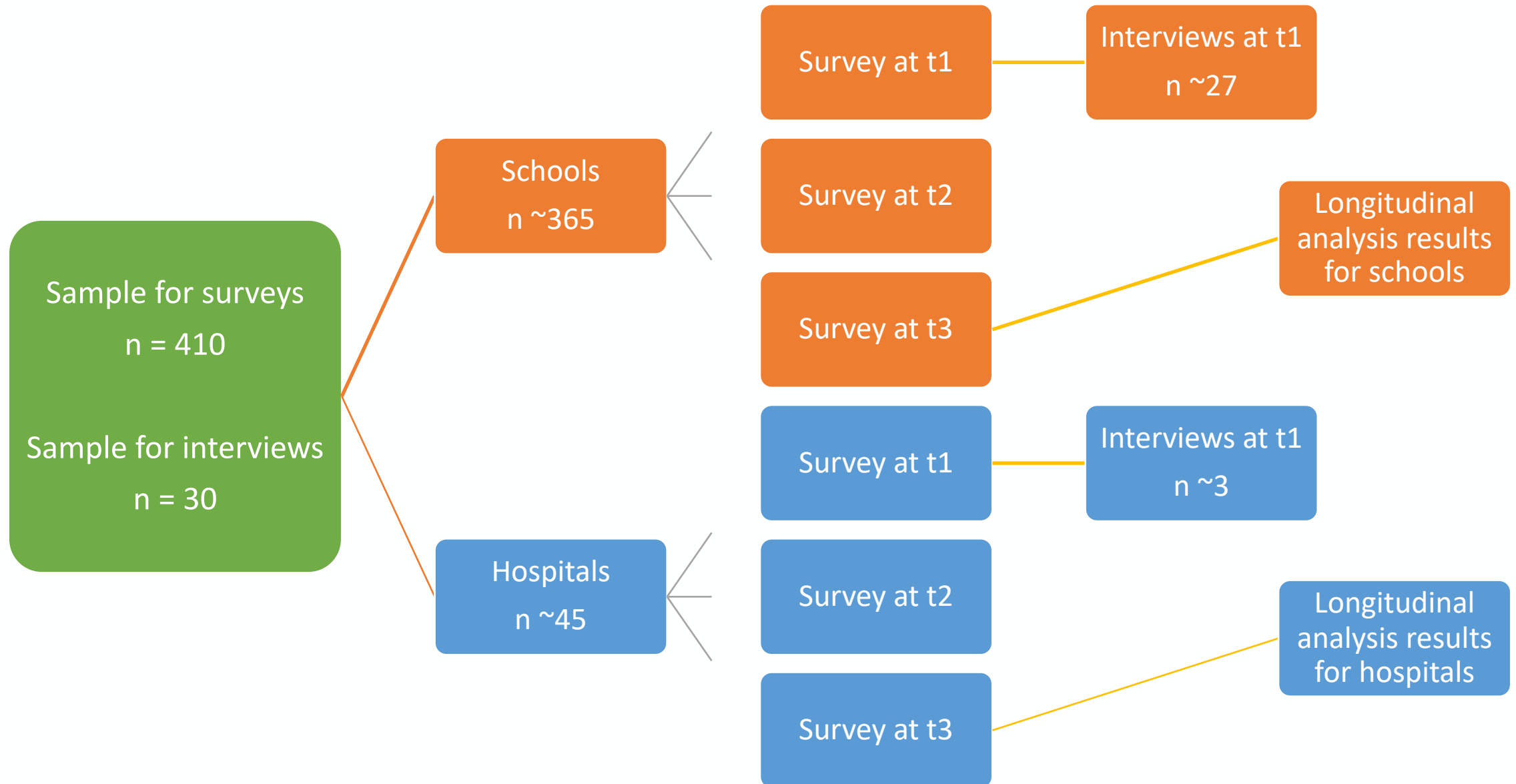


*Temporary hospital facilities in Puerto Rico*



*A school in Puerto Rico*

