

Transportation Interview: Hurricane Maria

U.S. Department of Commerce

National Institute of Standards and Technology

Generic Clearance for Community Resilience Data Collections

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1. Explain who will be surveyed and why the group is appropriate to survey.

Survey Group: The transportation interview is part of a larger research project that examines the effects of Hurricane Maria in the context of businesses and supply chains in Puerto Rico and the longitudinal recovery from these impacts. Through in-depth interviews this project attempts to understand the effect of severe windstorms on the operations of businesses in the transportation and warehousing sector using as benchmark for comparison Hurricane María. More specifically, the interview attempts to uncover vulnerabilities, impact, recovery strategies, limiting and facilitating factors, as well as changes made (resilience capacity) to manage future events. The findings will help set standards and guidelines to improve resilience in the transportation sector as well as all other sectors, dependent on transportation systems across the supply chain in Puerto Rico and across the United States.

We are expected to interview a total of 30 organizations that are key players in Puerto Rico's business supply chain. To operationalize this criterion, the organizations will be selected from the Transportation & Warehousing Sector (NAICS codes 48-49) except for: Transit and Ground Passenger (485), Transportation School and Employee Bus (4854), Transportation Pipeline (486) Transportation Scenic and Sightseeing Transportation (487). Organizations from only to subsectors in NAICS 49 will be included in the study are Couriers and Messengers (492) and Warehousing and Storage (493). All organizations must have been operating and/or servicing Puerto Rico at the time Hurricane Maria it hit the Island (September 2017). Respondents are individuals who are employed by the organizations in our sample, have knowledge of operational decisions and worked for the organization at the time of Hurricane Maria.

The following table includes the sectors included in the study and the number of establishments in Puerto Rico based on the County Business Patterns (2016).

| NAICS | Description | Est # |
|---------|---|-------|
| 48---- | | 969 |
| 481/// | Air Transportation (only cargo) | 40 |
| 483/// | Water Transportation (only cargo) | 16 |
| 484/// | Truck Transportation | 344 |
| 488/// | Support Activities for Transportation | 174 |
| 48831// | Port & Harbor Operations | 7 |
| 4889// | Other Support Activities for Transportation | 3 |
| 492/// | Couriers and Messengers | 70 |
| 493/// | Warehousing and Storage | 73 |

Source: CBP 2016

Study Area: The inclusion criteria for the Transportation interviews will consider organizations in the industry sectors described in the previous section (NAICS 48–49, with some exceptions) that have locations and provide services in any of the 78 municipalities of Puerto Rico.

| Municipality | | | |
|---------------------|-------------|--------------|---------------|
| Adjuntas | Cidra | Lajas | Río Grande |
| Aguada | Coamo | Lares | Sabana Grande |
| Aguadilla | Comerío | Las Marías | Salinas |
| Aguas Buenas | Corozal | Las Piedras | San Germán |
| Aibonito | Culebra | Loíza | San Juan |
| Añasco | Dorado | Luquillo | San Lorenzo |
| Arecibo | Fajardo | Manatí | San Sebastián |
| Arroyo | Florida | Maricao | Santa Isabel |
| Barceloneta | Guánica | Maunabo | Toa Alta |
| Barranquitas | Guayama | Mayagüez | Toa Baja |
| Bayamón | Guayanilla | Moca | Trujillo Alto |
| Cabo Rojo | Guaynabo | Morovis | Utua |
| Caguas | Gurabo | Naguabo | Vega Alta |
| Camuy | Hatillo | Naranjito | Vega Baja |
| Canóvanas | Hormigueros | Orocovis | Vieques |
| Carolina | Humacao | Patillas | Villalba |
| Cataño | Isabela | Peñuelas | Yabucoa |
| Cayey | Jayuya | Ponce | Yauco |
| Ceiba | Juana Díaz | Quebradillas | |

| | | | |
|--------|--------|--------|--|
| Ciales | Juncos | Rincón | |
|--------|--------|--------|--|

Why it is appropriate to survey this group:

This study falls within a broader program of activity at NIST - the Hurricane Maria Program. Under this program, there is both a technical investigation of Hurricane Maria and its impacts on Puerto Rico and a scientific study of the impacts of and recovery from Hurricane Maria. As complementary components of the NIST Hurricane Maria Program, the NCST technical investigation and the NWIRP research study are closely coordinated. *This protocol covers only a project under the scientific study of Hurricane Maria.*

Under the National Windstorm Impact Reduction Act Reauthorization of 2015 (Public Law 114-52), NIST is conducting a scientific study of the impacts of and recovery from Hurricane Maria. The National Windstorm Impact Reduction Act Reauthorization (Public Law 114-52) designates NIST as the lead agency for the National Windstorm Impact Reduction Program (NWIRP) and gives NIST responsibility to:

- Ensure that the Program includes the necessary components to promote the implementation of windstorm risk reduction measures;
- Support the development of performance-based engineering tools, and working with appropriate groups to promote the commercial application of such tools;
- Request the assistance of Federal agencies other than the Program agencies, as necessary;
- Coordinate all Federal post-windstorm investigations to the extent practicable; and
- When warranted by research or investigative findings, issue recommendations to assist in informing the development of model codes, and provide information to Congress on the use of such recommendations.

The National Windstorm Impact Reduction Program (NWIRP)¹ was established by Congress “... to achieve major measurable reductions in the losses of life and property from windstorms through a coordinated Federal effort, in cooperation with other levels of government, academia, and the private sector, aimed at improving the understanding of windstorms and their impacts and developing and encouraging the implementation of cost-effective mitigation measures to reduce those impacts.”

The goals of the NWIRP scientific study are to characterize the impacts to and recovery of: (1) businesses and supply chains, (2) education and healthcare services, and (3) infrastructure systems that support the functioning of critical buildings and emergency communications. By carrying out these three distinct but complementary projects as part of a single coordinated

¹ <https://www.nist.gov/el/materials-and-structural-systems-division-73100/national-windstorm-impact-reduction-program-nwirp>

effort, the NWIRP scientific study will present a more complete picture of the impacts of and recovery from Hurricane Maria in Puerto Rico. We expect that a scientific study on the recovery of impacted communities in Puerto Rico will result in important insights and may lead to recommendations to improve recovery and resilience practices for communities facing risks from hurricanes and other windstorms.

This study addresses NWIRP scientific study goal 1: to characterize the impacts to and recovery of businesses) and supply chains. The interviews with organizations in the transportation and warehousing sector will generate understanding of the effect of severe windstorms on the operations of these businesses, while uncovering vulnerabilities, strategies, limiting & facilitating factors, and resilience to manage future events. The reasons to study this group are twofold:

1. Recognition that organizations in transportation and warehousing, as well retailers, services, manufacturers and other, are an important business sector that contributes to Puerto Rico's economy.² Because of this, it is important to understand impacts and recovery of these businesses.
2. Transportation is a critical community lifeline that enables the continuous operation of critical government and business functions and is essential to human health and safety or economic security.³ All industry sectors depend directly or indirectly on the transportation & warehousing sector as it provides services to move people or goods, as well as transportation infrastructure. Hence, firms in the sector represent key actors in the business supply chain. From this perspective, studying the transportation and warehousing sector closes the loop by generating understanding of the impacts and recovery of the supply chain and the interdependencies among sectors.

2. Explain how the survey was developed including consultation with interested parties, pretesting, and responses to suggestions for improvement.

This instrument (interview guide) was developed by NIST and their contracting team. The framework to elaborate the open-ended questions was based on supply chain resilience literature, organizational theories and government toolkits for disaster, response, and recovery (e.g., FEMA community lifelines toolkit). Close-ended questions (ports resilience index) to evaluate current conditions of the Port of San Juan were developed by examining the literature on the resilience of ports. Overall, the questions in the interview have been thoroughly vetted in the field in previous studies. Additionally, we will check these questions with members of the Hurricane

² The annual payroll and revenues for the transportation sector in 2017 was \$424,650,000.00 and \$2,345,789,000.00, respectively. (Economic Census, 2017) in: [Census - Table Results](#)

³ Refer to FEMA (2019) for a definitions of community lifelines in: [CommunityLifelinesToolkit2.0v2 FEMA.pdf](#)

Maria team, contractors, researchers in the field of supply chain and representatives of entrepreneurial organizations (transportation sector).

