U.S. Department of Housing and Urban Development
Office of Policy Development and Research

Housing Recovery in the Gulf Coast Phase I:

Results of Windshield Observations in Louisiana, Mississippi and Texas

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Prepared for:
U.S. Department of Housing and Urban Development
Office of Policy Development and Research

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December, 2010

Foreword

I am pleased to share this report from the Department of Housing and Urban Development, "Housing Recovery on the Gulf Coast, Phase I: Results of Windshield Observations in Louisiana, Mississippi, and Texas." The report presents findings from a windshield survey of a sample of 3,511 residential properties located on blocks severely affected by Hurricanes Katrina and Rita. This report is the first of two in a project that will provide insight into how HUD programs can help communities more effectively recover from disasters.

In recent years, Congress has frequently provided supplemental appropriations through HUD's Community Development Block Grant program (CDBG) to help communities recover from natural and man-made disasters. CDBG is a very flexible program, which allows CDBG Disaster Recovery Grants to address a wide range of challenges that communities face along the road to recovery. Disaster Recovery Grants have been used to help New York City recover from the September 11th attack on the World Trade Center, to help towns in the upper Midwest recover from severe flooding (in 1993, 1997 and 2008), and to help the Gulf Coast in the wake of the devastating hurricanes of 2005.

The first goal of this research effort was to document housing conditions in neighborhoods severely damaged by Hurricanes Katrina and Rita. We find that, as of early 2010, 74.6% of hurricane-damaged homes on significantly affected blocks are in good condition. While this indicates a high overall level of recovery, there are many neighborhoods with significant repair needs remaining or with a large number of lots that no longer have any structure at all. This study also explores factors that might have influenced some of this variation, including the receipt of CDBG assistance. We find that many CDBG-assisted properties have already been rebuilt, but others are part of longer-term recovery strategies such as demolition and land banking.

In the second phase of this research, HUD is administering a survey of the individuals who owned properties damaged by the hurricanes. We will find out what factors influenced the decisions that individuals made to either rebuild or to move on, to a new home or even a new town. We will also find out what resources were available to help with rebuilding, and how HUD's recovery grants helped. Finally, we hope to learn more about how different program design features can best help families recover and cities responsibly rebuild.

Raphael W. Bostic,
Assistant Secretary for Policy Development and Research

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Executive Summary

Abstract of Findings: This report presents the findings of a windshield survey of a sample of 3,511 residential properties located on blocks severely affected by Hurricanes Katrina and Rita. Overall, there were 312,463 such properties. As of when these data were gathered early in 2010, the report estimates that 74.6 percent of these properties were in good condition, 14.6 percent of the properties still had substantial repair needs, and 10.9 percent of the properties no longer contained a permanent residential structure. The report also explores factors related to rebuilding.

Between August 29 and October 24, 2005, Hurricanes Katrina, Rita, and Wilma caused massive devastation in the Gulf Coast region, damaging more than one million housing units across five states. In response to the widespread destruction caused by the hurricanes, Congress appropriated $19.7 billion in supplemental Community Development Block Grant (CDBG) program funds for Gulf Coast disaster recovery. The three states hardest hit by Hurricanes Katrina and Rita—Louisiana, Mississippi, and Texas—received 99 percent of the supplemental CDBG funds. They used the funds in large part to compensate property owners for their losses and to assist with rebuilding, through such programs as Road Home in Louisiana, the Mississippi Development Authority (MDA) Homeowners' Grant program in Mississippi, and the 1st and 2nd Supplemental Disaster Recovery Programs in Texas.

The purpose of this study, "Housing Recovery on the Gulf Coast: Results of Windshield Observations in Louisiana, Mississippi, and Texas," is to assess the state of housing recovery in the states hardest hit by Hurricanes Katrina and Rita—Louisiana, Mississippi, and Texas—and to examine the role of supplemental CDBG funds in supporting that recovery. The study's main research questions are:

1. What is the overall state of housing recovery in areas most affected by Hurricanes Katrina and Rita?
2. What factors have affected the extent of housing recovery?
3. What role have the CDBG-funded programs played in housing recovery?
4. How do housing outcomes and owner experiences differ by state and CDBG program model?

The study has three main data collection components:

- ***Windshield observations*** of a sample of hurricane-damaged properties in Louisiana, Mississippi, and Texas to provide estimates of housing recovery.
- Collection of ***administrative data*** from the CDBG programs in each of the three states.
- ***Telephone interviews*** with the people who owned these properties at the time of the 2005 hurricanes to discuss their decisions about whether or not to rebuild.

This report is the first of two reports that will be prepared for the study. It focuses on findings about housing conditions on the ground in early 2010, using data from the windshield observations and the

administrative data from the CDBG programs. A second report, presenting the results of the owner survey and summarizing the overall findings from the study, will be prepared in early 2011.

Sampling and Data Collection Approach

The findings in this report are based primarily on analysis of data from "windshield observations" conducted on a sample of 3,511 residential properties affected by Hurricanes Katrina and Rita. In January and February 2010, trained observers drove and walked around a sample of blocks in Louisiana, Mississippi, and Texas to assess the current condition of residential properties and the condition of infrastructure on the blocks. The observers used a structured observation guide and documented the housing repair needs, signs of occupancy, and signs of ongoing repair activity. All of the observations were conducted from the sidewalk or street and captured only those repair needs that could be seen from the outside (hence the term "windshield").

We selected the sample of 3,511 properties to be representative of all residential properties that were both assessed for damage by FEMA following the 2005 hurricanes and located on a "significantly affected block."[1] A significantly affected block (SAB) is a Census block on which three or more properties were assessed by FEMA as having suffered "major" or "severe" damage from the 2005 hurricanes. We sampled 230 blocks to represent all SABs across the three study states and all SABs in selected parishes, counties, and municipalities. For each block, we conducted windshield observations on all residential properties that experienced major or severe damage in 2005 (based on the FEMA assessment) and a sample of properties that experienced minor damage or no damage.

In analyzing the findings of the windshield observations, we weighted the observations to generate representative estimates for each of the three states and for 20 lower levels of geography (counties, parishes, municipalities, and planning districts). The resulting estimates presented in this report are representative of ***all residential properties assessed by FEMA following the 2005 hurricanes and located on significantly affected blocks*** in these areas. The estimates are *not* representative of all properties on significantly affected blocks or of all hurricane-damaged properties in general. However, 90 percent of the housing that suffered major or severe damage in 2005 was located on significantly affected blocks, which means that our estimates provide a good representation of housing recovery among those blocks and houses that were most affected by the hurricanes.

Study Findings

This report presents estimates (as of early 2010) of the repair needs of hurricane-affected properties, of their occupancy rates, and of their rebuilding activity. The report also examines how the receipt of CDBG awards, as well as neighborhood factors, are associated with different rates of rebuilding. The main findings on each of these topics are summarized below.

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[1] Properties were assessed for damage by FEMA following a request by the owner for FEMA assistance. Based on the FEMA assessments, the properties were determined to have severe, major, minor, or no damage. In this report, we assume that all properties assessed by FEMA were affected by the hurricanes, even if they received an assessment of no damage.

Estimates of Current Repair Needs of Hurricane-Affected Properties

Across the three states in the study (Louisiana, Mississippi, and Texas), 312,463 properties were assessed for damage by FEMA in 2005 and were located on a significantly affected block. Based on the data collected by windshield observation, we estimate that:

- ***10.8 percent of hurricane-affected properties on SABs did not contain a permanent residential structure as of early 2010***. In other words, the lot was empty or contained only temporary housing such as a FEMA trailer. Given that these properties contained housing that was assessed for damage in 2005, we can assume the housing was either destroyed by the hurricanes or demolished at some point since then.
- ***14.6 percent of hurricane-affected properties on SABs contained a residential structure with substantial repair needs as of early 2010***. Substantial repair needs means the property has at least one observable repair need and is not in excellent or good condition overall.
- ***74.6 percent of hurricane-affected properties on SABs contained a residential structure with no substantial repair needs.*** That is, about three-quarters of all affected properties in the most damaged areas are in good condition as of early 2010, based on windshield observation.

One important caveat to these findings is that the estimates of repair needs and overall condition are based only on what can be seen from the sidewalk or street. If a house had internal damage but no observable problems with its roof, windows or doors, or walls or foundation, it would likely be rated as having no substantial repair needs. Interior damage due to flooding and mold was a widespread problem, but remaining damage of this kind would not be observable from the sidewalk or street.

The extent to which properties contain no permanent residential structure or contain a structure with substantial repair needs varies, based on the level of hurricane damage assessed in 2005, the tenure of the property at the time of the hurricanes, and the location of the property:

- ***Properties that experienced "severe" damage in 2005 are more likely to have no residential structure or a residential structure with substantial repair needs as of 2010.*** We estimate that 20 percent of the properties with severe damage in 2005 (as assessed by FEMA) currently have no residential structure, and another 20 percent have a structure with substantial repair needs. By contrast, 11-12 percent of properties with major or minor damage in 2005 have no residential structure, and 6-7 percent of properties contain a structure with substantial repair needs.
- ***Properties that were owner-occupied in 2005 are significantly less likely to contain a residential structure with substantial repair needs in 2010*** than properties that were renter-occupied in 2005. Owner-occupied properties are as likely as renter-occupied properties to contain no residential structure at all.
- ***Some areas have much higher proportions of properties with no residential structure or with substantial repair needs than others.*** In Louisiana, the Lower Ninth Ward Planning District of New Orleans and adjoining St. Bernard Parish have the highest

percentages of properties without a residential structure. In Mississippi, Hancock County, Biloxi, and Waveland/Bay St. Louis are the areas most likely to have empty lots. Overall, Mississippi has the highest estimated percentage of properties without residential structures, but it has a relatively small share of structures with substantial repair needs. By contrast, Texas has a low percentage of properties with no residential structure, but about one-fourth of the existing structures have substantial repair needs. However, the prevalence of structures with substantial repair needs in Texas may reflect the extensive damage caused by Hurricane Ike in 2008.

Estimates of Occupancy of Hurricane-Affected Properties

We used data from the windshield observations and data from the U.S. Postal Service to estimate the occupancy of each of the properties in our sample as of early 2010. We found that:

- ***About 83 percent of properties overall, and 93 percent of properties with a standing residential structure, meet the US Census criteria for habitability.***
- ***Occupancy rates among the three states range from 78.0 to 82.6 percent based on windshield observation and from 82.3 percent to 89.1 percent based on USPS records.*** According to both data sources, Louisiana has the lowest occupancy rate (of properties assessed by FEMA in 2005 on SABs) and Texas the highest of these states.
- ***Properties that were owner-occupied in 2005 are significantly more likely to be occupied as of 2010 than properties that were renter-occupied.*** The 2010 occupancy rate for properties that were owner-occupied at the time of the hurricanes is 86.1 percent based on USPS records, compared to 77.3 percent for properties that were occupied by renters.
- ***Occupancy rates vary by the condition of the property.*** Occupancy is lower (vacancies are higher) among properties with substantial repair needs and properties that do not appear to be habitable. Nonetheless, the data suggest that a non-trivial number of households may be living in housing that has substantial repair needs or that does not meet the Census definition of habitability.

Estimates of Rebuilding of Hurricane-Affected Properties

We used two measures to analyze rebuilding activity among hurricane-affected properties:

- ***Observed rebuilding***, which captures ongoing construction activity visible in early 2010; and
- ***Inferred rebuilding***, which captures the percentage of properties that sustained major or severe damage in 2005 and that have residential structures with no substantial repair needs as of early 2010.