# Project Plans: Study Design



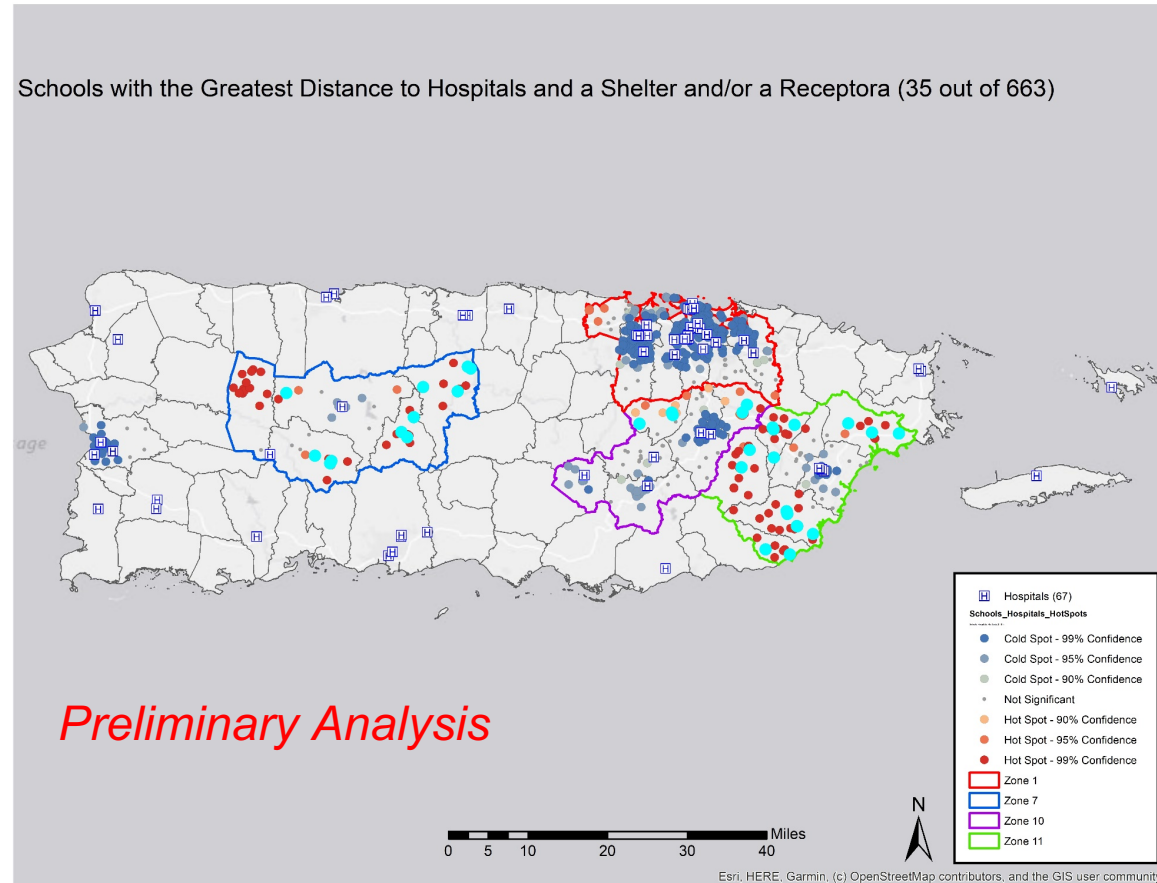
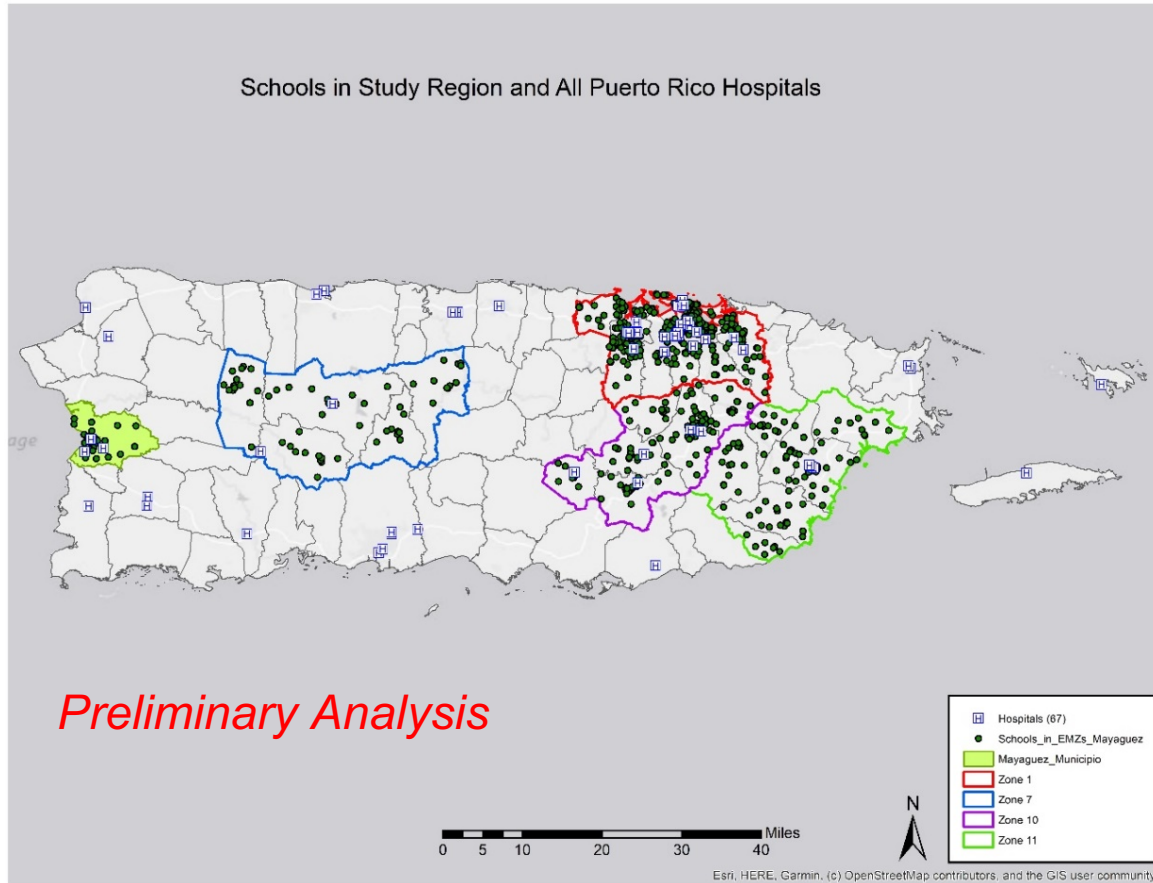
# Recent Progress