As a first step, our internal team will perform some test surveys within the team in both English and Spanish to assess comprehension. After some modifications, we will discuss the questions with one representative of the transportation committee of the Puerto Rico Manufacturing Association (PRMA). The feedback will allow us to remove, streamline and/or simplify questions, and will inform on training materials and interview guides.

3. Explain how the survey will be conducted, how customers will be sampled if fewer than all customers will be surveyed, expected response rate, and actions your agency plans to take to improve the response rate.

The interview will be conducted and recorded (for transcription purposes) via an online meeting platform that has met NIST security requirements (e.g., Zoom, Microsoft Teams). We expect to interview a total of 30 organizations in the Transportation & Warehousing Sector (NAICS 48-49) except for: Transit and Ground Passenger (485), Transportation School and Employee Bus (4854), Transportation Pipeline (486) Transportation Scenic and Sightseeing Transportation (487). Organizations from only to subsectors in NAICS 49 will be included in the study are Couriers and Messengers (492) and Warehousing and Storage (493). All organizations must have been operating and/or servicing Puerto Rico at the time Hurricane Maria Hit the Island (September 2017). Respondents are individuals who are employed by the organizations in our sample, have knowledge of operational decisions and worked in the organization at the time of Hurricane Maria. In most cases, the owner (or manager) of the business will be interviewed.

The main sources to build this sample are business lists from:

1. The Caribbean Book Lists
2. The United States Customs Borders and Patrol website
3. Puerto Rico Shipping Association
4. Puerto Rico Manufacturing Association
5. USA Info

Sampling

The underlying objective of these interviews is to uncover vulnerabilities, impact, recovery strategies, limiting & facilitating factors, and changes made (resilience) to manage future events to improve resilience in the transportation sector as well as all other sectors, dependent on transportation systems across the supply chain. Because of this, the study adopts a convenience sample adequate to its qualitative methodology. However, certain criteria will be put in place to maximize representation of all subsectors and establish recruitment priorities. Representativeness in this study is defined as a sample that represents the perspectives of all

sectors under study rather than matching the characteristics of the population under study. To maximize representation of all sectors under study, we will attempt to achieve the following quotas:

| NAICS | Transportation Categories | # of Interviews |
|---------|---|-----------------|
| 481/483 | Air and Water Transportation | 5 |
| 484 | Truck Transportation | 10 |
| 488 | Support Activities for Transportation | 10 |
| 492/493 | Couriers and Messengers/Warehousing and Storage | 5 |

The burden estimated is to be 900 minutes (15 hours). There are 30 respondents with an expected 30 minutes of time burden per respondent.

Response Rate Strategies:

To maximize responses, we will use the following strategies:

- Partner with relevant associations to assist in identification of potential participants and recruitment. These include but are not limited to: Puerto Rico Manufacturing Association (PRMA), Puerto Rico Shipping Association (PRSA), and Frente Amplio de Camioneros (FAC), among others.
- Send advanced emails to potential participants that explain the purpose of the study, its benefits and request collaboration. The email invitation will provide an expectation for a follow-up call. The communication will also contain contact information so that individuals can connect with project staff and clarify any questions and a pre-screening online survey/form to determine eligibility, validate point of contact and determine preferred interview hours.
- Three interviewers will be responsible for contacting and completing the 30 interviews (10 each). Each will be assigned organizations in specific sectors: (1) Truck Transportation, (2) Support Activities for Transportation, and (3) Air & Water Transportation/Couriers & Messenger/Warehousing and Storage. Assigning one contact for each organization helps build relationships that may increase participation rates, as well as the quality of responses.
- We will set a minimum of 5 and maximum of 10 call backs per organization prior removal from sample, unless requested by the contacted organization.
- Complete and Review sample dispositions⁴ to find any potential issues with the list, or data collection efforts.

