# Procedural and Distributive Equity in Disaster Housing Recovery: FEMA's IA Program for Unmet Housing Needs After Hurricane Ike

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## Background & Overview

Disaster recovery processes frequently reinforce pre-existing housing and social inequalities. While the recovery phase holds the potential to improve conditions and address long-standing disparities, it often occurs under time compression*, where urgent needs, limited resources, and development pressures converge. Housing recovery in particular plays a critical role in shaping household and community outcomes post-disaster. Understanding how federal assistance is distributed, including who receives it, how much, and when, is central to evaluating equity in recovery.

### FEMA IA

FEMA's Individual Assistance (IA) Program serves as a safety net for households with disaster-related unmet needs. It provides grants for rental assistance, repairs, and replacement costs through the Individuals and Households Program (IHP).

The IA process includes distinct stages: application, inspection, eligibility, funding, and timing.

Application → Inspection → Eligibility → Funding → Timing
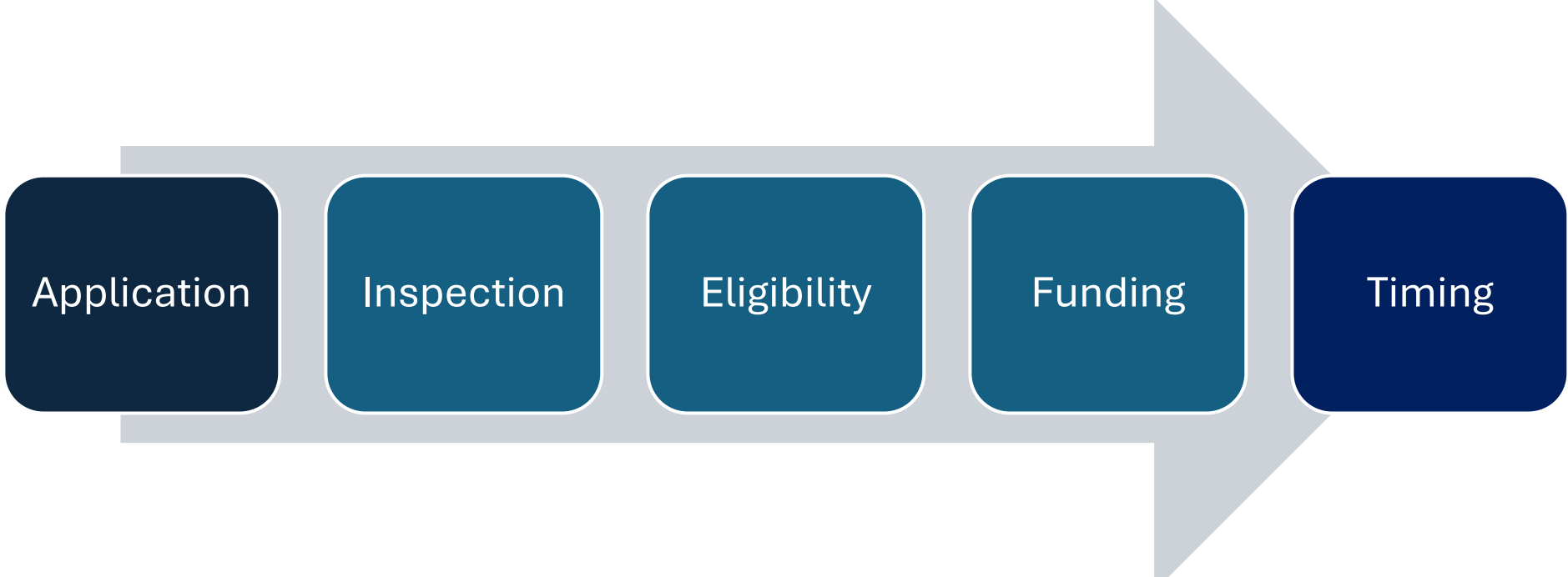
While both owners and renters can receive assistance, renters are eligible only for rental assistance, while owners are eligible for rental assistance as well as repair and replacement assistance (R/R). Renter households also have unique requirements and experiences when moving though the process for recovery funding.