- Conducted additional outreach meetings in November 2019 with the PR Department of Health, HHS, and FEMA, as well as with PREPA, PRASA, PR Ports Authority, and Emergency Management Officials
  - Successfully obtained data from FEMA and PR Department of Health
- Awarded survey and interview research services contract in January 2020
  - Kick Off Meeting held in February 2020;
  - Monthly and task specific meetings since March 2020
- Internal data on hospitals, schools, and shelters being compiled in various databases (e.g., school inspections from FEMA)
- Collection of secondary data on recovery of hospitals, schools (e.g., timing and flow of recovery assistance; recovery plans)



# Recent Progress

- Spatial analysis of secondary data for schools and hospitals to inform sampling and analysis plan



# Recent Progress

- Sampling frame for K-12 public and private schools and hospitals finalized in May 2020
  - Data acquired and provided to contractor
  - Contractor performed quality assurance/quality control on all datasets to develop complete frames for sample selection
- Refinement of sample design to now reflect
  - Alignment with Critical Buildings Project;
  - Coordination with Morbidity and Mortality Project and Recovery of Infrastructure Project
  - Direct linkage through sequential sampling with the Recovery of Business and Supply Chain Project
- Wave 1 survey instrument development
  - Changes in methodology due to COVID-19

# Next Steps

- Obtain required approvals for Wave 1 survey
  - NIST's Institutional Review Board; PR Department of Education; Office of Management and Budget's Paperwork Reduction Act
- Pilot test Wave 1 survey instrument
- Deploy Wave 1 survey
- Conduct literature/media review of issues in recovery facing hospitals and schools to inform Waves 2-3 of the survey and background for the report
- Continue spatial analysis of secondary data



*Hospitals in Puerto Rico*