PROJECT PLAN: WHO RECEIVES FEMA INDIVIDUAL ASSISTANCE AFTER DISASTERS

Contact 1
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ABSTRACT

Depending on the scale of impact, disasters can trigger the flow of Federal Emergency Management Agency (FEMA) Individual Assistance (IA) to help individuals and households recover. There are many different types of IA that support different aspects of recovery, including through financial grants that support immediate needs like food, temporary housing reimbursement and/or vouchers for rental assistance or hotel costs, providing a temporary housing unit to the displaced household, and providing repair or replacement costs for owner-occupied homes. Through the OpenFEMA data portal, FEMA provides individual level data on IA applications and awards. This project aims to investigate and identify odds ratios for receiving different types of IA assistance, or not receiving IA assistance, based on key hazard, geographic, and demographic variables using the OpenFEMA data. The odds ratios will be incorporated into a predictive algorithm for estimating post-disaster recovery resource access for households.

1 INTRODUCTION

Depending on the scale of impact, disasters can trigger the flow of Federal Emergency Management Agency (FEMA) Individual Assistance (IA) to help individuals and households recover. There are many different types of IA that support different aspects of recovery, including through financial grants that support immediate needs like food, temporary housing reimbursement and/or vouchers for rental assistance or hotel costs, providing a temporary housing unit to the displaced household, and providing repair or replacement costs for owner-occupied homes. For years, social scientists have conducted post-disaster field research and have called out exclusionary policies and processes that limit equitable access to federal recovery aid. More recently, through the OpenFEMA data portal, FEMA began providing individual level data on IA applications and awards. Recent research, as well as a New York Times article, have started analyzing the data and have begun to measure differential access, across FEMA's post-disaster recovery programs, including IA, as well as Public Assistance and Hazard Mitigation Assistance.

As part of the National Institute of Standards and Technology-funded Center for Risk Based Community Resilience Planning, the PI has developed a model for predicting the long-term household-level housing recovery process. The model uses social vulnerability to drive recovery timing and sequence across post-disaster housing recovery stages. The present Data Science Project will provide necessary odds ratios for expanding the predictive model to explicitly include recovery resources. This project will investigate and identify odds ratios for eligibility and receiving different types of IA assistance, or not receiving IA assistance, based on key hazard, geographic, programmatic, and demographic variables using the OpenFEMA data. It is anticipated that multiple data sources (e.g., U.S. Census, USDA rural designations) will be merged with the OpenFEMA data to investigate important independent variables that may influence FEMA IA eligibility and awards. The odds ratios will be incorporated into a predictive algorithm for estimating post-disaster recovery resource access for households.

Ultimately, the analyses proposed here will answer the following research question:

- What is the likeliness of different households to be eligible for and receive different types of IA assistance, considering hazard type, household demographics, home damage information, and geographic context?

2 Baseline or Initial Analysis

(a) - A first step should merge disaster information into the Individual Assistance data.

On the OpenFEMA data portal webpage, data fields are defined for the 'OpenFEMA Dataset: Individuals and Households Program – Valid Registrations – v1' (IHP-VR). The third data field is 'disasterNumber'. The OpenFEMA Dataset: Disaster Declarations Summaries – v2' hosts the key to the disasterNumber and the event information. A first step should include importing the 'declarationType', and 'declarationTitle' from the Disaster Declaration Summaries dataset into the IHP-VR dataset using the 'disasterNumber' as the link.

IHP-VR: https://www.fema.gov/openfema-data-page/individuals-and-households-program-valid-registrations-v1

Disaster Declaration Summaries: https://www.fema.gov/openfema-data-page/disaster-declarations-summaries-v2

(b) – A second step should begin to identify patterns in the data for the types of awards made and eligibility distinctions (e.g., food need, tsa, repair assistance, rental assistance, etc.) by hazard type (incidentType) considering application demographic information (e.g., age, household composition, income, own/rent, etc), geographic information (e.g., state, population density, rural zip code or not, etc.), and programmatic information (e.g., damage assessment conducted, damage level). In this step, visualizations and summary statistics will be beneficial tools to provide the requested outputs.

3 Final Analysis

Think about what the final analysis will entail in terms of code, visualizations, statistical models, and communication.

Use regression analysis to determine odds ratios for the following:

- Outcome of the odds ratio should tell us likeliness of:
  - being eligible or not for the various IA programs
  - receiving or not receiving awards from the various IA programs
- Baseline model using own/rent
  - Expanded model with covariates for other demographic information, geographic information, programmatic information
  - All odds ratios should be separated by type of hazard (incidentType)

4 Final Goals & Evaluation

Detail the deliverable that will make a final project successful for the community partner.

The following outputs should be communicated and delivered as follows:

- Odds ratios communicated in an excel file
- Tabulated summary statistics in an excel file
- Cross-variable correlation outputs in an excel file
- Source code

5 Related Work

Please cite research papers, reports, blog posts, projects, and other works you have consulted or plan to consult later. Please provide a sentence or two description that conveys the sources relevance to your project. You should have at least **5** sources.

This is the paper with the algorithm that will be expanded with the odds ratios.

- Sutley, E.J., and Hamideh, S. (2020). "Post-Disaster Housing Stages: A Markov Chain Approach to Model Sequences and Duration Based on Social Vulnerability." Wiley *Risk Analysis*, 40(12): 2675-2695. DOI: 10.1111/risa.13576.

This is a field study that has collected household level information on receiving FEMA IA funding; it will be used as a secondary validation.

- Sutley, E.J., Dillard, M.K., and van de Lindt, J.W. (2021). *Community Resilience-Focused Technical Investigation of the 2016 Lumberton, North Carolina Flood: Community Recovery One Year Later*. National Institute of Standards and Technology (NIST SP 1230-2). https://doi.org/10.6028.NIST.SP.1230-2.

These are papers/publications where someone else analyzed the openFEMA data (IA or other datasets) and observed disparities.

- Rivera, J. D. (2016). *Acquiring federal disaster assistance: Investigating equitable resource distribution within FEMA's home assistance program* (Doctoral dissertation, Rutgers University-Camden Graduate School).
- Domingue, S. J., & Emrich, C. T. (2019). Social vulnerability and procedural equity: Exploring the distribution of disaster aid across counties in the United States. *The American Review of Public Administration*, *49*(8), 897-913.
- https://www.nytimes.com/2021/06/07/climate/FEMA-race-climate.html

6 Data & Technical Requirements

Provide expected technical requirements and relevant datasets so the course staff can best support your project needs. What software libraries do you plan to use? What datasets are you using or need access to? Anything else we (the course staff) should know?

The analyses can be conducted in any statistical analysis package or programming language.

Datasets:

IHP-VR: https://www.fema.gov/openfema-data-page/individuals-and-households-program-valid-registrations-v1

Disaster Declaration Summaries: https://www.fema.gov/openfema-data-page/disaster-declarations-summaries-v2