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^ 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

^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
  - Utuado Region
  - Caguas Region
  - Humacao Region
- Additionally, includes the municipio of Mayaguez where Hospital Bella Vista is located

Study Areas for NIST Hurricane Maria Program

Municipio Boundary
San Juan Region
Utuado Region
Caguas Region
Humacoa Region
Mayaguez

0 5 10   20   30   40
Miles

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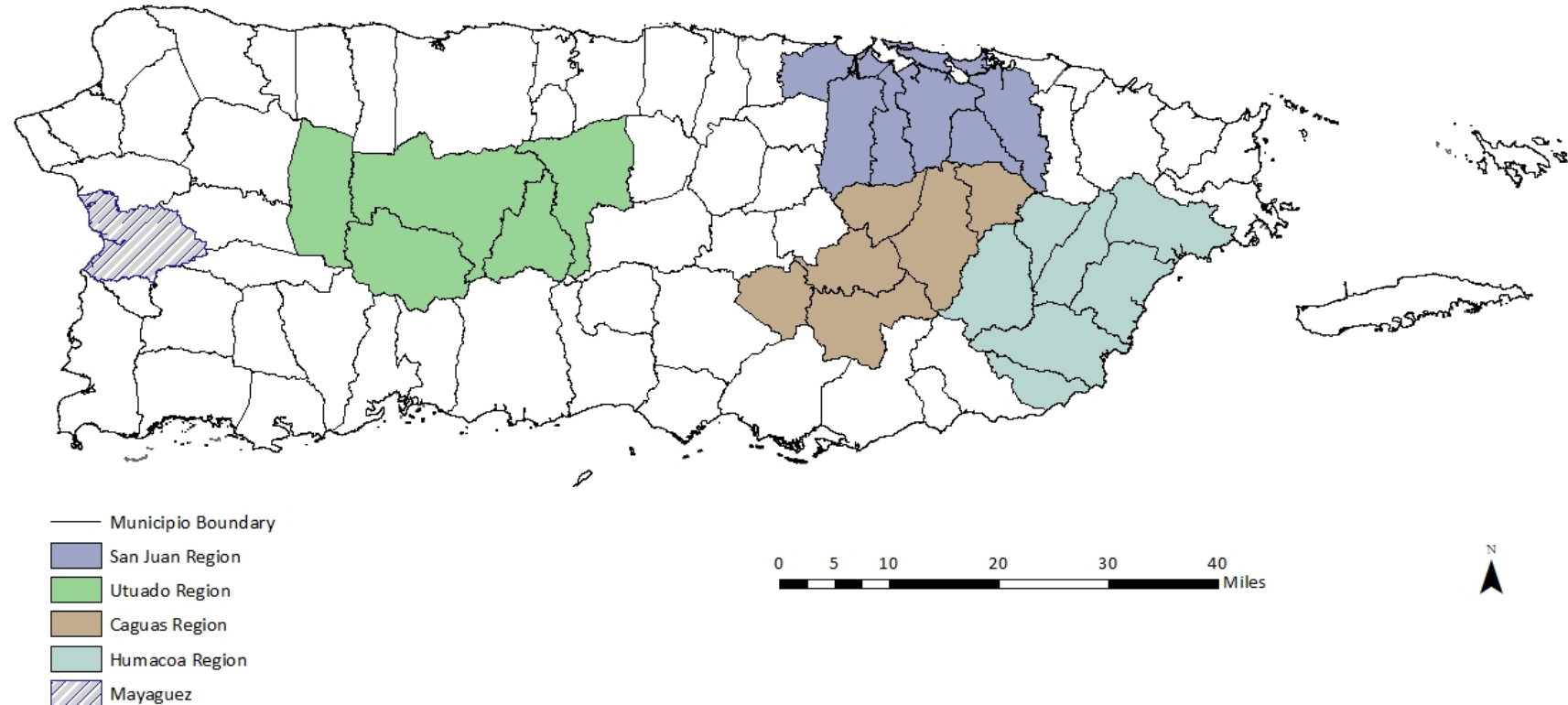
Data Source: US Census Bureau TIGER/Line 2016, FEMA 2017
Developed: NIST 2020; using ESRI software
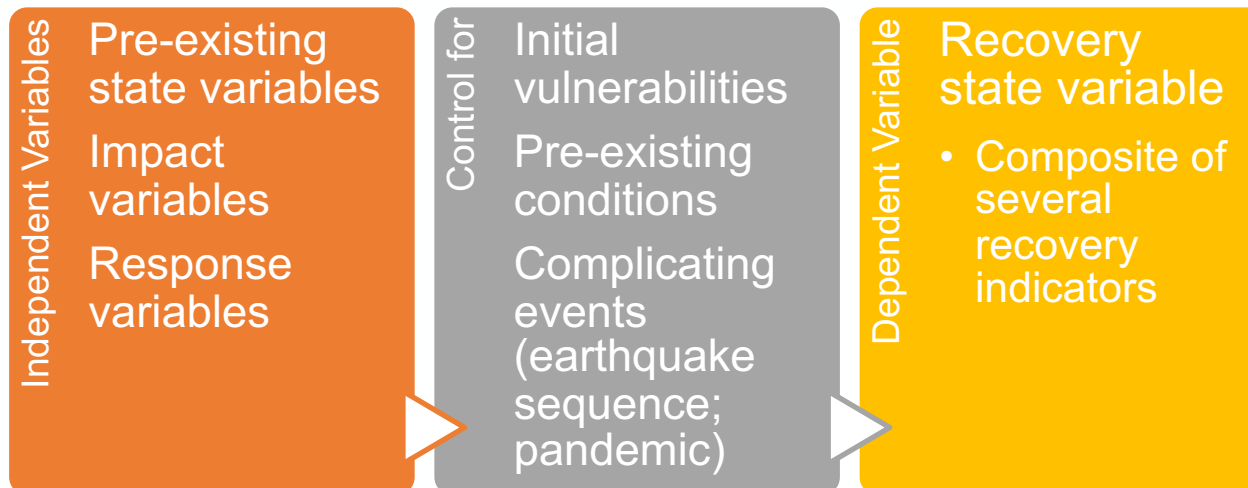Coordinate System: GCS NAD 1983
Datum: NAD 1983
Scale: 1:700,000