### Hurricane Ike

Hurricane Ike made landfall in September 2008, causing extensive damage along the Texas coast. The storm's large surge devastated Galveston Island and Bolivar Peninsula, leading to widespread displacement and housing loss. As a result, 34 counties were deemed eligible for IA. Galveston County, one of the hardest-hit areas, faced significant challenges in housing recovery. Considering the IA process outcomes for the applications from Texas as well as just those from Galveston County offers a compelling context to evaluate equity in federal housing recovery funding.


Hurricane Ike Maximum Sustained Wind (mph)
Hurricane Ike Mean Storm Surge
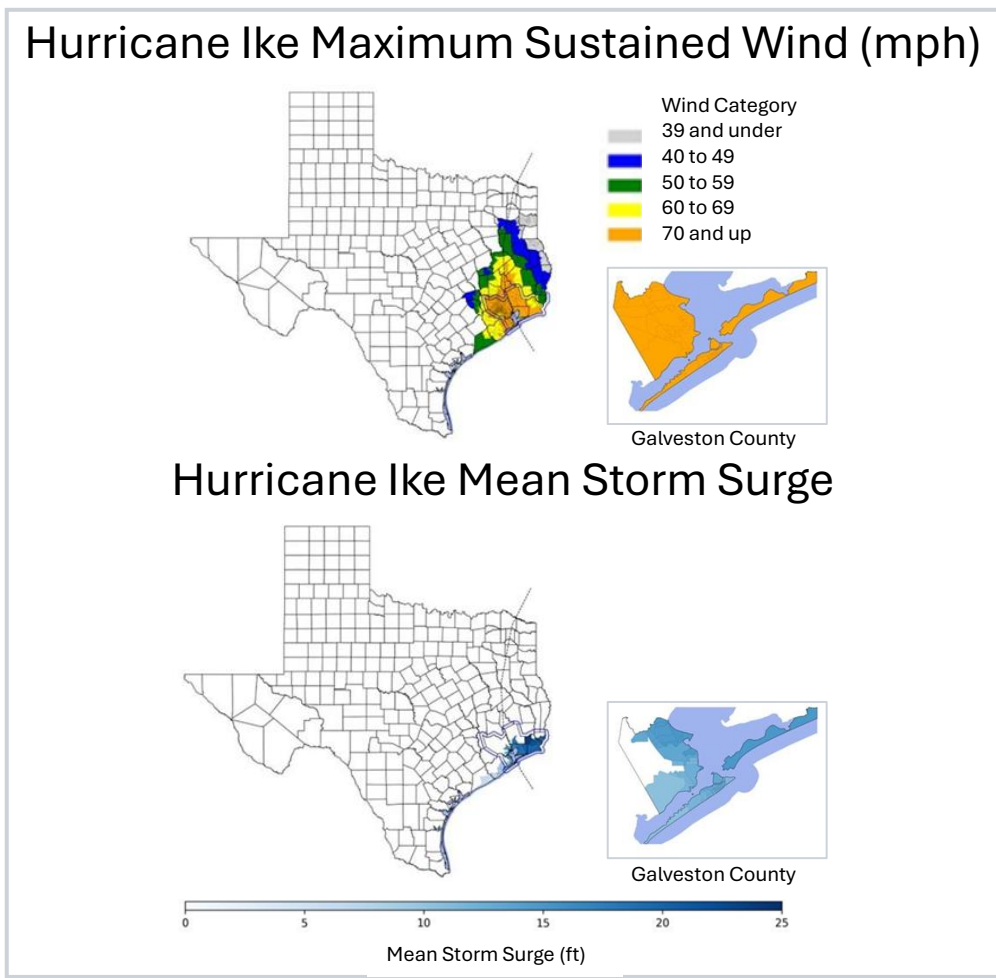
### Equity in Disaster Recovery

This research applies a socio-ecological lens to evaluate procedural and distributive equity in FEMA IA.
- **Procedural equity** considers whether the process of determining eligibility and requirements or criteria for eligibility are equitably applied across households.
  - Applied to housing recovery, procedural equity would ensure equitable inspections, eligibility criteria, and documentation requirements.
- **Distributive equity** considers how material resources are allocated among different groups.
  - Applied to housing recovery, distributive equity would result in more assistance to severely damaged, underinsured households.

