

# **Two-Year Post-Hurricane Matthew Field Study in Lumberton, North Carolina Housing/Household Recovery Survey 2020**

**U.S. Department of Commerce  
National Institute of Standards and Technology  
Generic Clearance for Community Resilience Data Collections  
OMB CONTROL NO. 0693-0078  
Expiration Date 07/31/2021**

For each proposed request using this generic clearance, NIST will submit the actual instrument and related documents (postcards, emails to respondents, scripts, etc.), as well as proposed statistical methods to be employed to OMB along with responses to the following questions:

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

The Center of Excellence (CoE) field studies team in conjunction with NIST researchers will conduct another round of data collection as part of the longitudinal field study in Lumberton, North Carolina, which experienced major flooding damage due to Hurricane Matthew in early October 2016. The purpose of this field study is to explore the interconnectivity between structural damage (buildings, roads, bridges, power, water) and social-economic impacts to the community. The goal of the current survey collection is to determine the status of recovery for these households. Furthermore, Lumberton was also impacted by another significant flooding event in September 2018 with Hurricane Florence. The information collected in this household survey instrument will augment findings from December 2016, January 2018, and March 2019. The data from this longitudinal collection will contribute to the housing recovery modeling in the IN-CORE community resilience modeling environment, as well as to NIST research on community resilience.

The new household electronic survey instrument is written to assess the continued housing recovery, dislocation, work and school impacts for households in Lumberton, NC following Hurricane Matthew (October 2016), Hurricane Florence (September 2018), and the recent COVID-19 pandemic. From the initial household survey conducted in December 2016, we are aware that the structural damage from Hurricane Matthew was significant in its impact to the population in terms of leading to dislocation and associated social and economic impacts. In January 2018 a one-year post-Hurricane Matthew Housing/Household Recovery Survey was conducted in addition to further exploration of the structural damage, school closures, and housing dislocation and recovery patterns. At that time most household survey respondents had not yet completed recovery from Hurricane Matthew. Approximately two years since the initial collection, the team collected information on the recovery of these housing units and the associated households. The team also expanded the collection to assess impacts and recovery from the latest flood event in September 2018 due to Hurricane Florence. The team has once more expanded the data collection to 1) assess the impacts of the COVID-19 pandemic generally

as well as on the recovery process and 2) better understand adoption of mitigation and preparedness actions in Lumberton.

We will be surveying randomly sampled households that are part of the sample previously used in 2016, 2018, and 2019 studies in Lumberton, NC; the goal for 2020 will be to survey 400 households. The 2016 sample design relied on a cluster sample of households within the most heavily impacted school attendance zones. The original 2016 sampling strategy and modifications are outlined in Response 3.

There is minimal quantitative primary data collection on housing recovery following a large-scale natural hazard event. Additionally, there is minimal primary data on longitudinal housing recovery to understand factors that affect long-term recovery of housing units and households affected by hurricane events. Lumberton provides a unique case for analyzing medium- and long-term recovery in the face of multiple hurricane events (i.e., Hurricane Matthew – 2016 and Hurricane Florence—2018). Survey respondents are household members and when no household is present, a neighbor or a property manager. Some of these households will have been directly affected by Hurricanes Matthew and (e.g., structural damage, dislocation, utility outages, employment/school impacts) while others were not. At this point in time, household members will still retain information about recovery activities from Hurricane Matthew immediately before Hurricanes Florence hit the community and immediately after Hurricane Florence, which can be meaningfully recorded and collected for data analysis.

PII is collected in this instrument, but information is not retrieved by personal identifiers in the system. Therefore, this is not a Privacy Act System and SORN and Privacy Act Notice are not applicable.

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

The electronic survey instrument was developed by the NIST funded Resilience Center of Excellence in collaboration with NIST researchers. Many sections of the electronic survey focus on recovery financing, while timing of return and mitigation actions draw from the 2018 and 2019 surveys. Likewise, sections on household dislocation and associated social and economic impacts of Hurricane Florence were drawn from the initial survey instrument used in 2016. A new section on impacts from the COVID-19 pandemic have been added, along with a section on mitigation and preparedness actions. Additionally, the survey draws from the rich experience of the CoE and NIST researchers in the area of disaster studies.

During development, the electronic survey instrument underwent several rounds of review by researchers on both the CoE team and at NIST, specifically in the Community Resilience Group of NIST's Engineering Laboratory (EL). Finally, the survey instruments were reviewed by the broader, interdisciplinary team that participated in the first, second, and third data collection efforts in Lumberton, NC. This iterative collaboration created a relatively brief and thorough instrument. Lessons learned from three years of data collection have informed both the form of the questions and the guidance to surveyors.