We observed very little active rebuilding on the properties in our sample. ***Based on the observations, we estimate that less than four percent of affected properties on SABs were actively under***

construction (for repair or rebuilding) in January-February 2010. At the same time, we infer from exterior observation that approximately 69.7 percent of properties that sustained major or severe damage have been "rebuilt" since 2005. The rate of rebuilding is higher among properties that were owner-occupied in 2005 (74.1 percent). It is highest (among the geographic areas) in Jefferson and St. Tammany Parishes (Louisiana) and Pascagoula (Mississippi). Three New Orleans Planning Districts—MidCity, Lower Ninth Ward, and ByWater—as well as Biloxi, Mississippi—have inferred rebuilding rates of less than 50 percent, meaning that at least half the properties assessed with major or severe damage in 2005 still have substantial repair needs.

Repair Needs and Rebuilding by Block and Neighborhood

To understand the extent to which remaining damage to the housing stock may be concentrated within particular neighborhoods, we analyzed the distribution of properties with remaining repair needs by block. We found that:

- ***Many blocks are substantially rebuilt.*** More than half of the sampled blocks (59 percent) have two or fewer properties with substantial repair needs.
- ***Properties with remaining repair needs are clustered geographically.*** A small number of blocks show remaining repair needs affecting more than half of the properties.
- ***Concentrated repair needs are clustered in neighborhoods with fewer resources***, as indicated by lower home values, lower incomes, and lower rates of occupancy and homeownership (according to the 2000 Census).
- After controlling for neighborhood income and initial damage to the property, ***higher proportions of both black and Hispanic residents in a block group as of 2000 are associated with an increased likelihood that a property is rebuilt as of 2010.***

We also considered the extent of infrastructure damage on significantly affected blocks. As of early 2010, based on windshield observation, ***38 percent of significantly affected blocks in Louisiana, Mississippi, and Texas show infrastructure damage***, and 6 percent of SABs show infrastructure repair activity.

Repair Needs, Rebuilding, and CDBG

Using administrative data obtained from the state CDBG programs, we analyzed the extent to which properties in the study sample received CDBG awards and the amount of those awards in relation to the estimated damage to the property. We found that:

- ***The estimated rate of CDBG receipt among owner-occupied properties on SABs is 58.6 percent for Louisiana and 57.1 percent for Mississippi***. The estimated rate of CDBG receipt among renter-occupied properties is much lower: 11.6 percent for Louisiana and 0.8 percent for Mississippi. In Texas, only one of the properties in the study sample received a CDBG award, so we were not able to develop estimates for the state.
- ***The damage amounts used to calculate CDBG awards for homeowners are substantially higher for Louisiana recipients than for Mississippi recipients.*** The median damage amount for CDBG recipients in Louisiana, based on administrative data

for properties in the study sample, is $170,289, compared to $92,938 for Mississippi. The difference in damage amounts likely reflects a combination of greater severity of damage in Louisiana and differences in the method of estimating damage for the purposes of calculating the grant award.

- ***The difference in CDBG award amounts between Louisiana and Mississippi is not as great as the difference in estimated damage amounts.*** Based on administrative data matched to the study sample, the median award amount in Louisiana for homeowners is about $2,000 lower than in Mississippi ($65,000 compared to $66,750). Also, the range in award amounts is wider in Louisiana. However, the total award amount was capped at $150,000 in both states.
- ***CDBG awards in Mississippi are larger relative to the estimated damage than CDBG awards in Louisiana.*** In Mississippi, 33 percent of the CDBG awards made to homeowners with major or severe damage were equal to at least 80 percent of the estimated damage to the property. This compares to 14 percent of awards in Louisiana.
- ***Homeowners that received CDBG awards in Mississippi had more total assistance relative to the damage to their property than their counterparts in Louisiana.*** The total assistance amount is the CDBG grant amount (excluding the elevation grant amount, as this was not directly linked to damage), plus private insurance (including home insurance, flood insurance, and wind insurance), plus FEMA assistance. For 66 percent of CDBG recipients in Mississippi, the total amount of assistance equaled 100 percent of the assessed damage to the property. This compares to just 35 percent of CDBG recipients in Louisiana, suggesting that owners in Mississippi had more resources with which to rebuild than owners in Louisiana.

In addition to analyzing rates of CDBG receipt and award amounts, we compared the rebuilding status and occupancy as of early 2010 for properties whose owners received CDBG awards to properties whose owners did not receive CDBG awards. This analysis was limited to properties in Louisiana and Mississippi that were owner-occupied at the time of the hurricanes, experienced major or severe hurricane damage, and were located on SABs. We found that:

- A simple comparison of the rebuilding status of CDBG-recipient properties to non-recipient properties finds that ***CDBG-recipient properties are more likely to be rebuilt and reoccupied as of 2010 than non-recipient properties, but this difference is not statistically significant.***
- ***When we adjust for differences across counties and in neighborhood characteristics, CDBG recipients show significantly greater rebuilding, habitability, and occupancy than non-recipients.*** The exception is the set of properties that received grant awards through Options 2 and 3 of the Road Home program in Louisiana. These properties—which were sold by their owners to the Louisiana Land Trust rather than the owners returning to rebuild them—show notably lower levels of rebuilding, habitability, and occupancy.
- ***Excluding properties that received grant awards through Options 2 and 3 of the Road Home program, properties with CDBG grants are nearly twice as likely to be rebuilt***

and about twice as likely to be habitable in early 2010 as properties without CDBG grants.

Lastly, we analyzed the relationship between the total amount of assistance received (from CDBG, FEMA, and private insurance) relative to the estimated damage and the likelihood that a property is rebuilt, habitable, and occupied as of early 2010. The analysis is not conclusive. Properties where the total amount of assistance is 100 percent of the damage estimate show consistently higher levels of rebuilding, habitability, and occupancy. However, these comparisons only occasionally show differences that are statistically significant. The telephone survey will provide more complete information on the sources of funding used by all property owners and thus will allow us to present more definitive analyses on the effect of the amount of assistance relative to damage on rebuilding and re-occupancy decisions.

Next Steps

The findings presented in this report provide several measures of housing recovery in the most affected parts of three Gulf States since the 2005 hurricanes. They also provide some insight into the neighborhood-level patterns of damage and recovery and the relationship between the CDBG program and rebuilding.

However, they do not tell us about the full range of possible factors that affect individual rebuilding decisions. The next step in the study will be to interview owners as of 2005 of properties on significantly affected blocks, to learn about owners' rebuilding decisions and their current housing situations. Through these interviews, we will also learn more about the remaining damage to hurricane-affected properties, taking into account repair needs inside the house as well as outside. We also will be able to assess the extent to which the repair needs observed in the windshield observations may be due to subsequent storm damage (for example, from Hurricane Ike, which caused substantial damage in Texas in 2008) or deferred maintenance, rather than damage remaining from Hurricanes Katrina and Rita. Finally, the next stage of the study will provide an opportunity to analyze further the neighborhood patterns of CDBG funding for housing recovery, as well as how the availability of CDBG grants for homeowners and owners of small rental properties affected property owners' decisions about whether or not to rebuild.

1. Introduction

Between August 29 and October 24, 2005, Hurricanes Katrina, Rita, and Wilma caused massive devastation in the Gulf Coast region, damaging more than one million housing units across five states. Damage from Hurricane Katrina was concentrated in Louisiana, Mississippi, and Alabama, while Hurricane Rita affected mainly east Texas and western Louisiana, and Hurricane Wilma most affected Florida.

In response to the widespread destruction caused by the hurricanes, Congress appropriated $19.7 billion in supplemental Community Development Block Grant (CDBG) program funds for Gulf Coast disaster recovery. Created in 1974, CDBG is one of the oldest programs administered by the Department of Housing and Urban Development (HUD), providing funding to states, cities, and counties nationwide to support neighborhood revitalization, housing rehabilitation, and economic development. With its network of state and municipal grantees and sub-grantees, CDBG offers a convenient way for the federal government to disburse large amounts of funds to local areas in the wake of large-scale disasters.

All five states affected by the 2005 hurricanes received supplemental CDBG disaster recovery funds, but 99 percent of the funds went to Louisiana, Mississippi, and Texas. Congress and HUD gave the states considerable flexibility in determining how to use their CDBG disaster recovery funds, even beyond the flexibility afforded by the regular CDBG program. Louisiana, Mississippi, and Texas designated a majority of their funding for housing recovery, mostly to help homeowners rebuild or repair their homes.

The purpose of this study is to evaluate the role that CDBG disaster recovery funding has played in housing recovery in ***Louisiana***, ***Mississippi***, and ***Texas***, and to identify the factors affecting owners' willingness and ability to rebuild or repair their storm-damaged properties. The study focuses on recovery from ***Hurricanes Katrina*** and ***Rita***, while recognizing that Hurricanes Ike and Gustav in 2008 created substantial further housing damage, especially Hurricane Ike in Texas. The results of the study will help HUD use current allocations of CDBG disaster recovery funds to make better progress on Katrina and Rita rebuilding efforts during fiscal year 2011-2012. The study findings also will help the federal government respond more effectively to future disasters.

The study has two main components: windshield observations of a sample of storm-damaged properties in Louisiana, Mississippi, and Texas to assess their current condition, and telephone interviews with the people who owned these properties at the time of the 2005 hurricanes to discuss their decisions about whether or not to rebuild. The study also draws on administrative data from the CDBG disaster recovery programs in each of the three states.

This report is the first of two reports that will be prepared for the study. It focuses on the findings from the windshield observations and provides preliminary analysis of the administrative data. The second report, detailing the results of the owner survey and further analyzing the administrative data, will be prepared in early 2011.

This chapter provides background on the housing damage experienced by Louisiana, Mississippi, and Texas from Hurricanes Katrina and Rita, and on the use of the supplemental CDBG disaster recovery funds in those states. It also introduces the research questions addressed by the study.

1.1 Damage from the 2005 Hurricanes

Hurricanes Katrina and Rita caused widespread destruction of housing and infrastructure in the three the states that are the focus of this study—Louisiana, Mississippi, and Texas. Between August 2005 and February 2006, the Federal Emergency Management Agency (FEMA) conducted damage assessments on all housing units whose occupants registered for FEMA housing assistance after the hurricanes.[2] HUD used the results of the FEMA assessments, largely based on direct inspection by FEMA contract inspectors, to create three categories of hurricane damage: minor, major, and severe. Although the criteria for categorization are somewhat more complex, "minor" implies assessed damage of less than $5,200, "major" implies assessed damage of at least $5,200 but less than $30,000, and "severe" implies assessed damage of $30,000 or more.[3]

HUD's analysis of the FEMA damage assessment data suggests that 875,543 housing units across Louisiana, Mississippi, and Texas suffered some type of damage from the 2005 hurricanes. The damage was most widespread in Louisiana and Mississippi. Fifty-nine percent of the damaged units were in Louisiana, 25 percent were in Mississippi, and 16 percent were in Texas. Moreover, about a third of all occupied housing units in Louisiana and 21 percent in Mississippi suffered damage. The 2005 hurricanes affected a much smaller share of homes in Texas, with only 2 percent of occupied housing units across the state suffering damage.

In addition to having the largest number of units affected by the storms, Louisiana also suffered the most severe damage. As shown in Exhibit 1-1, 40 percent of the damaged units in Louisiana were in the "major" or "severe" damage categories, compared to 28 percent in Mississippi and 9 percent in Texas. Within the three states, damage from the storms was concentrated geographically. In Louisiana, 89 percent of the homes that suffered major or severe damage were located in Orleans Parish (which includes New Orleans) or in one of the four parishes that border Orleans Parish. In Mississippi, damage was most extensive in the three coastal counties: Jackson, Harrison, and Hancock. Damage in Texas was concentrated in the eastern part of the state, with 90 percent of the units with major or severe damage located in eight counties near the Louisiana border.

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[2] FEMA disaster housing assistance can be used to help pay for temporary housing, repairs to the damaged housing, or the purchase or construction of new housing. Other sources of funding for housing recovery include private insurance, Small Business Administration Disaster Loans, and the housing recovery programs funded by the supplemental CDBG disaster recovery funds.

