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

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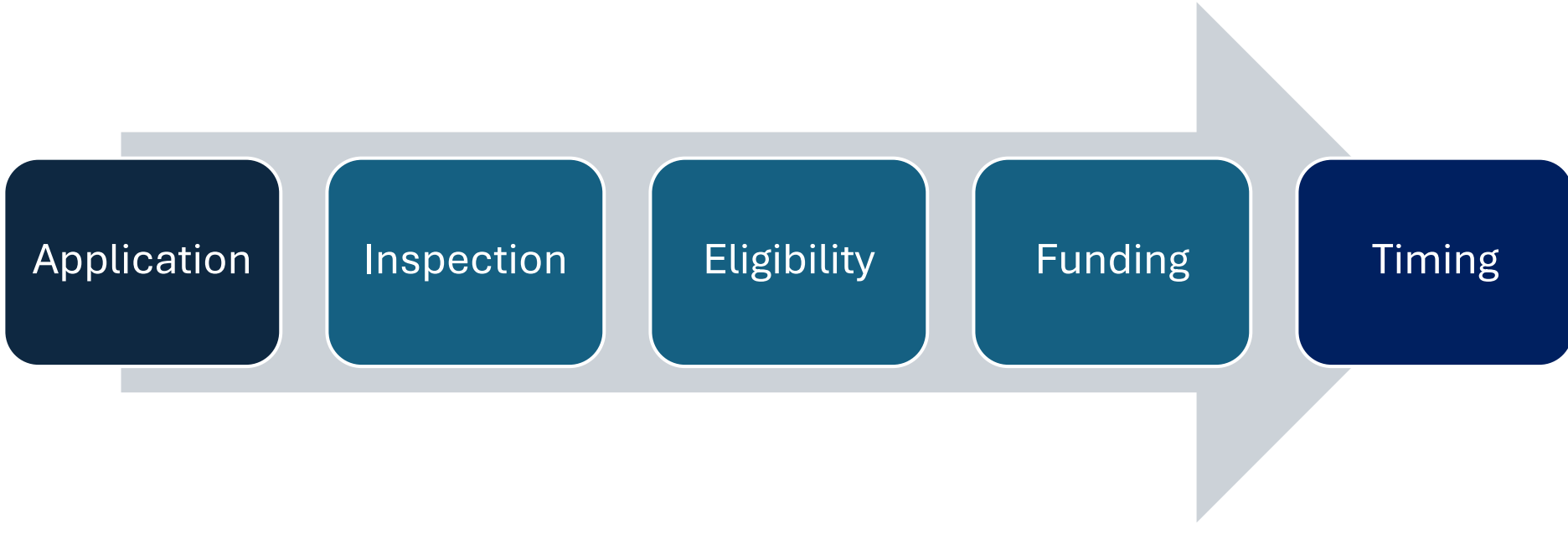
Background & Overview

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’s IA: Housing Assistance (Financial) Program

FEMA’s Individual Assistance (IA) Program serves as a *safety net* for households with disaster-related unmet needs. IA includes the Individuals and Households Program (IHP). The latter includes Housing Assistance (HA), which can be provided directly or through financial assistance, and Other Needs Assistance (ONA). A major component of the IHP is the financial assistance through the HA program, which provides grants for rental assistance, repairs, and replacement costs.