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
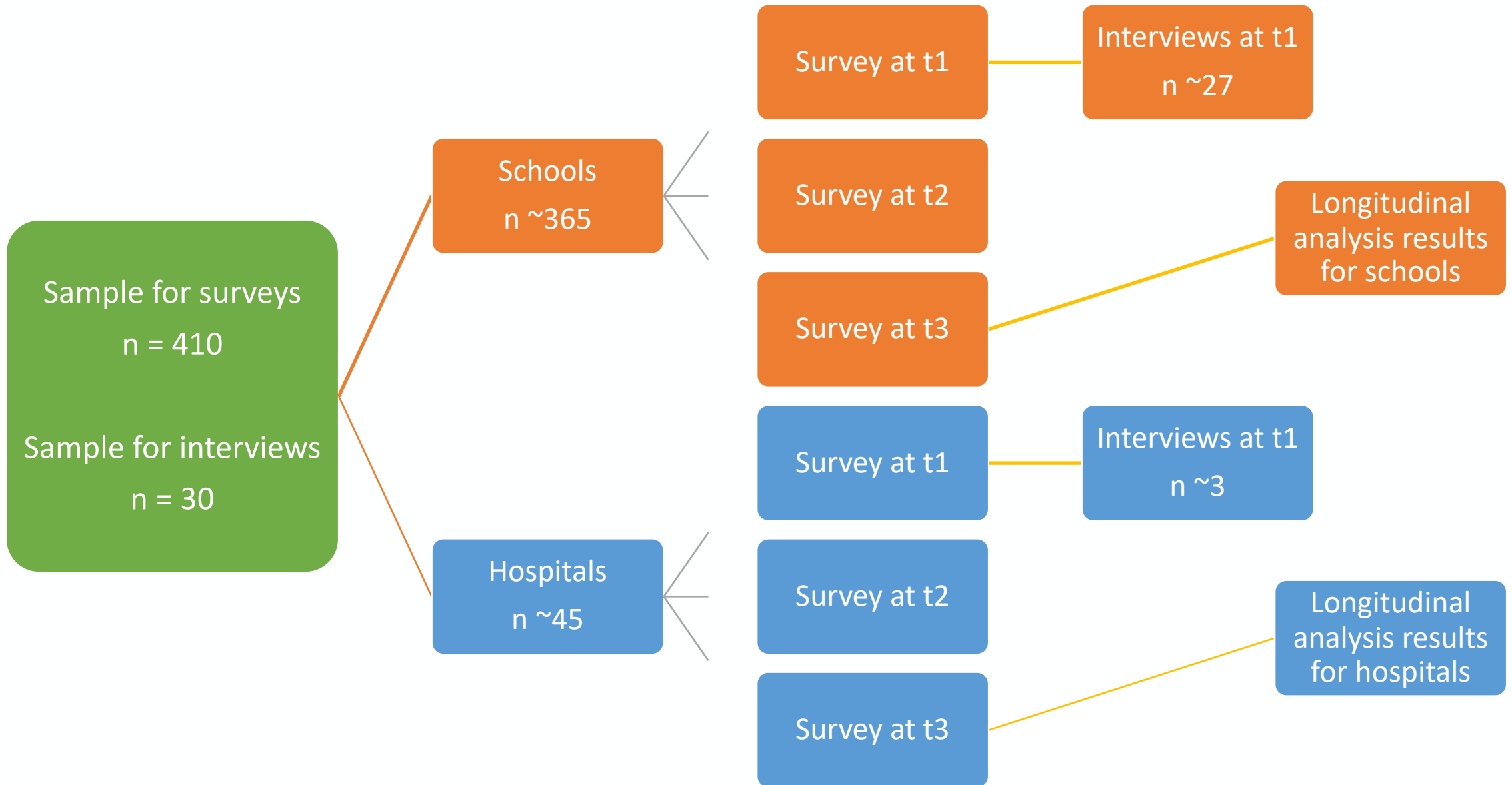   - Informs remaining waves of survey data collection