[3] U.S. Department of Housing and Urban Development, "Current Housing Unit Damage Estimates, Hurricanes Katrina, Rita, and Wilma," February 12, 2006.

Exhibit 1-1. Housing Unit Damage Estimates by State

Level of Damage	Louisiana	Mississippi	Texas	Overall
Minor	310,512 (60%)	158,998 (72%)	127,807 (91%)	597,317 (68%)
Major	98,086 (19%)	45,776 (21%)	10,523 (8%)	154,385 (18%)
Severe	106,651 (21%)	15,610 (7%)	1,580 (1%)	123,841 (14%)
Total Assessed Units	**515,249**	**220,384**	**139,910**	**875,543**

Source: HUD, "Current Housing Unit Damage Estimates," February 12, 2006.

The worst damage from the 2005 hurricanes occurred from flooding—including both storm surges and high water. Storm surges cause structural damage, while rising water takes its toll on the interior of the structure (including the electrical, plumbing, and heating and ventilation systems) and creates problems with mold. The other major type of hurricane damage comes from wind. Hurricane winds (and the debris they pick up) can destroy poorly-constructed housing and mobile homes and severely damage the roof, windows, and walls of sturdier homes.

Exhibit 1-2 describes the prevalence and severity of flood damage across the three states in the study. The top part of the table shows the percent of *all* damaged units—including those assessed as having minor damage—that suffered flood damage. (Units with flood damage could also have suffered wind damage.) Just over one-third of all damaged units in Louisiana and one-fifth of all damaged units in Mississippi had flood damage, compared to only one percent in Texas. A substantial share of the flood-damaged units—23 percent in Louisiana, 67 percent in Mississippi, and 88 percent in Texas—were located outside of FEMA-designated 100-year flood plains.[4] Many owners in these areas did not carry flood insurance, making it much more difficult to finance repairs or rebuilding.

The bottom part of Exhibit 1-2 shows the prevalence of flood damage among only those housing units that suffered major or severe damage, according to the FEMA assessments. These data show that although flood damage was less common overall than wind damage, housing units in Louisiana and Mississippi that had flood damage (with or without wind damage) generally were more severely affected than units that had wind damage alone. In Louisiana, although only 37 percent of damaged units overall had flooding, 82 percent of units with major or severe damage had flooding. In Mississippi, 67 percent of units with major or severe damage had flooding. In Texas, the situation was different: the most serious damage was caused not by flooding but by wind. Only 5 percent of the units with major or severe storm damage in Texas had flood damage.

[4] The 100-year flood plain is the area that would be expected to be inundated only in very extreme floods (happening approximately once every 100 years, or with a probability of 1 percent in any year).

Exhibit 1-2. Prevalence and Severity of Flood Damage

	Louisiana	Mississippi	Texas
All Damage Levels:			
Housing Units with Flood Damage	191,297 (37%)	45,718 (21%)	1,274 (1%)
Housing Units with No Flood Damage (Typically Wind)	323,952 (63%)	174,666 (79%)	138,636 (99%)
All Damaged Housing Units	515,249 (100%)	220,384 (100%)	139,910 (100%)
Major/Severe Damage:			
Housing Units with Flood Damage	168,813 (82%)	41,110 (67%)	585 (5%)
Housing Units with No Flood Damage (Typically Wind)	35,924 (18%)	20,276 (33%)	11,518 (95%)
All Major/Severe Damaged Housing Units	204,737 (100%)	61,386 (100%)	12,103 (100%)

Source: HUD, "Current Housing Unit Damage Estimates," February 12, 2006.

1.2 Supplemental CDBG Funds for Housing Recovery

This study focuses on the use of supplemental CDBG funding for housing recovery. Between 2005 and 2008, Congress appropriated $19.7 billion in supplemental CDBG funds for disaster recovery in the states affected by Hurricanes Katrina, Rita, and Wilma. The purpose of the funding was to support disaster relief, long-term recovery, and restoration of infrastructure in the most affected and distressed areas. HUD allocated the funds to the states based primarily on the number of housing units in the state that sustained major or severe damage, using the FEMA assessments. As a result, Louisiana received the largest share of CDBG funds, $13.4 billion, followed by Mississippi ($5.5 billion), and Texas ($503 million). (Florida received $183 million and Alabama received $95 million).

Congress authorized the supplemental CDBG funds in three separate appropriations, in December 2005, June 2006, and November 2007. As shown in Exhibit 1-3, Louisiana received funds from all three appropriations, while Mississippi and Texas received funds from the first two.

Exhibit 1-3. Supplemental CDBG Funding for Disaster Recovery ($ millions)

	Supplemental CDBG Funds for Gulf Coast Recovery ($ millions)			
	Dec 2005	June 2006	Nov 2007	Total
Louisiana	$6,210	$4,200	$3,000	$13,410 (68%)
Mississippi	$5,058	$423	$0	$5,481 (28%)
Texas	$75	$429	$0	$504 (3%)
Florida	$83	$100	$0	$183 (1%)
Alabama	$74	$21	$0	$95 (<1%)
Total	**$11,343**	**$5,052**	**$3,000**	**$19,673**

Source: HUD, "Current Housing Unit Damage Estimates," February 12, 2006, and GAO, "Gulf Coast Disaster Recovery: Community Development Block Grant Guidance Needs to be Improved," June 2009.

Congress gave the states considerable flexibility in determining how to use the supplemental CDBG funds and how much oversight to provide to sub-recipients. All three states in the study designated a majority of their supplemental CDBG funds to housing recovery (86 percent in Louisiana, 74 percent in Texas, and 72 percent in Mississippi), for a total of nearly $16 billion across the three states.[5]

Most of supplemental CDBG funding targeted to housing recovery has been used to assist homeowners. The homeowner assistance programs generally take the form of grants for underinsured homeowners: people who do not qualify for other sources of funding or for whom the cost of repairs exceeds the amount available from other sources. Other sources of funding for housing repair/rebuilding include private hazard or flood insurance, Federal Emergency Management Agency (FEMA) grants, and Small Business Administration (SBA) loans.

Exhibit 1-4 provides information on the number of homeowners assisted through the CDBG homeowner programs in each state and the average award amount, based on administrative data provided to HUD by the state CDBG programs in March 2010. Comparing the total number of awards to date, Louisiana's homeowner program is more than four times the size of Mississippi's program, and Texas's program is very small relative to the other two states. The median grant award, however, is largest in Texas: $74,800 compared to $68,507 in Mississippi and $48,773 in Louisiana.

Exhibit 1-4. CDBG Homeowner Program Awards

	Louisiana	Mississippi	Texas
Total Number of Awards	124,516	25,086	1,499
Total Amount Awarded (in millions)	$7,537	$1,847	$111
25th Percentile Award Amount	$21,042	$41,997	$64,978
50th Percentile (Median) Award Amount	$48,773	$68,507	$74,800
75th Percentile Award Amount	$97,413	$100,000	$84,500

Source: CDBG administrative data, March 2010.

Note: The sample includes 40 CDBG awards in Louisiana and 16 properties in Mississippi with observed award amounts in excess of $150,000, the maximum award amount. Exclusion of these grants reduces the 25th, 50th, and 75th percentile award amounts by less than $100 in all cases.

The median award amount is highest in Texas because in that state CDBG funds have mainly been used for new construction. In Texas, homeowners do not receive CDBG grants directly. Instead, the program assesses the hurricane damage and determines whether it can be addressed through rehabilitation work or whether the structure needs to be completely rebuilt. The program then hires contractors to do the rehabilitation or new construction on the owner's behalf. Most grants have been used for building new houses rather than making repairs.

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5 GAO, "Gulf Coast Disaster Recovery: Community Development Block Grant Guidance Needs to be Improved," June 2009; CDBG Summary Points, March 5 2010 (www.msdisasterrecovery.com); 1st Supplemental CDBG Disaster Recovery Funding, Oct 1, 2009 through Dec 31, 2009 Performance Report (www.tdhca.state.tx.us/cdbg); 2nd Supplemental CDBG Disaster Recovery Funding, "Oct 1, 2009 through Dec 31, 2009 Performance Report" (www.tdhca.state.tx.us/cdb).

In Louisiana and Mississippi, the programs are structured differently. Homeowners receive a one-time payment designed to pay the difference between the estimated cost of damage to the home (or in some cases, the cost to rebuild the home) and what the homeowner has received from other sources. Unlike in Texas, the Louisiana and Mississippi homeowners receive the grants directly and are not required to use the grants for rebuilding or repair.

As observed in Exhibit 1-4, Louisiana and Mississippi show a wider range in grant award amounts than Texas. The wider range in grant award amounts suggests a wider range in damage amounts and/or more variance in the estimated cost to repair or rebuild. Also, in Mississippi, properties that suffered wind but not flood damage were not eligible to received CDBG awards. More detailed information on the CDBG homeowner programs in Louisiana and Mississippi is provided in Chapter 5 as part of the analysis of the relationship between the CDBG program and patterns of rebuilding observed in those states.

In addition to the CDBG homeowner programs, Louisiana and Mississippi have CDBG-funded programs targeted to owners of small rental properties (properties with fewer than five rental units) damaged by the hurricanes. Texas does not have such a program. The Small Rental Property Programs in Louisiana and Mississippi provide forgivable loans to owners of rental properties targeted to low- and moderate-income renters. The receipt of funds by owners of rental properties is contingent on repairs being made to the property.

Exhibit 1-5 shows the number of awards and average award amounts for the CDBG Small Rental Property Programs in Louisiana and Mississippi. These programs are much smaller than the homeowner programs; thus far, fewer than 10,000 owners have received awards across both states. This does not mean that rental properties were not affected by the storms. Across the two states, about 103,000 of the 266,000 housing units with major or severe damage were occupied by renters.[6] The CDBG Small Rental Property Programs have been implemented more slowly than the homeowner programs and thus far have reached a smaller share of affected owners.

Exhibit 1-5. CDBG Small Rental Program Awards

	Louisiana	Mississippi
Total Number of Awardees	4,449*	2,149
Total Amount Awarded (in millions)	$362.6*	$95.3
Average Award Amount	$81,509*	$44,353

Source: CDBG administrative data, March 2010; Road Home Small Rental Property Program Incentive Operations Status Report March 8, 2010 (Louisiana).

*Based on commitment letters.

[6] This includes rental properties with five or more units. HUD, "Current Housing Unit Damage Estimates," February 12, 2006.

1.3 Study Research Questions

This study seeks to answer four main research questions related to housing recovery from the 2005 hurricanes:

1. What is the overall state of housing recovery in areas most affected by Hurricanes Katrina and Rita?
2. What factors have affected the extent of housing recovery?
3. What role have the CDBG-funded homeowner and small rental property programs played in housing recovery?
4. How do housing outcomes and owner experiences differ by state and CDBG program model?

Our approach to answering these questions is to analyze in detail the current housing conditions on a representative sample of blocks that sustained significant damage from Hurricanes Katrina and Rita. Based on windshield observations of the external condition of properties on these blocks, as well as a telephone survey of the owners of these properties at the time of the hurricanes, we will try to understand the extent to which properties damaged in the storms have been rebuilt and the factors that affect rates of rebuilding at the property and block level.

The approach to selecting the sample of blocks and conducting the windshield observations is described in detail in Chapter 2. To summarize, we selected 230 blocks across the three states and 20 lower levels of geography (counties, parishes, municipalities, and planning districts) to represent the universe of housing units damaged by the storms and located on significantly affected blocks. From this sample of 230 blocks, we used a dataset provided by HUD to identify all residential properties on the blocks that had sustained "minor," "major," or "severe" damage from the storms according to the FEMA assessments. We then conducted windshield observations on a sample of 3,736 of these properties to describe their exterior condition (as visible from the street) as of January 2010.

This report describes the findings of the windshield observations. In the next phase of the study, we will conduct telephone interviews with the 2005 owners of a sample of the properties on which we conducted windshield observations. The main purpose of the interviews will be to understand the factors that influenced owners' decisions about whether to rebuild or not, including the availability of financial or rebuilding assistance through CDBG-funded programs.