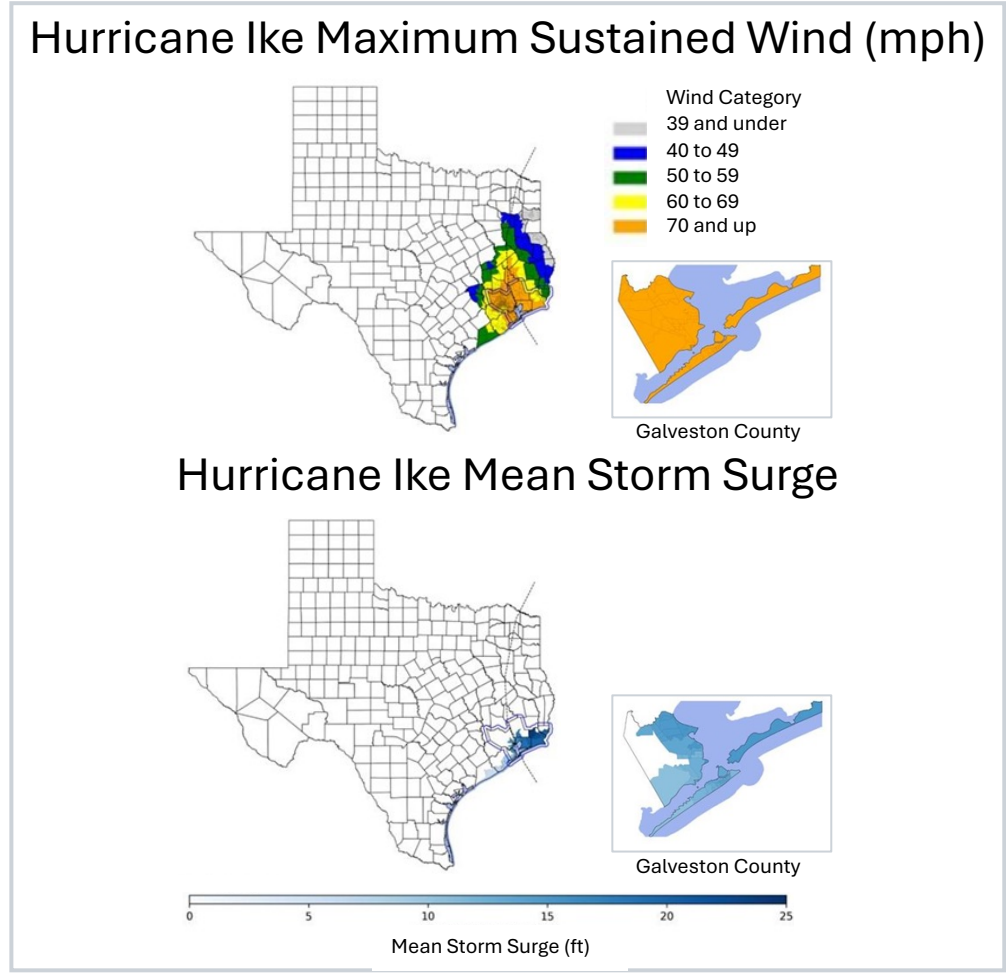
The funding process includes distinct stages: application, inspection, eligibility, funding, and timing.



Inspection was a critical first step in eligibility, and ultimately funding. While both owners and renters can receive assistance; renters are eligible for rental assistance only, while owners are eligible for rental assistance and repair and replacement (R/R) assistance funding up to \$28,800 in 2008. Renter households also have unique requirements and experiences when moving through 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. In total, 34 counties were declared as eligible for IA. Galveston County, one of the hardest-hit areas, faced significant challenges in housing recovery. This research assesses equity in the federal housing assistance processes across applications from all 34 IA declared counties in Texas and those from Galveston County as a critical point of comparison.



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 and IA, procedural equity would expect to find equitable procedures for application processes related to inspection, eligibility, and funding, particularly in the context of a program targeting disaster impacted households with limited resources and capacities.
- Distributive equity** considers how material resources are allocated among different groups in a population, often considering relative distributions toward marginalized or disadvantaged groups.
 - Applied to housing recovery, distributive equity determinations would seek to ensure that disadvantaged groups, often associated with social vulnerability such as minorities, renters, and lower income households would have equitable access to recovery resources, net of other factors.

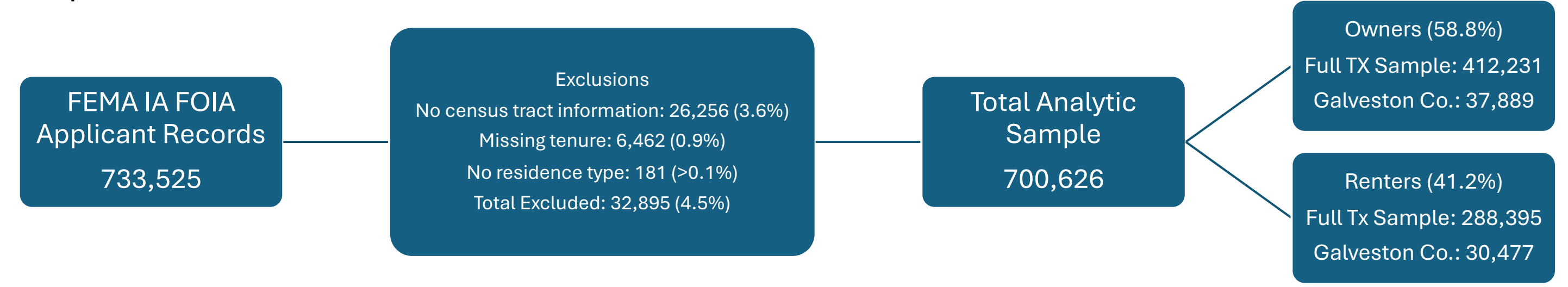
Research Questions

- Do procedural and distributional equity expectations hold for all stages in the housing assistance process following Hurricane Ike?
- Are there variations in process determinations for housing assistance between renter & owner households?
- Do procedural and distributional equity expectations hold when considering the timing of funding for owner and renter households?
- Are there variations in findings when considering applications across all Texas IA declared counties when compared to applications from the hardest impacted county (Galveston)?