- Data analysis

Temporary hospital facilities in Puerto Rico

A school in Puerto Rico

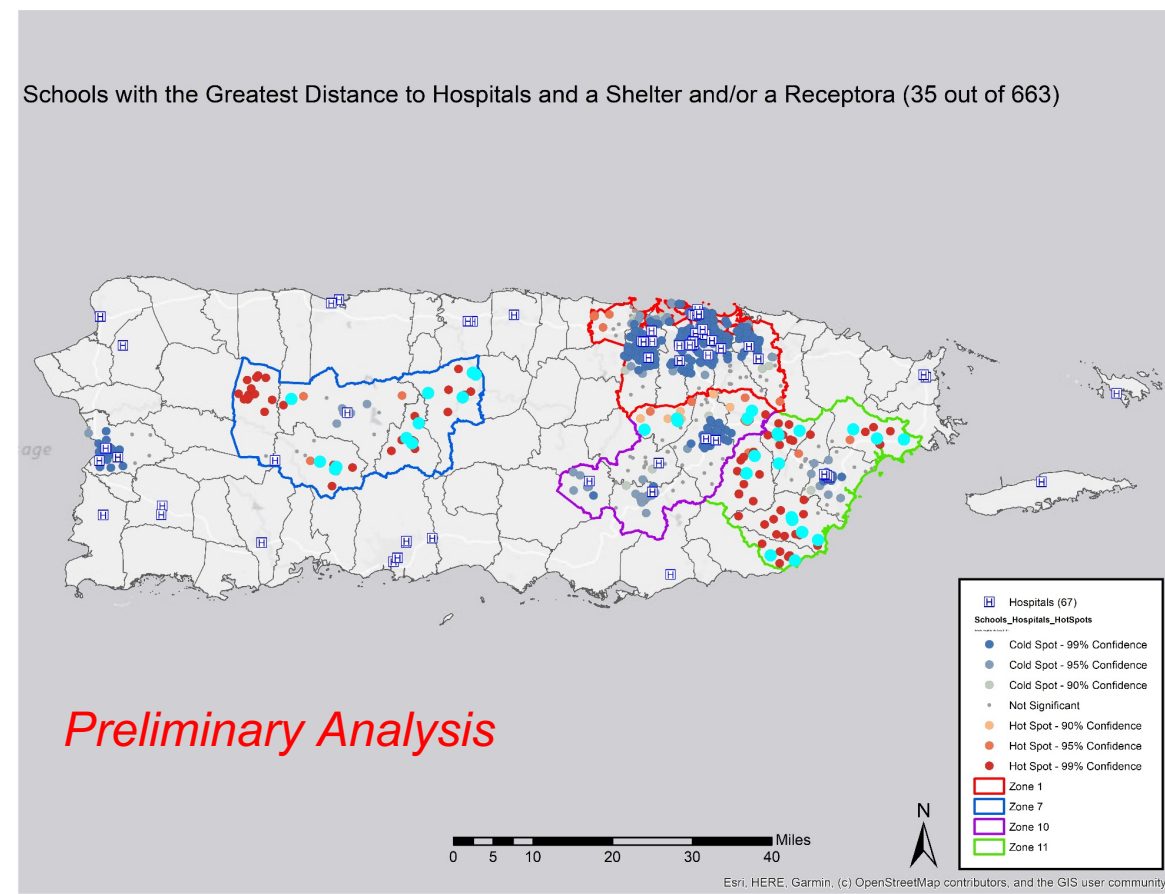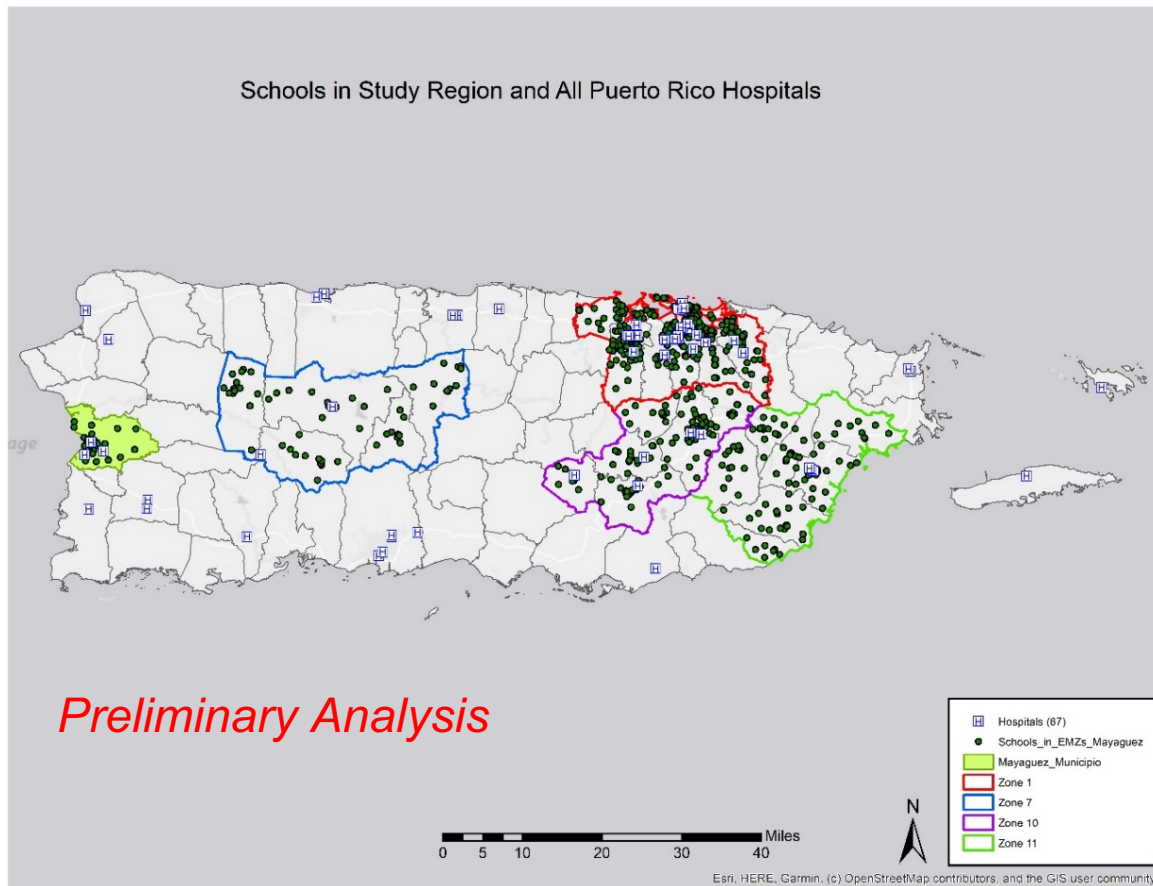| Independent Variables	Control for	Dependent Variable
Pre-existing state variables Impact variables Response variables	Initial vulnerabilities Pre-existing conditions Complicating events (earthquake sequence; pandemic)	Recovery state variable • Composite of several recovery indicators

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

Schools in Study Region and All Puerto Rico Hospitals

Preliminary Analysis

Schools with the Greatest Distance to Hospitals and a Shelter and/or a Receptora (35 out of 663)

Preliminary Analysis

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

All photos credited to NIST.

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Questions?

Please 'raise your hand' using the Blue Jeans Participant window and unmute your audio and video