Social vulnerability indicators, such as income, household composition, insurance coverage, and residence type, as well as the influence of neighborhood racial and ethnic compositions are considered in factors that may influence household outcomes in the IA process for recovery funding.
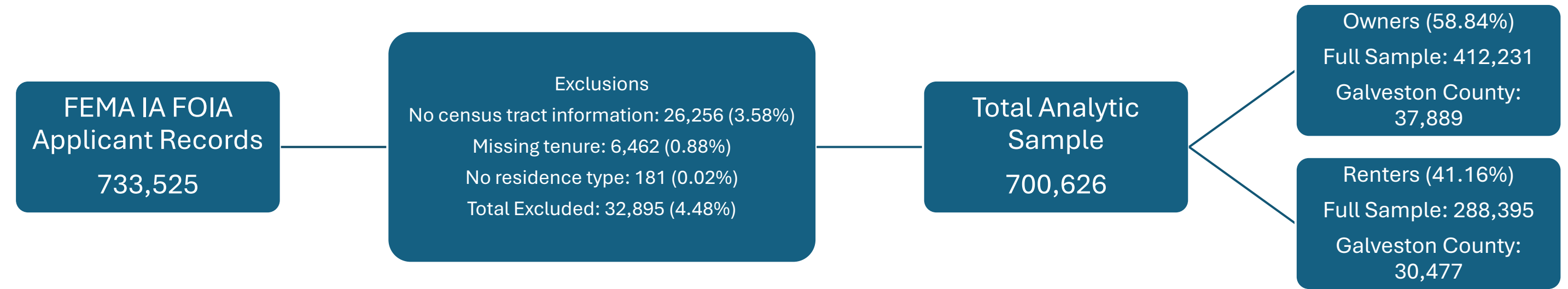
### Research Questions

1. How do household and neighborhood racial and ethnic characteristics influence inspection, eligibility, and funding outcomes for homeowners applying for FEMA repair and/or replacement or rental assistance?
2. How do these same characteristics affect renter households' outcomes for rental assistance?
3. How do these characteristics influence the timing of FEMA IA disbursements to owner and renter households?

## Methodology

This study uses applicant-level data obtained through OpenFEMA's Individuals and Households Program – Valid Registrations – v1 dataset for Hurricane Ike in Texas (DR-1791). The dataset was enhanced with census tract information acquired from a Freedom of Information Act (FOIA) request. Applications without census tract, tenure, or residence type information were excluded. The analysis focused on two geographic samples, the full set of 34 IA-eligible Texas counties (referred to as the "full Texas sample") and Galveston County. The full sample captures a broader regional view which can be compared to Galveston County which in contrast provides insight into outcomes in a highly impacted coastal area.

The figure below describes the analytic sample and the breaks down the number of applications by tenure and geographic sample.

FEMA IA FOIA Applicant Records 733,525 → Exclusions: No census tract information: 26,256 (3.58%) / Missing tenure: 6,462 (0.88%) / No residence type: 181 (0.02%) / Total Excluded: 32,895 (4.48%) → Total Analytic Sample 700,626 → Owners (58.84%) Full Sample: 412,231 Galveston County: 37,889 / Renters (41.16%) Full Sample: 288,395 Galveston County: 30,477

Separate models were run for owner and renter households across the different stages of the IA process:
- Inspection stage: likelihood of a receiving a FEMA inspection
- Eligibility stage: likelihood of being eligible for assistance
- Funding stage: amount of assistance received
- Timing stage: number of days between disaster declaration and assistance disbursement

Multilevel logistic and linear regression models were used to assess the effects of household characteristic (e.g., composition, income, insurance status, residence type), neighborhood racial and ethnic composition, and hazard exposure variables. Census tract-level random intercepts were included to account for spatial clustering.

## Owner and Renter Analysis

This section presents the results from the inspection, eligibility, and funding stages of the FEMA IA process by tenure and geography.

The first table displays the distribution of applications by process stage and highlights patterns across the IA process for the full Texas sample and for Galveston County.