Methodology

This study uses applicant-level data from OpenFEMA’s Individuals and Households Program – Valid Registrations – v1 dataset for Hurricane Ike in Texas (DR-1791). The dataset was enhanced, via FOIA requests, providing geo-referencing to census tract, timing, and other data. The analysis is replicated for two geographic samples: 1) all applications from the 34 IA-eligible Texas counties (referred to as the “full Texas sample”) and 2) all applications from Galveston County, Texas. The full Texas sample captures a broader regional assessment of IA processes and determinations, while Galveston County provides insights concerning applications from the most highly impacted county. Given different funding packages, amounts, criteria, and determination processes, rental and owner applications are analyzed separately.

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



Separate models were run for owner and renter households across the different stages of the IA process:

- Inspection: likelihood of a receiving a FEMA inspection
- Eligibility determination: likelihood of being eligible for assistance
- Funding: amount of assistance received
- Timing of funding: number of days between disaster declaration and assistance disbursement

Multilevel linear probability (1, 2, & 4) and linear regression (3) 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 at each stage’s outcome. Census tract-level random intercepts were included to account for spatial clustering associated with racial/ethnic composition and hazard exposure measures.

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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.

Table 1. Owner and Renter Distribution of Applications Across IA Process Stages 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 (44.9%)	183,388 (63.6%)	24,892 (65.7%)	26,981 (88.5%)
Eligible Applications	48,051 (26.0%) <ul style="list-style-type: none">40,226 (83.7%) R/R25,968 (54.6%) Rental	32,834 (17.9%) Rental	10,262 (41.2%) <ul style="list-style-type: none">6,883 (67.1%) R/R7,675 (74.8%) Rental	10,164 (37.7%) Rental

Galveston County applications had higher inspection and eligibility rates for owners and renters. However, while Galveston owners had higher rental rates, their rate for home repair/replacement funding was lower. Renters had higher inspection rates, but lower eligibility rates compared to owners.

Table 2. Total and Average Housing Assistance for Owner/Renter Assistance Types and Samples

	Owner Repair and Replacement (R/R)	Owner Rental Assistance (RA)	Renter Rental Assistance (RA)	Total Amount
Full Texas Sample	\$231,090,107 (60.8%) (\$5,745 mean)	\$60,342,983 (15.9%) (\$2,324 mean)	\$88,660,635 (23.3%) (\$2,700 mean)	\$380,093,725
Galveston County	\$75,114,017 (58.4%) (\$10,913 mean)	\$21,958,386 (17.1%) (\$2,861 mean)	\$31,544,898 (24.5%) (\$3,104 mean)	\$128,617,301

The majority housing assistance funding in Galveston and among all declared counties targeted home repair/replacement (R/R) funding with substantially higher average repair/replacement funding going to Galveston owners. Average rental assistance (RA) was slightly higher for Galveston’s owners and renters, compared to respective sample averages. Interestingly, renter households received higher average rental assistance compared to owner households, with differences being within a few hundred dollars.

To capture factors influencing housing assistance determinations at each stage, a series of separate multilevel, multivariate models for owner & renter households in the full Texas and Galveston samples were estimated predicting:

- The **probability of damage inspection**
- The **probability of program eligibility** for: a) R/R for owners, b) RA for owners and c) RA for renters
- Funding (\$)** amount received for: a) R/R for owners, b) RA for owners and c) RA for renters

Independent variables: Household characteristics, neighborhood racial/ethnic composition, Hazard Exposure (surge, hurricane track, wind speed, coastal location, and estimated damage).