In order to answer all four of the study's main research questions, we need the results of both the windshield observations and the owner interviews. Since this report only covers the windshield observations, it primarily addresses research questions 1 and 2. Exhibit 1-6 lists the research questions and areas of inquiry for the study and indicates which will be covered in this interim report and which in the final report. This interim report provides information on the ***overall state of housing recovery*** (Chapter 3), ***block and neighborhood patterns of recovery*** (Chapter 4), and the ***relationship between observed patterns of rebuilding and CDBG disaster assistance*** (Chapter 5). The final report will include further analysis of the role of CDBG disaster assistance in housing recovery and of the individual factors affecting owners' decisions about whether or not to rebuild.

Exhibit 1-6. Study Research Questions Addressed in Interim Report

Areas of Inquiry	Evidence Provided in Interim Report	Chapter
Research Question 1: What is the overall state of housing recovery in areas most affected by Hurricane Katrina and Hurricane Rita?		
What is the state of the housing stock as of early 2010 in areas that sustained significant storm damage in 2005?	– Estimates of exterior condition of the properties based on windshield observations. – Estimates of inferred rebuilding based on comparison of the external condition of the property in 2010 to the damage assessed by FEMA in 2005. – *Final report will include additional estimates based on the repair activity reported by property owners*	3
How does the current state of the housing stock vary among areas that sustained significant storm damage?	– Distribution of current damage, overall condition, habitability, and rebuilding activity by the intensity of initial damage to the block *Final report will update the estimates based on windshield observations with self-reported information provided by property owners.*	4
To what extent is the housing stock in significantly affected areas occupied?	Estimates of occupancy based on windshield observation and US Postal Service records.	3
Research Question 2: What factors have affected the overall pace of housing recovery?		
What property-level characteristics are associated with repair/rebuilding?	*To be addressed in final report.*	*N/A*
What owner characteristics are associated with repair/rebuilding?	*To be addressed in final report.*	*N/A*
What is the current condition of state-owned properties in Louisiana?	Windshield observation of exterior condition of properties owned by Louisiana Land Trust (LLT). Information on current status of LLT-owned properties provided by LLT.	5
What neighborhood characteristics are associated with repair/rebuilding of individual properties?	Housing conditions, occupancy, and repair by: – Block group characteristics – 2000 Census. – Extent of storm damage on the block.	4
What jurisdictional characteristics are associated with repair/rebuilding of individual properties and with the extent of housing recovery in significantly affected areas?	*To be addressed in final report.*	*N/A*
Research Question 3: What role has CDBG disaster assistance played in housing recovery?		
How have states allocated their CDBG funds?	Summary data on CDBG Homeowner and Small Rental Property Programs.	5
To what extent is repair/rebuilding in significantly affected areas financed by CDBG recovery grants?	Percentage of properties in sample blocks that received CDBG grants.	5
Why did some storm-damaged properties not receive CDBG grants?	*To be addressed in final report.*	*N/A*
What barriers do owners face in accessing funds for rebuilding?	*To be addressed in final report.*	*N/A*

Areas of Inquiry	Evidence Provided in Interim Report	Chapter
What other sources of funds have been used for repair/rebuilding sampled properties?	*To be addressed in final report.*	*N/A*
What factors affect whether owners have used CDBG funds to repair or rebuild?	*To be addressed in final report.*	*N/A*
What obstacles do owners of properties in LA and MS face in getting repairs made?	*To be addressed in final report.*	*N/A*
How have concentrations of CDBG funding affected the likelihood that a property will be repaired or rebuilt?	Summary data of the extent to which CDBG grants are clustered on some blocks. Distribution of current housing conditions across blocks with and without concentrations of CDBG grants.	5
How have CDBG recipients used their grants other than for repairing/rebuilding significantly affected areas?	*To be addressed in final report.*	*N/A*
Where do CDBG recipients who have not repaired/rebuilt in the significantly affected area plan to live permanently?	*To be addressed in final report.*	*N/A*
What is the housing and neighborhood quality of CDBG recipients who have not repaired or rebuilt?	*To be addressed in final report.*	*N/A*
Research Question 4: How do housing outcomes and owner experiences differ based on state CDBG program requirements and the model of providing assistance?		
Are meaningful comparisons of program models possible by state or by owner type?	*To be addressed in final report.*	*N/A*
Is the extent of rebuilding associated with program model or specific program requirements?	*To be addressed in final report.*	*N/A*
Do the factors affecting CDBG fund receipt and/or the decision to rebuild differ by program model or program requirements?	*To be addressed in final report.*	*N/A*
Do the obstacles to CDBG receipt and/or rebuilding differ by program type?	*To be addressed in final report.*	*N/A*
How does recipients' use of CDBG funds for non-repair purposes differ by program type?	*To be addressed in final report.*	*N/A*

1.4 Organization of the Report

The remainder of this report is organized as follows:

- **Chapter 2** discusses the approach to selecting the blocks and properties for windshield observation and the procedures for conducting the observations. The chapter also describes the characteristics of the selected blocks and properties.
- **Chapter 3** presents estimates of repair needs, habitability, and occupancy of hurricane-affected properties as of early 2010 based on the results of the windshield observations. The chapter also includes estimates of rebuilding of hurricane-affected properties and a discussion of properties in the observation sample owned by the Louisiana Land Trust.
- **Chapter 4** analyses the geographic patterns of housing damage and rebuilding and examines how neighborhood characteristics may affect the pace and extent of rebuilding.
- **Chapter 5** discusses the relationship between the receipt of CDBG awards in the years following hurricanes Katrina and Rita and the rebuilding and repair status of properties observed in early 2010.

The report has four appendices. Appendix A provides copies of the property-level and block-level instruments used to conduct the windshield observations. Appendix B provides maps of the sampled blocks in each state that show the distribution of these blocks in the areas most affected by the 2005 hurricanes. Appendix C provides supplemental property-level estimates of repair needs and rebuilding. Appendix D provides supplemental analysis of neighborhoods with concentrated repair needs.

2. Approach to Sample Selection and Data Collection

The main objective of the windshield observations was to provide statistically reliable information on the state of housing recovery in the three states most affected by Hurricanes Katrina and Rita—Louisiana, Mississippi, and Texas. HUD recommended a study design that would provide representative estimates of housing recovery for the three states overall, for each state individually, and for 20 smaller geographic areas, using "significantly affected blocks" as the unit of analysis.

HUD developed the concept of significantly affected blocks based on its analysis of FEMA damage estimates to identify those areas that were substantially affected. A significantly affected block (SAB) is a Census block on which three or more housing units sustained "major" or "severe" damage according to the FEMA damage assessments described in Chapter 1. Census blocks are areas that are typically bounded by visible features such as streets, bodies of water, or railroad tracks, but can also be bounded by less visible boundaries such as city or county limits or individual property lines.[7] In urban areas, Census blocks generally correspond to standard city blocks. In suburban and rural areas, however, Census blocks may be irregular in shape and much larger, in some cases covering several square miles. Exhibit 2-1 provides examples of Census block boundaries. In each of these maps, the Census block is the area inside the yellow boundary line.

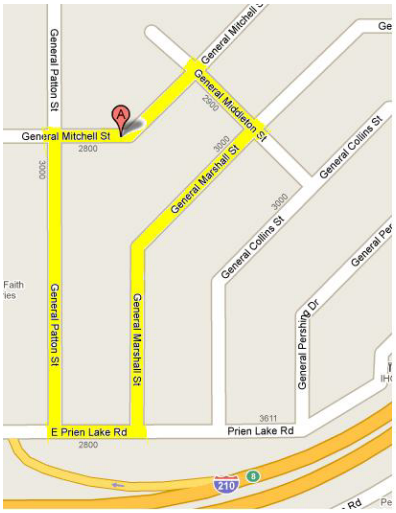
Significantly Affected Blocks

A significantly affected block (SAB) is a Census block on which 3 or more housing units sustained major or severe damage from the 2005 hurricanes based on FEMA's assessment.

The study design called for selecting a representative sample of 230 SABs and conducting windshield observations on a total of 3,736 properties. Selecting the sample of properties for observation entailed a two-step process: selecting the sample of blocks and selecting the sample of properties. Each step in the sampling process is described below, followed by a discussion of representativeness and sampling weights. The chapter ends by describing the location and characteristics of the sample of 230 blocks.

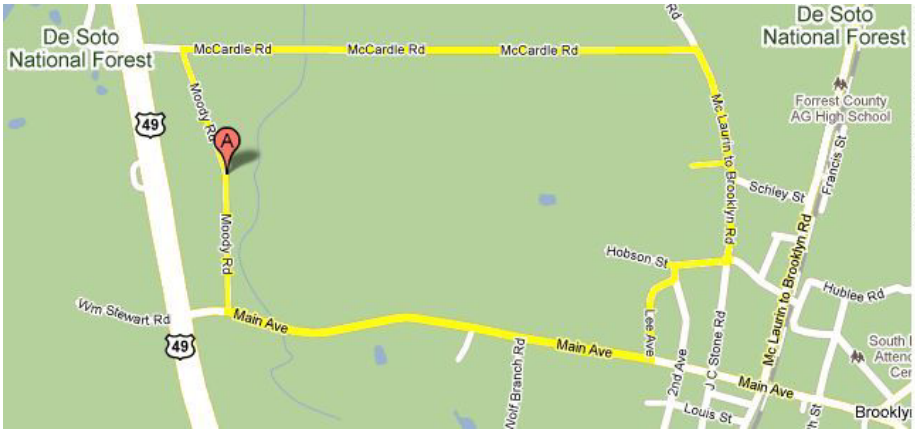
[7] http://www.census.gov/geo/www/geo_defn.html#CensusBlock.

Exhibit 2-1. Examples of Census Block Boundaries



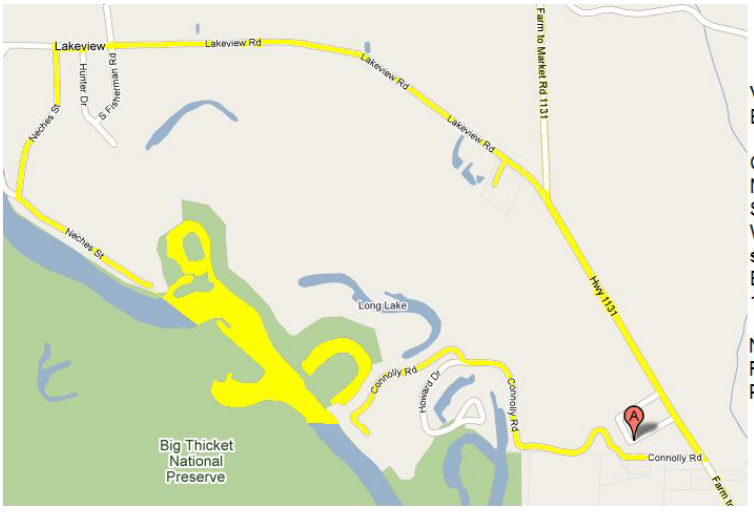
Lake Charles, LA 70615
Block: 1018

County/Parish: Calcasieu Parish
North Boundary: General Middleton Street
South Boundary: E Prien Lake Road
West Boundaries: General Patton Street and General Mitchell Street
East Boundary: General Marshall Street



Brooklyn, MS 39425
Block: 3093

County/Parish: Forrest County
North Boundary: McCardle Road
South Boundaries: Main Avenue and Hobson Street
West Boundary: Moody Road
East Boundaries: JC Stone Road (Old Highway 49 W) and Lee Avenue



Vidor, TX 77662
Block: 3004

County/Parish: Orange County
North Boundary: Lakeview Road
South Boundary: Connolly Road
West Boundaries: Neches Street, Neches River shoreline
East Boundary: Farm to Market Road 1131/Highway 1131

Note: The area inside Hunter Drive and S Fisherman Road as well as the area inside Apple Pie Ridge Road is not included in the block.