⁴ Sample disposition - refers to the outcome of contact attempts with respondents, and includes completed interviews, refusals to do the interview, non-working telephone numbers, undeliverable mail, etc. This metric is used to measure the quality of the sample list, the ability of interviewers to reach the correct respondent, the openness of the respondents to the project, and many other factors.

In addition to the above, we will adopt the following strategies to increase participation and response rates:

- Send pre-notification mailings.
- Perform calls at different times of the day and week (e.g., Monday morning, Saturday afternoon).
- Schedule calls outside of work hours (and potentially using different telephone numbers) for respondents who request it.
- If initial calls are during a busy period, set up appointment times to perform the survey over the phone at a more convenient time.
- Although interviews are expected to be pre-scheduled and using online meeting platforms, if necessary, the interview could be conducted at the moment as long as recording, for transcription purposes, is guaranteed.
- Develop introductory text that focuses on how this effort could provide insights to help businesses in the future (i.e., hone in on the outcomes of the project that provide benefits to them and others in their position).
- Install monitoring capabilities and train “lead” interviewers on listening and feedback skills. Record both surveys to give feedback to students on best practices during interviewing (e.g., gaining cooperation, refusal aversion, reading verbatim, probing for open ended responses, pat responses to objections, scheduling callbacks, etc.). We will update our “best practices” guide weekly and post for all interviewers and schedule check-ins with interviewers to discuss these practices weekly as well as we discuss any needed changes for the week.

In addition to the above, the characteristics of the sample and nature of this study (qualitative methodology) requires that interviewers be provided with specialized training, not only to increase responses but to maintain interviewees engaged during the interview and avoid abandonment. Training should include:

- strategies to increase participation rates and refusal conversions;
- industry knowledge (e.g., context-sector specific challenges, general operations, supply chain resilience);
- qualitative data collection strategies;
- known impacts from Hurricane Maria; and
- theoretical assumptions embedded in the interview guide.

4. Describe how the results of the survey will be analyzed and used to generalize the results to the entire customer population.

It is expected that the findings of this survey will inform the understanding of the team in terms of business interruption and best practices and circumstances for recovery of the transportation sector in Puerto Rico. The interview attempts to uncover vulnerabilities, impact, recovery strategies, limiting & facilitating factors, and changes made (resilience) to manage future events.

This is of particular importance for two reasons: first, the sector's role in economic development as a business entity, and the sector's role as a critical community lifeline.

The qualitative analysis will be analyzed as a representative case of the sector impacted by Hurricane Maria in Puerto Rico and to address the NWIRP goals to learn about economic dimensions and dependencies (supply chain) of disaster recovery.

The main sections of the interview guide are:

1. About the Business Operations and Interviewee
2. Hurricane Maria Impact
3. Preparedness, Response and Recovery Strategies per Impact Category
4. Facilitating and Limiting Conditions per Impact Category
5. Learning per Impact Category
6. Reflections on Preparedness, Recovery Status and Resilience
7. Organizational Characteristics (Demographics)

Analyzing these data extends our understanding of the causes, actions (preparedness, response, and recovery), and dependencies at play during business interruptions resulting from natural disasters. These findings will lead to theoretical developments and conceptual frameworks that will inform the transportation sector on best practices when managing disruptions and the literature on resilience, business continuity and disaster management). Of particular interest to the NIST AEO researchers the findings will enhance our understanding of preparedness, response, recovery, and resilience strategies in the supply chain, specifically in a sector that is at the core of all business activity in the region. Puerto Rico is a key case study for these areas of inquiry due to the ongoing NIST NCST investigation and NWIRP study.

Finally, the results will inform government institutions as to how to create the conditions necessary to increase the resilience of this critical lifeline, particularly since other community recovery efforts and functions are reliant on it (e.g., social, economic, environmental).