**Owner and Renter Distribution of Applications Across IA Process and Samples**

| | Full Owner Sample | Full Renter Sample | Galveston Owner Sample | Galveston Renter Sample |
|---|---|---|---|---|
| Total Applications | 412,231 | 288,395 | 37,889 | 30,477 |
| Inspected Applications | 184,967 (44.87%) | 183,388 (63.59%) | 24,892 (65.70%) | 26,981 (88.53%) |
| Eligible Applications | 48,051 (25.98%) 40,226 (83.72%) R/R 25,968 (54.04%) Rental | 32,834 (17.90%) Rental | 10,262 (41.23%) 6,883 (67.07%) R/R 7,675 (74.79%) Rental | 10,164 (37.67%) Rental |

The second table reports the total funding amounts and average household assistance by program type and tenure.

| | Owner Repair and Replacement | Owner Rental Assistance | Renter Rental Assistance | Total Amount |
|---|---|---|---|---|
| Full Texas Sample | $231,090,107 ($5,745 household mean) | $60,342,983 ($2,324 household mean) | $88,660,635 ($2,700 household mean) | $380,093,725 |
| Galveston County | $75,114,017 ($10,913 household mean) | $21,958,386 ($2,861 household mean) | $31,544,898 ($3,104 household mean) | $128,617,301 |

Galveston County has higher inspection rate, higher eligibility rates, and larger average awards. Renters in general have higher inspection rates, but lower eligibility rates compared to owner applications.

Finally, the results for the multilevel logistic and regression models are presented in the final table below. The models were conducted separately for owner and renter samples at each IA process stage. The table presents the significant predictors of IA outcomes across the models, highlighting the role of household characteristics, neighborhood racial and ethnic composition, and hazard exposure factors on outcomes.



## Owner and Renter Findings

### Household Characteristics

| | Inspection | Eligibility | Funding |
|---|---|---|---|
| Larger Households | + | + | +Rental |
| Lower Income Households | + | + (owner only) | |
| Mobile Homes | + | + (owners only) | +R/R, - Rental (renters only) |
| Travel Trailers | + | + | +R/R, - Rental (renters only) |
| Homeowners Insurance Only | - | - | +R/R, - Rental (renters only) |
| Flood Insurance Only | - | - | - R/R, + Rental (renters only) |
| Combined Insurance | - | - | - R/R |

### Neighborhood Race and Ethnicity

| | | Inspection | Eligibility | Funding |
|---|---|---|---|---|
| Applications from census tracts with higher proportions of Black households | Owners | + | + (Rental) | - |
| | Renters | + | + (Rental) | - |
| Applications from census tracts with higher proportions of Hispanic households | Owners | + | - | - |
| | Renters | + | - | - |

### Hazard Exposure
- For owners and renters, higher levels of storm surge and close proximity to the hurricane track increased inspection and eligibility likelihood.
- For owners, higher levels of storm surge led to increases in repair and replacement funding and rental assistance in Galveston County.
- For renters, higher levels of storm surge led to decreases in rental assistance, except in Galveston County where it increases funding.
- The effects of wind exposure were inconsistent across models and geography.

### Galveston County
- For owners and renters, the Galveston coastal areas were more likely to be inspected, deemed eligible, and received more assistance.
  - In Galveston County, owner and renter applications from Galveston Island were more likely to be inspected and deemed eligible. For owners, they also received more repair and replacement assistance
  - In Galveston County, owner applications from Bolivar Peninsula were more likely to be eligible for repair and replacement assistance and renter applications were more likely to be inspected

### Damage and Other Assistance
- For owner and renter applications, higher levels of RPFVL increases inspection eligibility likelihood and resulted in more funding
- For owner applications, higher levels of rental assistance were related to higher levels and repair and replacement funding and higher levels of repair and replacement funding were related to lower levels of rental assistance.

## Timing Analysis

This section examines the timing of FEMA IA disbursements, measured as the number of days between the disaster declaration and when households received funding. Analyses are separated by IA program, tenure, and geographic sample.

The response curves below illustrates how quickly assistance was distributed over time. In addition, the table provides descriptive statistics for the timing variable.


Timing of FEMA IA Funding After Hurricane Ike by IA Program, Tenure, and Geography

**Descriptive Statistics of Timing Variable by IA Program, Tenure, and Geography**

| | Full Sample | | | Galveston County | | |
|---|---|---|---|---|---|---|
| | Owner R/R | Owner Rental | Renter Rental | Owner R/R | Owner Rental | Renter Rental |
| Mean | 35.5 | 36.6 | 29.4 | 44.6 | 40.9 | 32.8 |
| Median | 22.0 | 22.0 | 21.0 | 27.0 | 26.0 | 24.0 |
| Std. Dev. | 40.6 | 41.1 | 30.4 | 48.9 | 42.2 | 31.1 |
| Min | 1.0 | 1.0 | 2.0 | 1.0 | 2.0 | 2.0 |
| Max | 657.0 | 536.0 | 674.0 | 610.0 | 470.0 | 396.0 |
| Skewness | 3.4 | 3.2 | 3.6 | 3.2 | 2.6 | 3.3 |