2.1 Selecting the Sample of Blocks

The study design is intended to provide statistically reliable information for the 3 states in the study and for 20 smaller geographic areas of interest to policy makers. The 20 geographic areas include 6 parishes and 7 planning districts in Louisiana and three counties and 5 municipalities in Mississippi.[8] The first column of Exhibit 2-2 shows the distribution of significantly affected blocks across the three states and 20 geographic areas.[9] Overall, there are 15,399 SABs across the three states. Nearly three-quarters (71 percent) of all the SABs are in Louisiana, 24 percent are in Mississippi, and 5 percent are in Texas.

In order to produce reliable estimates for each geographic area, we selected a stratified sample using the geographic areas as the strata. The first step was to allocate the total sample of 230 blocks to each stratum in proportion to the total number of SABs in the stratum. We then increased the sample of blocks to 10 for any stratum for which the sample size based on proportional allocation would have been less than 10. This was because we determined that it was important for statistical reliability to have at least 10 blocks in each stratum or geographic area. After increasing the sample sizes for those strata that had less than 10 blocks, we reduced the sample sizes across the remaining strata to maintain the total sample size of 230 blocks.

Within each stratum, the blocks were sampled with equal probability—that is, any given block in the geographic area had as much chance of being selected for the sample as any other block. This creates an unbiased sample, but one in which the confidence intervals around the estimates are slightly higher than they would have been had we been able to sample based on the number of properties or housing units in each block. This could not be done with the information available from the HUD dataset of storm-damaged housing units.

The second column of Exhibit 2-2 shows the distribution of the sampled blocks across the geographic areas. The sample of blocks roughly corresponds to the distribution of all SABs across the areas. The distribution of sample blocks differs somewhat from the overall distribution because (as described above) we allocated additional blocks to the smaller areas to ensure at least 10 blocks in each geographic area. The maps in Appendix B show the location of the sampled blocks in each state relative to all significantly affected blocks in the state. A separate map shows the distribution of sampled blocks in Orleans Parish, which has the largest number of blocks for a single parish or county.

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[8] Calcasieu Parish and Cameron Parish in Louisiana were treated as one geographic area for the purpose of developing estimates of housing recovery.

[9] We also sampled blocks from six other areas in order to develop the state, county, and parish estimates. These other areas are shown in italics in Exhibit 2-2.

Exhibit 2-2. Allocation of the Total Sample of Significantly Affected Blocks to Strata

Sampling Stratum	Total Blocks N (%)	Sample Blocks N (%)	# Properties on Sample Blocks N (%)
Louisiana	**10,960 (71)**	**150 (65)**	**3,036 (63)**
Calcasieu and Cameron Parishes	649 (4)	10 (4)	185 (4)
Jefferson Parish	2,297 (15)	27 (12)	551 (11)
Orleans Parish	5,292 (34)	80 (35)	1,485 (31)
MidCity Planning District	989 (6)	12 (5)	192 (4)
Lakeview Planning District	461 (3)	10 (4)	167 (3)
Gentilly Planning District	657 (4)	10 (4)	243 (5)
ByWater Planning District	595 (4)	10 (4)	192 (4)
Lower Ninth Ward Planning District	393 (3)	10 (4)	170 (4)
New Orleans East Planning District	718 (5)	10 (4)	221 (5)
Uptown Planning District	760 (5)	10 (4)	149 (3)
Other Orleans Parish[a]	719 (5)	8 (3)	151 (3)
St. Bernard Parish	744 (5)	10 (4)	323 (7)
St. Tammany Parish	1,123 (7)	13 (6)	302 (6)
Other Louisiana Parishes[a]	855 (6)	10 (4)	190 (4)
Mississippi	**3,663 (24)**	**70 (30)**	**1,579 (32)**
Hancock County	835 (5)	17 (7)	235 (5)
Waveland and Bay St. Louis	277 (2)	10 (4)	190 (4)
Other Hancock County[a]	558 (4)	7 (3)	45 (1)
Harrison County	1,506 (10)	32 (14)	710 (14)
Biloxi	351 (2)	10 (4)	286 (6)
Gulfport	520 (3)	10 (4)	232 (5)
Pass Christian and Long Beach City	419 (3)	10 (4)	242 (5)
Other Harrison County[a]	192 (1)	2 (1)	49 (1)
Jackson County	1,077 (7)	18 (8)	560 (11)
Pascagoula	351 (2)	10 (4)	286 (6)
Other Jackson County	726 (5)	8 (3)	274 (6)
Other Mississippi Counties[a]	245 (2)	3 (1)	74 (2)
Texas	**776 (5)**	**10 (4)**	**284 (6)**
Hardin County[b]	116 (1)	2 (1)	51 (1)
Jefferson County[b]	391 (3)	4 (2)	69 (1)
Orange County[b]	269 (2)	4 (2)	164 (3)
Total: All States	**15,399 (100)**	**230 (100)**	**4,899 (100)**

Source: HUD block-level data, provided 9/04/09, and HUD address data for sampled blocks, provided 9/21/09.

[a] We sampled blocks in these areas in order to develop the state and county estimates. We have not developed stand-alone estimates for these areas.

[b] The state of Texas is a single sampling stratum due to the small number of SABs and affected properties in Texas. We do not produce stand-alone estimates for Texas counties. The distribution of SABs and properties by county is included here for the benefit of the reader.

The 230 sampled blocks contain a total of 4,899 unique addresses or properties that received a FEMA damage assessment in 2005.[10] This is the universe from which we selected the sample of properties for windshield observation. HUD estimates suggest that properties that received a FEMA damage assessment constitute between 50 and 95 percent of all housing units in the areas where we conducted windshield observations. The estimates range from 53.3 percent of housing units in Jefferson Parish to 90.2 percent of housing units in Cameron Parish. Estimates for the New Orleans Planning Districts range from 61 percent in Uptown to 99 percent in New Orleans East.

2.2 Selecting the Sample of Properties for Observation

Study resources permitted windshield observation of 3,736 properties, 76 percent of the 4,899 FEMA-assessed properties on the sampled blocks. In order to select the 3,736 properties for observation, we divided the 4,899 properties into two groups based on the assigned FEMA damage code: one group with the damage codes "major" and "severe," and one group with the damage codes "minor" or "no damage." Because of the study's focus on housing recovery, we chose to conduct windshield observations on 100 percent of the properties in the major and severe damage groups and as many properties as possible in the minor or no damage group, up to the total of 3,736.

The major and severe damage categories together contained 3,017 properties, all of which were included in the observation sample. That allowed us to observe 719 properties in the minor/no damage category from the total of 1,881 properties (1,689 with minor damage and 192 with no damage). We allocated the 719 observations across the sampling strata based on the proportion of minor/no damage properties in the blocks assigned to each stratum. We then selected the actual addresses for observation using equal probability sampling. This approach ensured that properties with minor or no damage would be observed in each stratum, while allocating larger numbers of observations to strata with a higher proportion of properties in the minor or no damage categories. Exhibit 2-3 shows the total number (and percent) of windshield observations to be performed in each stratum.

[10] The HUD dataset used for sampling contained 6,172 observations, with each observation representing a housing unit but not necessarily a distinct address or property. We consolidated housing units by address so that multi-unit properties were represented in the sample as one property. We also excluded observations with missing address information or identified in the dataset as being neither owner nor renter occupied. This resulted in a total number of properties on the blocks of 4,899.

Exhibit 2-3. Properties Observed by Geographic Area

Stratum	Number of Windshield Observations N (%)
Louisiana	**2,403 (64)**
Calcasieu and Cameron Parishes	100 (3)
Jefferson Parish	364(10)
Orleans Parish	1,358 (36)
MidCity Planning District	180 (5)
Lakeview Planning District	161 (4)
Gentilly Planning District	207 (6)
ByWater Planning District	180 (5)
Lower Ninth Ward Planning District	166 (4)
New Orleans East Planning District	211 (6)
Uptown Planning District	133 (4)
Other Orleans Parish[a]	120 (3)
St. Bernard Parish	296 (8)
St. Tammany Parish	156 (4)
Other Louisiana Parishes[a]	129 (3)
Mississippi	**1,188 (32)**
Hancock County	216 (6)
Waveland and Bay St. Louis	175 (5)
Other Hancock County	41 (1)
Harrison County	474 (13)
Biloxi	153 (4)
Gulfport	136 (4)
Pass Christian and Long Beach City	159 (4)
Other Harrison County[a]	26 (1)
Jackson County	462 (12)
Pascagoula	265 (7)
Other Jackson County	197 (5)
Other Mississippi Counties[a]	36 (1)
Texas	**145 (4)**
Hardin County[b]	28 (1)
Jefferson County[b]	39 (1)
Orange County[b]	78 (2)
Total: All States	**3,736 (100)**

Source: HUD address data for sampled blocks, provided 9/21/09.

[a] We sampled blocks in these areas in order to develop the state and county estimates. We have not developed stand-alone estimates for these areas.

[b] The state of Texas is a single sampling stratum due to the small number of SABs and affected properties in Texas. This report does not produce separate estimates for Texas counties. The distribution of SABs and properties by county is included here for the benefit of the reader.

2.3 Sampling Weights and Representativeness

The sampling design allows representative estimates to be calculated for the states, counties, parishes, and jurisdictions defined in Exhibit 2-3. In order to create these representative estimates, we created sampling weights at the Census block and property level and applied these weights to the results of the windshield observations.[11] We also calculated standard errors for each point estimate and corrected the standard errors for stratification and clustering in the sample design.[12] The standard errors allow us to calculate confidence intervals for each estimate, which help explain the precision of the estimates. In general, the smaller the number of blocks and properties observed in a given geographic area, the less precise the estimate.

Given how we selected the windshield observation sample, the findings of this report apply only to *significantly affected blocks* in each geographic area—that is, Census blocks where three or more properties experienced major or severe damage based on FEMA assessments—and not to all blocks that experienced hurricane damage. Blocks on which fewer than three properties experienced major or severe damage were excluded from the study sample, even if they had a larger number of properties with minor damage. This means that the study findings can only be generalized to the population of 15,399 SABs in Louisiana, Mississippi, and Texas (see Exhibit 2-3), not to all Census blocks in the states. Excluding blocks that did not meet the SAB criteria from the sample allowed the study data collection to focus on those areas that experienced the most storm damage. Across the three states in the study, 91 percent of the properties with major or severe damage are on SABs.

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[11] The sampling weights are defined as the inverse of the sampling probability. For blocks this is defined as:

$$w_h = \left(\frac{n_h}{N_h} \right)^{-1}$$

Where h indexes the stratum, n_h is the number of blocks drawn in strata h, and N is the total number of blocks in stratum h. At the property level, the sampling weight is defined as:

$$w_{hp} = \begin{cases} w_h & if \quad D_{hp} = 1 \\ \left(w_h \frac{n_{mh}}{N_{mh}} \right)^{-1} & if \quad D_{hp} = 0 \end{cases}$$

Where h indexes the stratum, p indexes the property, n_{mh} is the number of properties with minor/no damage sampled from stratum h, N_{mh} is the total number of properties in stratum h with minor/no damage, and D_{hp} indicates whether the FEMA damage code for property p in stratum h is major or severe.

[12] The standard errors are calculated using the Taylor series method. Because the set of selected properties cluster within the set of selected blocks, it is necessary to correct for similarities that may be shared by properties within a block. The correction is implemented with the surveymeans and surveyfreq procedures in SAS 9.2.

2.4 Approach to Conducting the Windshield Observations

The windshield observations were conducted in-person by trained field personnel between January 16, 2010 and March 2, 2010. The field observers used a structured instrument to record their observations at the property and the block level. (A copy of the windshield observation instrument is included in Appendix A.)