Owner and Renter Findings

Table 5. Household Characteristics (red = equity inconsistent, purple = partially consistent; black = equity consistent)

Household Characteristics	Inspection				Eligibility						Funding Amounts					
	Texas		Galveston		Texas		Galveston				Texas		Galveston			
	Owner	Renter	Owner	Renter	Owner	Renter	Owner	Renter	Owner	Renter	Owner	Renter	Owner	Renter	Owner	Renter
Household size	+	+	+	+	+	+	+	+	+	+	ns	+	ns	+	+	+
Household Inc.	-	-	-	-	-	-	ns	-	-	ns	ns	+	ns	ns	ns	ns
Mobile Homes	+	+	+	+	+	+	ns	ns	+	ns	+	ns	-	+	ns	ns
Travel Trailers	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	ns
Homeowners Ins.	-	-	-	-	-	-	-	-	-	+	ns	ns	ns	ns	ns	-
Flood Insurance	-	-	-	-	-	-	-	ns	-	+	+	+	-	+	+	+
Flood & Home Ins	-	+	-	+	-	-	-	-	-	-	+	ns	-	+	+	ns

Table 6. Neighborhood Race and Ethnicity (red = equity inconsistent, purple = partially consistent; Black = equity consistent)

Proportion of Census tract households	Inspection				Eligibility						Funding					
	Texas		Galveston		Texas		Galveston				Texas		Galveston			
	Owner	Renter	Owners	Renters	Owner	Renter	Owner	Renter	Owner	Renter	Owner	Renter	Owner	Renter	Owner	Renter
Hispanic	+	+	ns	ns	-	-	+	ns	-	ns	-	-	ns	-	-	ns
Non-Hispanic Black	+	+	ns	+	ns	+	+	ns	ns	ns	-	ns	-	-	-	ns

Hazard Exposure

- For **owners and renters**, higher levels of storm surge and 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 (relatively minor for Ike), 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 estimated damage (RPFVL) increases 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, but higher levels of repair and replacement funding were related to somewhat lower levels of rental assistance, probably due to programmatic limitations.

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.

Table 7. Descriptive Statistics for Days from Ike to households receiving funding.