## Timing Analysis Findings



| Finding | Owner R/R | Owner Rental | Renter Rental |
|---|---|---|---|
| Larger households experience delays. | X | | X |
| Low-income households experience delays. | | X | X |
| House/Duplex experience delays | | | X |
| Condos experience delays. | | | X |
| Mobile homes experience delays. | X | X | X |
| Travel trailers experience delays. | X | X | X |
| Boats experience delays. | X | X | X |
| "Other" residence types experience delays. | | | X |
| Homeowners insurance only is related to delays. | X | X | X |
| Flood insurance only is related to delays. | X | X | X |
| Combined homeowners and flood insurance is related to delays | X | X | X |
| Tracts with higher proportions of Hispanic households experience delays. | X | | |
| Tracts with higher proportions of Black households receive funding faster. (full and coastal cluster subsample) | X | | |
| Combined homeowners and flood insurance is related to delays | X | | |
| Tracts with higher proportions of Black households experience delays. (Galveston County subsample) | X | | |
| Coastal counties experience delays. | X | X | X |
| Coastal cluster counties receive funding faster. | | X | |
| Galveston Island & Bolivar Peninsula receive funding faster. | X | | |
| Galveston Island & Bolivar Peninsula experience delays. | | | X |
| In Galveston subsample, Galveston Island receive funding faster. | X | X | |
| In Galveston subsample, Bolivar Peninsula receive funding faster. | X | | |
| In Galveston subsample, Bolivar Peninsula experience delays. | | | X |
| Applications submitted closer to the disaster declaration experience greater wait times than those submitted later. | X | X | X |

## Overall Results

The table below summarizes both the positive and negative equity findings.

| Positives | Negatives |
|---|---|
| Larger households have positive outcomes throughout the FEMA IA process | Large households experience delays in receiving assistance. |
| Low-income households have positive outcomes in the inspection and eligibility stages. | Low-income households experience delays in receiving rental assistance. |
| Applications from census tracts with higher proportions of Black households, were more likely to be inspected and deemed eligible. Owner applications from these tracts received repair and replacement funding faster in the full sample. | Applications from census tracts with higher proportions of Black households received less funding. Owner applications from these tracts were delayed in Galveston County in receiving repair and replacement funding. |
| Applications from census tracts with higher proportions of Hispanic households were more likely to be inspected. Renter applications from these tracts were also more likely to be eligible. | Applications from census tracts with higher proportions of Hispanic received less funding. Owner applications from these tracts were also less likely to be eligible and renter applications were delayed in receiving assistance. |
| Vulnerable housing types (mobile homes and travel trailers) have positive outcomes in the inspection and eligibility stages. Owner applications with these residence types also have positive funding outcomes. | Renter applications from vulnerable housing types (mobile homes and travel trailers) have negative funding outcomes. These housing types for owners and renters experience delays in receiving funding. |

## Discussion

This study highlights how FEMA's IA program produces mixed equity outcomes across the program's stages. While larger households, low-income applicants, and those in vulnerable housing types were more likely to be inspected and deemed eligible (procedural equity), these same groups often faced delays in funding (distributive inequity).

Neighborhood racial and ethnic composition played a significant role in FEMA IA program outcomes. Applications from census tracts with higher proportions of Black and Hispanic households were more likely to be inspected, but received less funding and experienced longer delays. These findings illustrate how procedural equity at early stages of the program process can be undercut by distributive inequities in the disbursement and timing stages.

Contributions of this study include:
- A single-event, multi-scale approach that contrasts broad state-level trends with those in a highly impacted local area.
- An applicant-level dataset, enhanced with FOIA data, that enables detailed modeling of owner and renter experiences with the inclusion of census-tract level data.
- A stepwise modeling structure that captures the outcomes of the distinct phases of the recovery assistance process.

## Conclusion

FEMA IA plays a critical role in post-disaster housing recovery, especially for households with limited insurance or financial resources. By isolating distinct stages of the assistance process and modeling outcomes for owners and renters separately across the full Texas sample and just in Galveston County, this study reveals how institutional inequities shape disaster recovery.