Eight locally-hired observers conducted the 3,736 property observations. The observers received 3.5 days of training, including classroom training and practice observations in the field. The training culminated in a series of exams to certify that each observer could conduct the observations accurately and consistently.

Once in the field, the observers were provided with maps and lists of addresses to locate the properties for observation. They spent about 10 minutes observing each individual property and another 10 minutes observing the block as a whole. All of the observations were conducted from the street or the sidewalk. Damage that was not visible from the street, such as flood damage to the interior of a house, would not be picked up by the windshield observations. This is a fundamental caveat to keep in mind in interpreting the estimates of housing conditions presented in this report. Exhibit 2-5 shows the main components of the property-level and block-level observations. The most important aspects of the property-level observations are discussed in more detail below.

Exhibit 2-5. Main Components of Property- and Block-Level Observations

Property-Level Observation Elements	Block-Level Observation Elements
❖ Property type (residential, commercial, school, other use, empty or vacant lot). ❖ Type of structure on property. ❖ Presence of debris on property. ❖ Visible damage to the property (roof, windows and doors, walls and foundation, and other parts of the property). ❖ Overall condition of the property. ❖ Habitability of the property. ❖ Estimated elevation of the property. ❖ Signs that property is occupied. ❖ Signs of ongoing repair or rebuilding activity. ❖ Type of repair/rebuilding (new construction, extensive rebuilding, repairs).	❖ Block type (standard, non-standard, rural). ❖ Land use on block (residential, commercial, industrial, other) ❖ Visible damage to block infrastructure (roads, sidewalks, curbs and gutters, signage). ❖ Ongoing repair to block infrastructure. ❖ Share of properties on the block that are vacant, empty, or destroyed. ❖ Share of properties on the block needing major repairs. ❖ Presence of negative features in the block (major industrial activity, excessive trash or debris, boarded up commercial areas).

In addition to training and certifying the observers, we instituted several quality control measures to ensure accuracy and consistency across states and observers. After the first week of observations, the

data collection supervisor accompanied each observer for several hours and conducted property- and block-level observations in parallel to the observer (but without communicating with the observer). This exercise revealed no major areas of discrepancy or inconsistency, suggesting that we can expect a high degree of inter-observer reliability. We also conducted quality control on the entry of observation data into the web-based system designed for this study. The data collection supervisor reviewed a sample of observations—comparing the paper version to the electronic version—to ensure the data were complete and being entered correctly. The review identified errors on less than one percent of all property observations and on three percent of the block observations. All identified errors were corrected. The data were also carefully reviewed for logical consistency.

Windshield Observations of Damage, Overall Condition, Habitability and Signs of Occupancy

Four components of the property-level windshield observations are particularly important for developing estimates of housing recovery: visible damage to the property, overall condition of the property, habitability of the property, and signs the property is occupied. Following is a brief description of our approach to each.

Visible Damage to the Property

The observers were instructed to observe carefully the condition of three parts of the property: the roof, the windows and doors, and the walls and foundations. They were instructed to record any damage they could see in each of these areas, as well as any damage observed on other parts of the residential property. The instrument asked observers to note particular types of damage—such as holes in the roof, boarded up windows, and cracks in the foundation—but also allowed them to note other types of damage not specifically listed. For each area, observers were also told to record if they saw no damage at all.

The observers could not determine whether damage they observed in January and February 2010 was caused by hurricane Katrina or Rita, subsequent storms, deferred maintenance by the owner, or some other cause. The term "damage" is therefore misleading, as it implies storm damage when we do not know whether that is the case. As a result, in the remainder of this report, the observations of visible damage in 2010 are referred to as ***current repair needs***, while the term "damage" is reserved for describing the damage from the 2005 hurricanes as assessed by FEMA.

The observations of visible damage in 2010 are referred to as *current repair needs*, while the term "damage" is reserved for describing the damage from the 2005 hurricanes as assessed by FEMA.

Overall Condition of the Property

The windshield observers were asked to characterize the overall condition of each residential property observed as excellent or good, fair, poor, or totally destroyed. (Properties undergoing complete rebuilding were excluded from this characterization.) In assessing the overall condition of the property, the observers were instructed not to consider aesthetics but to focus only on visible repair needs. They were told to take into consideration any damage or repair needs observed on the property and use the following definitions as guidelines:

- **Excellent or Good Condition:** The structure is well cared for, with no signs of deterioration such as broken windows, deteriorated roofs, major areas of peeling paint, or rotted porches. Structures undergoing light repair work may fall in this category or in the "fair" category, depending on the condition of the rest of the structure.
- **Fair Condition:** Structures in fair condition have some repair needs and may exhibit one or two types of minor damage, such as large areas of peeling paint, cracked windows, missing roof materials, or damaged gutters.
- **Poor Condition:** Structures in poor condition have substantial repair needs or visible damage in several areas. These structures may or may not be habitable.
- **Totally Destroyed:** Structures in this category are not habitable and have either major structural damage, such as a caved-in wall or roof, or are no longer standing.

This was the most subjective part of the windshield observations; as a result, we spent a large amount of time training on it. Exhibits 2-6 through 2-9 provide examples of properties in the Gulf Coast area in each of the categories. (These photos were taken at different times between 2005 and 2010 and the properties were not part of our research sample.)

Habitability of the Property

Observers were asked to determine whether the property was habitable based on the Census definition of habitability. The American Housing Survey defines a habitable unit as one that is closed to the elements with intact roof, windows, and doors and no positive evidence—such as a sign on the house or block—that the unit is to be demolished or condemned.[13] To better assist the observers, we defined an "intact roof" as no major damage or holes, "intact windows" as none broken or missing, and "intact doors" as none missing and at least one not boarded over (that is, there is a functional point of entry and exit).

Note that the Census definition of habitability is based on external observation only and does not mean that the unit is ready for someone to move in. For example, a unit may be sealed to the elements and meet the definition of habitability without having the internal plumbing, electrical, and heating systems needed to make it a decent, safe, and sanitary place to live. Because they are based only on external observation, the windshield observation data are likely to overstate the number of properties that are habitable in the broader sense of meeting modern living standards.

[13] American Housing Survey Definitions (www.census.gov/hhes/www/housing/ahs/ahs01/appendixa.pdf).

Exhibit 2-6. Property in "Good or Excellent" Condition

Exhibit 2-7. Property in "Fair" Condition

Exhibit 2-8. Property in "Poor" Condition

Exhibit 2-9. Property "Completely Destroyed"

Signs of Occupancy

Like habitability, occupancy is difficult to determine by observing a property from the street. The observers were asked to look for specific signs of occupancy and note which (if any) were observed. The signs of occupancy are listed in Exhibit 2-10.

Exhibit 2-10. Signs of Occupancy Noted in Windshield Observations

Signs of Occupancy	❖ Occupant(s) observed. ❖ Vehicle(s) in the driveway or parking area. ❖ Light(s) on inside. ❖ Furniture visible inside the house. ❖ Satellite dish on the roof or attached to the house. ❖ Garbage can out front (if others in the neighborhood are also out). ❖ Landscaping or yard or porch furniture suggests occupancy. ❖ Some other sign of occupancy is observed.

For analyzing rates of occupancy among the sampled properties, we coded the property as occupied if the observer saw one or more signs of occupancy, unless the observer also noted that the property was missing an electrical meter head. We assumed that all properties that did not have electrical meter heads were unoccupied.

Given this definition, the windshield data likely provide a lower bound estimate of occupancy rates. Some properties may actually be occupied but counted as vacant because the observer did not see any signs of occupancy (for example, the occupants took their cars to work, do not have a satellite dish, closed their curtains, turned off their lights, and did not put out a garbage can.) As an alternative to the observational data on occupancy, we also analyzed U.S. Postal Service data on mail delivered to the addresses in the research sample. The Postal Service data are included in the discussion of occupancy in Chapter 3.

2.5 Characteristics of Sampled Blocks

The windshield observations were conducted on a representative sample of 230 SABs, that is, Census blocks where three or more housing units were assessed by FEMA as having received major or severe damage from Hurricane Katrina or Rita. Of the 230 blocks, 150 are in Louisiana, 70 are in Mississippi, and 10 are in Texas. The maps in Appendix B show the locations of the sampled blocks across the three states. The location of the blocks reflects the stratified sampling described above, where the goal was to obtain reliable estimates for each state plus 20 geographic areas. Within each sampling stratum, individual blocks were selected randomly (that is, each block had an equal chance of being selected).

Exhibit 2-11 describes the land use on the sampled blocks in each state as of early 2010. The information is based on the block observations conducted as part of the windshield observations.

Across all three states, most blocks are either completely residential or a mix of residential and commercial. The Texas sample includes more mixed use blocks (that is, residential plus other types of properties) than the other two states, and the Louisiana sample has the largest share of blocks that are entirely residential. Only two of the 230 blocks—one in Louisiana and one in Mississippi—are largely vacant, making the land use difficult to determine.

Exhibit 2-11. Land Use in 2010 on Sampled Blocks

	LA (n=150)	MS (n=70)	TX (n=10)
Residential	79%	54%	20%
Residential and commercial	17%	21%	50%
Residential and other land uses (industrial, institutional)	1%	11%	10%
Residential, commercial, and/or other land uses	3%	11%	20%
Difficult to determine/mainly vacant	1%	1%	0%

Source: Windshield observations conducted in January and February 2010.

Exhibit 2-12 describes the housing and socioeconomic characteristics of the sampled blocks in each state, compared to all significantly affected blocks in the state. The data are from the 2000 Census and thus describe conditions prior to the 2005 hurricanes. The Census data are at the block group level, so the table assumes that the characteristics of the individual block are accurately represented by the characteristics of the block group in which it is located.

As shown in Exhibit 2-12, 90 percent of all SABs in Louisiana were in urban areas. The housing vacancy rate in 2000 was about 10 percent, and 64 percent of the occupied housing was owner-occupied. About half the housing stock was built after 1963. About one-third of households living on the blocks in 2000 had incomes below 150 percent of the poverty level, and the median household income was just over $35,000. The 150 blocks selected for the study sample in Louisiana look very similar in housing and socioeconomic characteristics to all significantly affected blocks in the state.

In Mississippi, more SABs were located in non-urban areas, and the housing vacancy rate and the homeownership rate both were higher than in Louisiana. The housing stock was also about a decade younger, with half the housing stock built after 1973. SABs in Mississippi also had a larger share of multifamily housing than in Louisiana. The 70 blocks selected for the study sample in Mississippi were somewhat more urban and more affluent in 2000 than all SABs in the state, with a slightly higher homeownership rate, a lower poverty rate, and a higher median household income.

In Texas, the universe of 776 SABs as well as the 10-block research sample is less urban than in the other two states. As is the case in Mississippi, the sampled blocks in Texas were somewhat less affluent in 2000 than the average for all SABs in the state.

Exhibit 2-12. Pre-Storm Characteristics of Sampled Blocks, Based on 2000 Census Data

	Louisiana		Mississippi		Texas	
	Sampled Blocks (N=150)	All SABs (N=10,954)	Sampled Blocks (N=70)	All SABs (N=3,663)	Sampled Blocks (N=10)	All SABs (N=776)
Percent of Blocks Located in Urban Areas	88%	90%	80%	77%	65%	73%
Housing Vacancy Rate	10%	10%	13%	13%	10%	9%
Homeownership Rate (Occupied Units)	64%	64%	73%	71%	70%	74%
Median Home Value	$91,226	$97,678	$81,925	$80,248	$51,740	$60,008
Median Age of Housing	36 yrs.	37 yrs.	25 yrs.	27 yrs.	26 yrs.	29 yrs.
Percent of Housing with 2+ Units	28%	30%	25%	28%	37%	27%
Percent of Housing with 5+ Units	13%	15%	20%	22%	35%	24%
Percent of Households Below 150% of Poverty	31%	31%	24%	26%	28%	25%
Median Household Income	$35,387	$35,821	$37,725	$36,110	$33,909	$37,921

Source: Census 2000 Summary File 3 (SF 3) Sample Data, block group level.