	Full Texas 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

Timing Analysis Continued

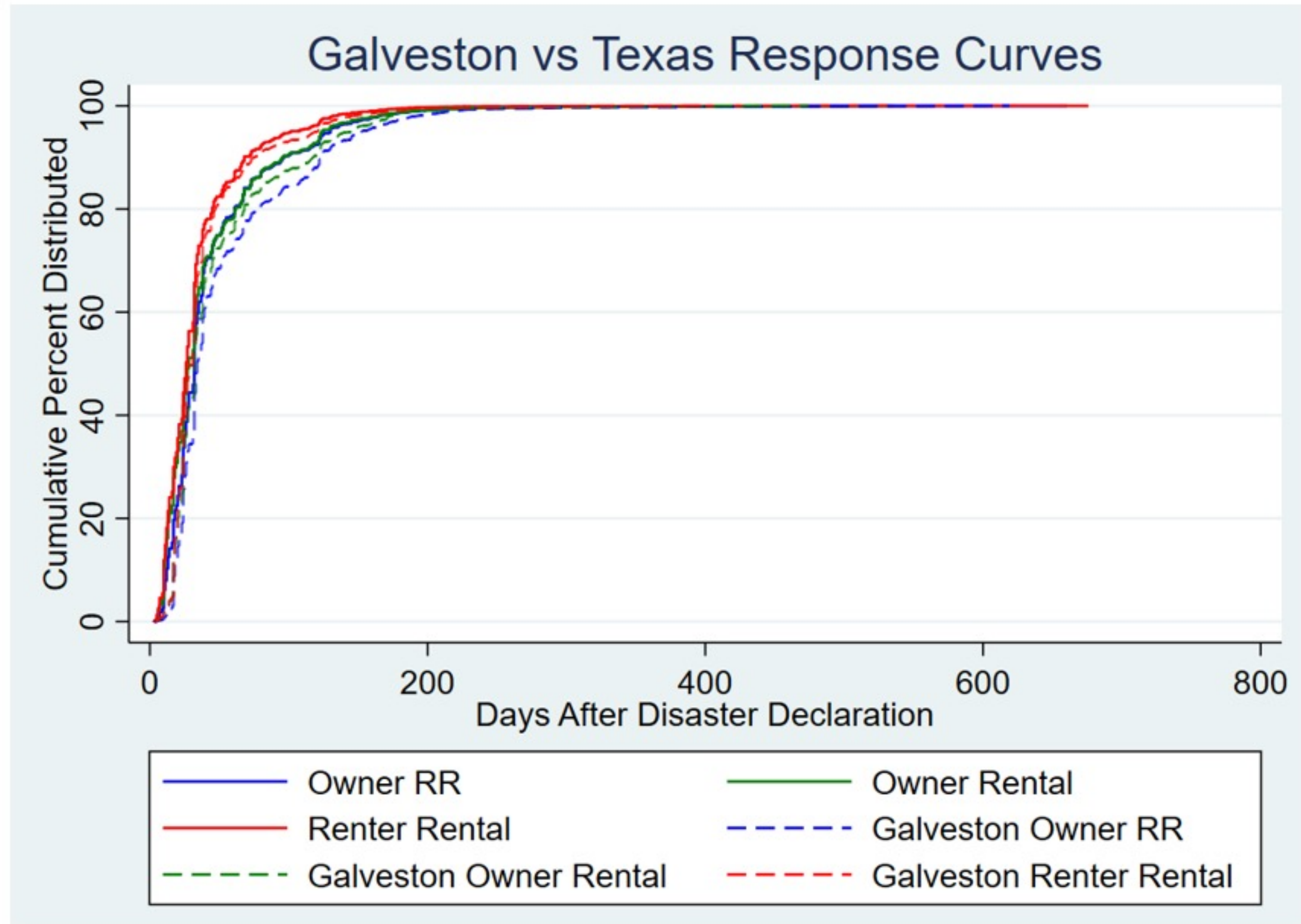


Table 8: Timing Analysis Findings (red = equity inconsistent, purple = neutral; black = equity consistent)

Multi-level Linear Regression predicting Ln(days) Only significant factors listed	Texas Sample			Galveston Sample		
	Owner R/R	Owner RA	Renter RA	Owner R/R	Owner RA	Renter RA
Household size ≥ 5	+	+	+	+	+	+
Lower-income (* < 30K; ** < 15K)		+	+		+	+
Mobile homes	+	+	+			+
Travel trailers	+	+	+	+	+	+
Boats	+	+		+	+	
Homeowners Insurance	+	+	+	+	+	
Flood insurance			+			
Homeowner & Flood Insurance	+	+		+	+	+
Hispanic			+			
Non-Hispanic Black	-	-		+		
Surge	-					
Coastal Counties	+	+	+			
Galveston Island				-	-	
Bolivar					-	+
# days from Ike to application	+	+	+	+	+	+

Summary of Overall Results

Table 9. 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 higher probabilities of inspection and positive eligibility determinations.	Low-income households experience delays in receiving rental 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.
In general households with no insurance or only homeowners' insurance were more likely to be inspected, deemed eligible for housing assistance and received more R/R funding.	However, owner households with flood insurance received higher RA. Renters with flood insurance also received higher amounts for RA.
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.	Owner applications from census tracts with higher proportions of Black households received less R/R funding in Texas and Galveston samples and for RA in Galveston. Renters in these tracts received less RA. Owner applications for R/R funding from these tracts were delayed in Galveston.
Applications from tracts with higher Hispanic Household proportions had higher inspection rates and renter applications were more likely to be eligible.	Owner applications from tracts with higher Hispanic household proportions received less R/R and RA funding. Owner applications from these tracts were less likely to be eligible and renter applications were delayed longer.

Discussion

This study highlights **shifting equity assessments** FEMA’s - Financial Housing Assistance - program stages.

- During Initial inspection and eligibility stages, both procedural and distributional equity expectations generally hold**, particularly for homeowners.
 - Larger, lower-income, and lower resourced (no or only home insurance) households, as well as those in the most vulnerable housing and in minority neighborhoods were more likely to be inspected and deemed eligible, indicating procedural & distributional equity.
- At the funding stage however, the picture is mixed.**
 - For Repair and Replacement (R/R):
 - lower insurance resourced households and those in highly vulnerable homes fared better while household size and income were nonsignificant.
 - However, households in Hispanic and Black neighborhoods received significantly less funding and often waited longer for that funding; findings suggestive of distributive inequity.
 - For Rental Assistance (RA):
 - larger households and those in travel trailers received higher levels of funding.
 - However, households with flood insurance received higher levels of funding and households in higher minority areas received less funding and longer delays; findings suggest procedural and distributive inequality, particularly among homeowners.
- Future research should investigate damage evaluations/assessments and variations in assumptions related to deferred maintenance as reasons for funding inequities. Additionally, research assessing relative loss and relative funding is needed to complete the picture.

Contributions of this study include:

- 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.
- Modeling the stage like structure captures outcomes of the distinct phases of the recovery assistance process.
- A single-event, multi-scale approach that contrasts broad state-level trends with those in a highly impacted local area.

Limitations:

- Racial and ethnic measures are based on tract compositions, and not household characteristics.
- Losses and funding are based on absolute dollar amounts versus relative assistance based on relative (%) damage and funding amounts.
- Highly dependent on secondary data with limited data on household and neighborhood characteristics as well as other assessment criteria.