**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 survey will be conducted via a *FedRamp* approved electronic survey platform. A consent script will be used on the opening page of the electronic survey. Each survey should require no more than 15 minutes of the respondent's time. The electronic surveying will take place across a six-week period in order to maximize the response rate.

For household surveys conducted in December 2016, January 2018, and March 2019, we conducted a cluster sample of households within the most heavily impacted school attendance zones. Utilizing the results of this cluster sampling as our sample (n=567), we will follow the data collection strategy for the electronic survey outlined below:

- 1) Researchers at Colorado State University will assign a code to each potential respondent in the sample. The code will be printed on the postcards and used by the respondent to access the electronic survey. The codes will be used by researchers to determine which respondents have completed the survey so that further postcard reminders will only be sent to those respondents that have not yet taken the survey.
- 2) The researchers will print, affix postage, and mail postcards to all 567 households in the sample. The postcard will contain the following information:
  - A brief introduction to the purpose, scope, and goals of the survey.
  - The access code assigned to the respondent.
  - The web address directing the respondent to the electronic survey instrument.
  - A link to a website where high-level results of the data collected in Lumberton since 2016 are shared.

An example postcard is provided with this Supporting Statement.

3) The electronic survey instrument will be available beginning on the first day that the postcard invitations are sent out. The electronic survey instrument will be available for a period of six weeks.

4) Beginning approximately three weeks after the postcards are sent, researchers will collect information to determine the respondents that have completed the survey. Reminder postcards will then be sent to those from the sample that have not completed the survey.

Electronic surveys generally experience low response rates. As such, we expect a response rate of 15%. It should be noted that responding to more than 50 % of the survey questions is considered as a complete survey response. All questions are optional; thus, we expect that some households will answer only a portion of the questions. Once 400 complete responses have been recorded, the survey will be closed. Therefore, the total burden hours for this collection would be 100 hours (Burden estimate: 400 households x 15 minutes = 100 hours).

Although resources (staff, time, and funds) will be limiting factors, several actions will be taken to improve the outcomes of the electronic survey data collection. To ensure a higher response rate, the team will:

- Mail postcard reminders to those that have not responded.
- Supplement the original sample by instituting a convenience sampling strategy to leverage relevant networks from previous years of data collection (e.g., church groups, schools, and the city government). Ambassador networks are expected to send out communications to their networks to make their members aware of the survey effort, but not requiring/encouraging them to take part. This will allow additional households to participate in the survey with the focus being on responses of relevance at a single time point.
- And, keep the survey open until we have received 400 responses.

#### **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 CoE field studies team in conjunction with NIST researchers in terms of housing recovery and best practices and circumstances for recovery over medium- and long-term timeframes and when households face multiple extreme flooding events (i.e., Hurricanes Matthew and Florence).

The data will be analyzed as a case study in the specific context of Lumberton, NC and the existing social, economic, and built infrastructure elements to the community. Statistical analysis will be used to determine trends and correlations in the data, as well as relationships between factors that contributed to housing recovery, dislocation, work and school impacts. Results from the respondents of the original sample will be analyzed separately from the results of the respondents originating from our convenience sampling efforts to determine differences between these households. There are seven main survey sections in the household electronic survey tool. The sections are:

- 1) Occupancy and eligibility
- 2) Housing damage and repair
- 3) Financial assistance for housing recovery
- 4) Impacts of COVID-19 (utilities, dislocation, work)
- 5) Recovery
- 6) Mitigation and Preparedness
- 7) Household demographics

Analyzing these types of data singularly and in conjunction is expected to extend understanding of housing recovery alone and in relation to the recovery of the community, more broadly. Of particular interest to NIST researchers are the dependencies between housing recovery and household recovery along with the interconnections of housing, business, and school recovery following a hazard event.

Research on housing and household recovery to date has been limited by a lack of over time data following a single event in a community as well as an absence of cases that collect the same data across events and communities. Nor are there a great deal of geographic areas studied in detail that were affected by multiple extreme hurricane hazards in relatively quick succession. Several factors that impact the timeline associated with the recovery of housing and households have been identified in prior research. In this field study, these factors are expected to be quantified for a model of housing recovery. The data from this collection will continue to refine the housing recovery modeling in the IN-CORE community resilience modeling environment. Additionally, these data in combination with the business recovery data will be analyzed to understand the dependencies between these two critical sectors.

The data will also be used to inform conceptual and quantitative modeling of the community as a system, including resilience actions taken, interdependencies between housing, business, and school recovery, the timing of aspects of community recovery, and the resources available versus those needed. Furthermore, it is expected that administering the survey tool will continue to provide useful information on best practices for field research on housing recovery following a natural disaster. The electronic survey tool itself is one that has been designed to be applicable for field studies in other communities for a range of hazard events.