2.6 Characteristics of Sampled Properties

Within the 230 sampled blocks, we selected a sample of 3,736 property addresses for windshield observation. As described above, the sample included 100 percent of the addresses on the blocks coded by FEMA as having suffered major or severe damage in the 2005 storms, plus a random sample of properties on each block coded by FEMA as having suffered minor damage or no damage. Of the 3,736 addresses in the sample, we determined (based on the windshield observations) that 3,511 were residential parcels that could be included in our analysis of housing recovery. Of the 225 parcels excluded from the analysis, 125 could not be located, 18 were located but did not contain a residential structure that could be observed from the street, 52 did not contain residential structures, and 30 were located outside the sampled Census blocks. Exhibit 2-13 explains these exclusions in detail.

Exhibit 2-13. Exclusions from the Study Sample

The final sample of residential parcels used for the analysis in this report excluded 225 addresses from the initial sample of 3,736.

First, the observers were not able to locate 125 addresses using maps or GPS. For another 18 addresses, the observers found the address but could not observe the parcel or property because a high fence, long driveway, or trees obscured their view.

Among the 3,593 parcels that could be located and observed, 52 contained only non-residential structures. The data set from which we selected the addresses was assumed to contain only residential properties. However, 24 parcels contained a commercial structure, 10 parcels contained a school, and 18 parcels contained some other type of non-residential structure (such as a government office building). Because this study focuses on housing recovery, we did not conduct full property observations on parcels that contained non-residential structures. This reduced the number of parcels on which property observations could be conducted from 3,593 to 3,541.

After completing the property observations, we found that 92 of the 3,541 residential parcels were not located within the sample Census block boundaries. (Observers were told to indicate whether the parcel was inside the boundaries of the Census block, outside the boundary of the Census block but adjacent to the boundary line, or totally outside the Census block boundary.) Some parcels in our sample were outside the sampled Census blocks because of imprecision in the geo-coding process. Comparing the 92 addresses to the Census block boundaries revealed that 62 observations were close to the Census block for which they were selected, either on an adjacent Census block or within the same Census block group (18). We included these 62 observations in the analysis for this report. The remaining 30 observations were excluded from the analysis because they could not be coded to any Census block or tract or were in a different Census block group. These exclusions resulted in the final sample size of 3,511 residential parcels.

Total Addresses Sampled: 3,736
- *minus* parcels not located: 125
- *minus* parcels located but structures not observable: 18
- *minus* parcels containing commercial buildings: 24
- *minus* parcels containing schools: 10
- *minus* parcels containing another type of non-residential structure: 18
- *minus* parcels located in a different Census block group from sampled block: 6
- *minus* parcels that could not be coded to a Census block: 24

Total Sample for Analysis: 3,511

Of the 3,511 residential parcels in the research sample, 86 percent contained a residential structure other than a FEMA trailer or a Mississippi Cottage at the time of the windshield observations (Exhibit 2-14). Another 10 percent of the parcels contained no structure at all and no slab or foundation, and 3 percent contained a slab or foundation but no standing structure.[14] Twenty-five parcels contained a

[14] We assumed these parcels had contained residential structures prior to the hurricanes because of how the data set was constructed.

Mississippi Cottage, mostly on its own but in some cases next to a pre-existing structure, and 6 parcels contained a FEMA trailer.

Exhibit 2-14. Observed Parcel Contents

Parcel Contents	Number	Percent
Residential structure, no other housing[a]	3,026	86%
Empty lot, no slab or foundation	354	10%
Slab or foundation of residential structure, no other housing	100	3%
Mississippi cottage, no other housing	20	1%
Residential structure, plus Mississippi cottage	5	0%
FEMA trailer, no other housing	3	0%
Residential structure, plus FEMA trailer	3	0%
Total Parcels	**3,511**	**100%**

Source: Windshield observations conducted in January and February 2010.

[a] Does not include FEMA trailers or Mississippi Cottages.

We only conducted the full property observation on those parcels with a residential structure that was not a FEMA trailer or a Mississippi Cottage. We chose not to assess the current condition of FEMA trailers and Mississippi Cottages because we know that the former are not meant as permanent housing and the latter are quite new and all built to the same standard. We also did not conduct a full property assessment on parcels that were empty lots or contained only slabs or foundations, as these parcels had no residential structure to assess. As a result, we assessed a total of 3,034 permanent residential structures. Of these, 78 percent were single-family homes (including 156 mobile homes), 20 percent were multifamily buildings with fewer than 5 units, and 1 percent were multifamily buildings with 5 or more units (Exhibit 2-15). The analysis sample of 3,511 properties therefore includes a full property observation for the 3,034 properties with residential structures and documents the parcel contents of the remaining residential properties.

Exhibit 2-15. Types of Residential Structures Observed

Types of Residential Structures	Number	Percent
Permanent single-family home	2,219	73%
Mobile home (non-FEMA)	156	5%
Multifamily building, 2-4 units	617	20%
Multifamily building, 5 or more units	40	1%
Type unclear, structure in the process of being built	1	<1%
Type unclear, structure too damaged	1	<1%
Total	**3,034**	**100%**

Source: Windshield observations conducted in January and February 2010.

3. Estimates of Repair Needs, Reoccupancy, and Rebuilding

This chapter describes the current repair needs, habitability, occupancy, and rebuilding activity of the residential housing stock on significantly affected blocks (SABs) in the geographic areas of study. Most of the information presented in this chapter comes from the windshield observations of the 3,511 residential properties in the research sample. The observations were conducted from the sidewalk or street and focused on the exterior condition of the properties. The assessments of damage and current condition do not extend to the interior of the structures, and therefore do not take into account damage to the plumbing and electrical systems or inside walls and floors. The windshield assessments took place in January and February 2010. Discussions of "current" housing conditions refer to that timeframe.

The chapter begins by revisiting the FEMA damage estimates that formed the basis for developing the research sample. Section 3.1 provides baseline estimates of the initial damage from the 2005 hurricanes across the 3 states and 20 geographic areas of interest to the study. The next section presents estimates of the current repair needs on SABs. Section 3.3 provides estimates of the proportion of residential properties on SABs that are currently habitable and that are currently occupied. Finally, Section 3.4 presents estimates of the proportion of residential properties that have been rebuilt or are currently in the process of being rebuilt.

3.1 Distribution of 2005 Hurricane Damage by Geographic Area

As described in Chapter 2, the goal of the windshield observations was to develop statistically reliable estimates of housing recovery among significantly affected blocks in Louisiana, Mississippi, and Texas. The estimates developed in this report do not apply to the states as a whole but only to the universe of significantly affected blocks within the state—that is, to Census blocks where three or more housing units on the block were assessed by FEMA as having experienced major or severe damage from the 2005 hurricanes.

The universe of significantly affected blocks from which the study sample is drawn covers about 91 percent of the properties that experienced major or severe storm damage across the three states. A large number of the properties that were assessed by FEMA as having minor damage were not located on significantly affected blocks, so the study findings are much less applicable to those properties. Our study findings assume that the FEMA assessments are relatively accurate—that is, that a property assessed as having severe damage actually did experience considerable damage and vice versa. However, the FEMA assessments generally do not take account of damage that occurred in the

Categories of Assessed Damage, 2005

- **Minor Damage or No Damage:** Damage estimate of less than $5,200.
- **Major Damage:** Damage estimate of $5,200 - $29,999, or less than 50 percent of the property value.
- **Severe Damage:** Damage estimate of $30,000 or more, or more than 50 percent of the property value.

months following the hurricanes and before CDBG assistance became available for rebuilding. As a result, local officials suggest that in some cases the FEMA damage estimates may be misleading, in that they fail to account for further damage stemming from the original storm damage. In Texas, for example, many homes suffered roof damage from the storms that might have been assessed as "minor" immediately after the hurricanes. The fall of 2005 was a particularly rainy one in Texas, and some roofs that were not fully repaired suffered significant further damage from water getting into the house. By the time the CDBG program in Texas evaluated properties applying for assistance, the overall damage assessment was worse than that assessed by FEMA.

Exhibit 3-1 shows—for significantly affected blocks in the three states and the 20 smaller geographic areas—the levels of 2005 damage based on the FEMA assessments. The numbers in the table are estimates based on applying sampling weights to the 4,899 properties with FEMA damage assessments located on the study sample of 230 blocks (see Exhibit 2-3).[15] The estimates suggest that a total of 312,463 properties on SABs in Louisiana, Mississippi, and Texas were assessed by FEMA for hurricane damage and that 182,434 of those properties had major or severe damage.[16]

Throughout the report, we use the terms **"hurricane-affected properties"** or **"affected properties"** to refer to properties on significantly affected blocks that received a FEMA damage assessment in 2005.

The number of hurricane-affected properties presented in Exhibit 3-1 (312,463) is substantially smaller than the total number of damaged housing units across the three states shown in Exhibit 1-1 in Chapter 1 (875,543). There are two reasons for this. First, the estimates in Exhibit 3-1 are for properties, not housing units.[17] The estimates in Exhibit 3-1 count multiple housing units located at the same address (for example, in an apartment building) as a single property. Second, the numbers in Exhibit 1-1 represent all areas of the state, whereas the estimates in Exhibit 3-1 represent only the significantly affected blocks in the state.

The estimated numbers of properties on SABs affected by the hurricanes in 2005 are shown by geographic region to provide a sense of the distribution of damage across the study region. As the estimates in Exhibit 3-1 show, the areas that sustained the most hurricane damage and had the highest share of properties with major and severe damage are Orleans Parish and Jefferson Parish in Louisiana. Orleans Parish includes the City of New Orleans, and Jefferson Parish is adjacent to Orleans Parish. Also among the most affected counties are Hancock and Jackson Counties in Mississippi and St. Bernard Parish in Louisiana.

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15 Exhibit 3-1 (and subsequent exhibits) show estimates for the states because we only had access to property-level damage assessments for the blocks in our sample, not for all SABs in the three states.

16 The 312,463 properties include a small number of properties (less than 4 percent) assessed by FEMA to have suffered no damage from the hurricanes. Because the owner registered for FEMA housing assistance for the property, triggering a FEMA inspection, we consider these properties to have been affected by the hurricanes, even if the FEMA assessed damage was zero.

17 We chose to conduct windshield observations of properties rather than housing units because it would be very difficult for observers to report on the external condition of just one unit of a multifamily property.

The 2005 damage assessments also form the basis for the estimates of housing rebuilding presented in Section 3.4 below, which compare the current condition of each sampled property—as captured through windshield observation—to the property's 2005 damage category.

Exhibit 3-1. 2005 Damaged Properties on Significantly Affected Blocks, by Geographic Area and Damage Code

Stratum	All Properties with a FEMA Damage Code[a]		Properties with Major or Severe Damage	
	Number	Percent (N=312,463)	Number	Percent (N=182,434)
Louisiana	**217,401**	**69.6**	**136,926**	**75.1**
Calcasieu and Cameron Parishes	12,041	3.9	3,124	1.7
Jefferson Parish	46,930	15.0	21,073	11.6
Orleans Parish	94,415	30.2	79,925	43.8
MidCity Planning District	15,291	4.9	13,638	7.5
Lakeview Planning District	7,258	2.3	6,981	3.8
Gentilly Planning District	16,011	5.1	12,123	6.6
ByWater Planning District	11,278	3.6	10,144	5.6
Lower Ninth Ward Planning District	6,621	2.1	6,385	3.5
New Orleans East Planning District	15,193	4.9	14,041	7.7
Uptown Planning District	11,006	3.5	9,222	5.1
St. Bernard Parish	24,025	7.7	20,742	11.4
St. Tammany Parish	25,610	8.2	5,631	3.1
Mississippi	**76,499**	**24.5**	**41,072**	**22.5**
Hancock County	7,789	2.5	6,812	3.7
Waveland and Bay St. Louis	4,192	1.3	3,695	2.0
Harrison County	31,247	10.0	12,551	6.9
Biloxi	6,323	2.0	4,250	2.3
Gulfport	11,701	3.7	3,755	2.1
Pass Christian and Long Beach City	8,506	2.7	3,488	1.9
Jackson County	32,571	10.4	20,726	11.4
Pascagoula	9,363	3.0	8,166	4.5
Texas	**18,563**	**5.9**	**4,436**	**2.4**
Total: All States	**312,463**	**100**	**182,434**	**100**

Source: HUD address data for sampled blocks, provided 9/21/09.

[a] Includes properties coded as having severe damage, major damage, minor damage, and no damage.

In addition to the FEMA damage assessment, the data set from which our observation sample was drawn includes information on whether the housing was owner-occupied or renter-occupied. Based on the tenure of the properties reported by applicants for FEMA housing assistance, we estimate that 72 percent of the 312,463 hurricane-affected properties on SABs across the three states were owner-

occupied in 2005 and 28 percent were renter-occupied. Homeownership was somewhat higher in Mississippi than in Texas and Louisiana (see Exhibit 3-2).

Exhibit 3-2. Estimated Tenure in 2005 of FEMA-Assessed Properties on Significantly Affected Blocks

	Louisiana		Mississippi		Texas		Overall	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Owner-occupied	151,906	70%	59,360	78%	151,906	70%	225,542	72%
Renter-occupied	65,495	30%	17,139	22%	65,495	30%	86,922	28%
Total	**217,401**	**100%**	**76,499**	**100%**	**217,401**	**100%**	**312,464**	**100%**

Source: HUD address data for sampled blocks, provided 9/21/09.

Note: This exhibit presents weighted estimates for 312,463 properties based on 3,511 observations.

3.2 Estimates of Current Repair Needs

Exhibit 3-3 presents estimates of the current repair needs of the 312,463 FEMA-assessed properties on SABs across the three states in the study. The estimates are based on the windshield observations conducted in January and February 2010 on 3,511 properties, as described in Chapter 2.

The first column of the table shows the estimated number of hurricane-affected properties on SABs that (1) no longer contain a permanent residential structure, (2) contain a residential structure with one or more repair needs observable from the outside, and (3) contain a residential structure with no repair needs observable from the outside. Together, these three numbers sum to the 312,463 hurricane-affected properties in SABs across the three states. The second column of the table shows the percentage of all hurricane-affected (that is, FEMA-assessed) properties in each category. The third column shows the 95 percent confidence interval for the point estimate.[18]

Overall, the estimates in Exhibit 3-3 show that 57 percent of all hurricane-affected properties on SABs contain a permanent residential structure as of early 2010 with no repair needs observable. In other words, we estimate that just over half the properties that were affected by the 2005 hurricanes and that were located in areas that sustained the most damage are now in good condition, based on what can be seen from the outside. About one-third of the properties (32 percent) contain housing with repair needs evident from the outside. Finally, about one in 10 properties (10.8 percent) no longer have a permanent residential structure at all, meaning that the housing that was there at the time of the hurricanes has been demolished and not rebuilt.

[18] The confidence interval provides upper and lower bounds for the percent estimate. For example, in Exhibit 3-2, we estimate that 10.8 percent of properties do not contain a residential structure. This is an unbiased estimate, but the actual percentage may be higher or lower. The confidence interval shows us that we can be 95 percent confident that the actual percentage of properties is between 7.2 and 14.4.

Exhibit 3-3. Current Repair Needs of Hurricane-Affected Properties

	Number	Percent (N=312,463)	95% CL
Property does not contain a permanent residential structure[a]	33,815	10.8	7.2 – 14.4
Property contains a residential structure with one or more exterior repair needs observed	101,000	32.3	28.7 – 35.9
Property contains a residential structure with no exterior repair needs observed	177,647	56.9	53.3 – 60.5
Total	**312,463**	**100**	

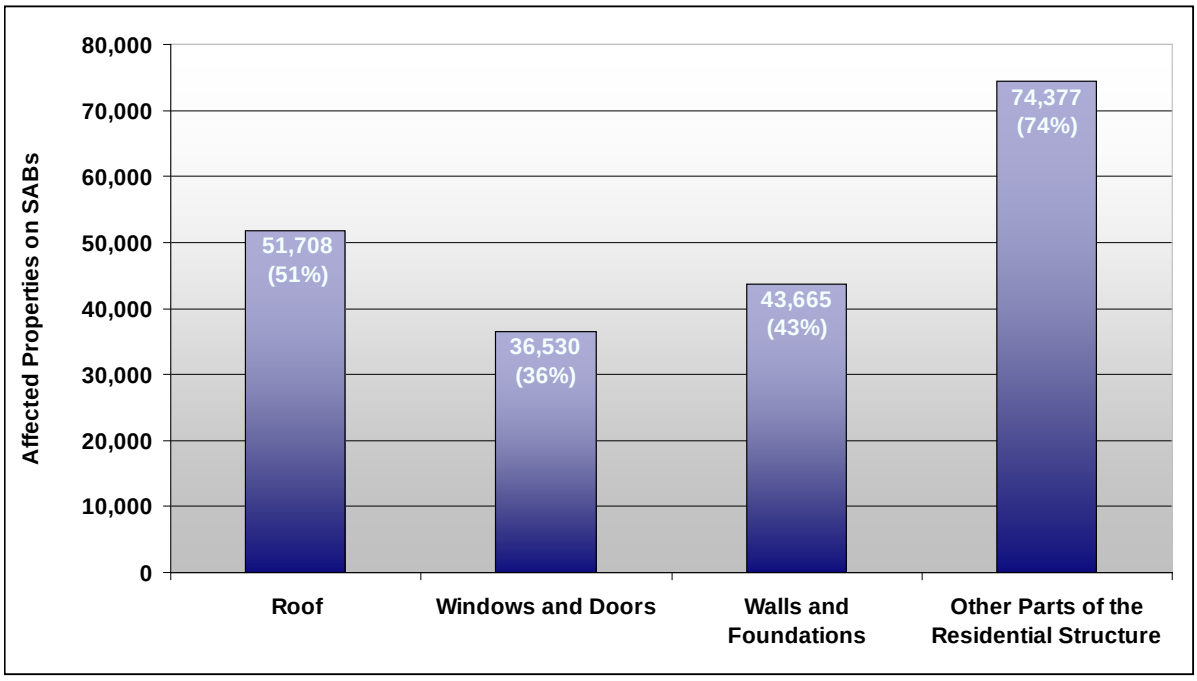
Source: Windshield observations conducted in January and February 2010.

Note: This exhibit presents weighted estimates for 312,463 properties based on 3,511 observations.

[a] This category includes vacant lots and lots that contain a slab, steps, or foundation or a previous home. It also includes a small number of properties that contain FEMA trailers, Mississippi cottages, and Mississippi park models (see estimates in Chapter 2). Although some of the Mississippi models may be permanently installed, these properties are coded as temporary housing and excluded from estimates of permanent residential structures.

Exhibit 3-4 provides more details on the types of repair needs observed among those properties with observable repair needs. Based on windshield observation alone, we cannot determine the extent to which the repair needs observed in 2010 reflect damage that occurred during the 2005 hurricanes, damage that occurred in subsequent storms (such as Hurricane Gustav in Louisiana and Mississippi and Hurricane Ike in Texas), or simply deferred maintenance. As shown in the exhibit, an estimated 51,708 properties with observable repair needs (51 percent) need repairs to the roof, 36,350 properties (36 percent) need repairs to the doors or windows, and 43,665 properties (43 percent) need repairs to the exterior walls or foundation. (Exhibits C-1 through C-3 in Appendix C provide further detail on the types of repair needs observed within these categories.) In addition, 74,377 properties with observable damage (74 percent) need repairs on some part of the structure other than (or in addition to) the roof, doors, windows, exterior walls, or foundation. These "other parts of the structure" are typically porches, outdoor staircases, and carports.

Exhibit 3-4. Types of Repair Needs Observed



Source: Windshield observations conducted in January and February 2010.

Note: Percentages are based on all properties in sample with observable repair needs. A property may have one or more observable need.

Exhibit 3-5 shows the windshield observers' assessments of the overall condition of properties and provides estimates of the numbers of properties with ***substantial repair needs*** in early 2010. A property has substantial repair needs if the residential structure has one or more observable repair needs and also is not rated as being in excellent or good condition. If a structure has repair needs but is nonetheless rated in excellent or good condition, we assume those repair needs are minor and not substantial.

Substantial repair needs means the property has at least one observable repair need and is not in excellent or good condition overall.

As of early 2010, about three quarters (73.6 percent) of affected properties on SABs are in excellent or good condition, without substantial repair needs. This percentage includes in the denominator those properties that no longer have residential structures (10.8 percent of the study sample). In addition to the 73.6 percent in good or excellent condition, about 10 percent of the affected properties are in "fair" condition, typically with one or two areas where repairs are needed, and 5 percent are in poor condition, with more substantial repair needs. Less than one percent of the properties have residential structures that are still standing but largely destroyed (for example, with caved-in roofs and walls), and less than one percent of the properties have residential structures actively under construction. Overall, an estimated 14.6 percent of all hurricane-affected properties currently have substantial repair needs. This includes all properties in poor condition and destroyed, as well as most of the properties in fair condition. Exhibits C-4 and C-5 in Appendix C provide point estimates and confidence intervals for the proportion of properties in each geographic area in each of the condition categories.

Exhibit 3-5. Current Condition of Affected Properties

	Number	Percent	95% CL
Overall Condition:			
Excellent or good condition	229,992	73.6	69.9-77.3
Fair condition	31,694	10.1	8.2-12.1
Poor condition	14,490	4.6	3.3-6.0
Destroyed	1,274	0.4	0.2-0.7
N/A: Property is being rebuilt or undergoing major renovation[a]	1,198	0.4	0.2-0.6
N/A: Lot does not contain a permanent residential structure	33,815	10.8	7.3-14.4
Total	**312,463**	**100**	
Substantial Repair Needs:			
Residential structure exhibits substantial repair needs	45,536	14.6	11.8-17.3

Source: Windshield observations conducted in January and February 2010.

[a] Observers used this category if the condition of the structure could not be assessed because it was under construction or undergoing major renovation.

Exhibit 3-6 compares the 2010 condition and repair needs of properties that were owner-occupied at the time of the hurricanes and properties that were renter-occupied. We find no statistically significant differences between owner-occupied and renter-occupied properties in terms of the different measures of overall condition. However, owner-occupied properties about 15 percentage points less likely than renter-occupied properties to contain a residential structure with substantial repair needs, a difference that is statistically significant at the 5 percent level.

Exhibit 3-6. Current Condition and Repair Needs of Affected Properties by 2005 Tenure

	Owner-Occupied Properties (N=225,542)	Renter-Occupied Properties (N=86,920)	All Properties (N=312,463)
Overall Condition:			
Excellent or good condition	78.2	61.6	73.6
Fair condition	8.0	15.6	10.1
Poor condition	3.0	8.9	4.6
Destroyed	0.1	1.1	0.4
N/A: Property is being rebuilt or undergoing major renovation	0.4	0.3	0.4
N/A: Lot does not contain a permanent residential structure	10.1	12.6	10.8
Total	**100**	**100**	**100**
Substantial Repair Needs:			
Residential structure exhibits substantial repair needs	10.5	25.0	14.6

Source: Windshield observations conducted in January and February 2010.

Exhibit 3-7 provides estimates of current repair needs for each geographic area. The first column of the table shows the total estimated number of hurricane-affected properties on SABs in each area, repeated from Exhibit 3-1. The next two columns show the estimated percentage of these affected properties that, as of early 2010, have no residential structure (column B) and have substantial repair needs (column C).

The percentages in the exhibit can be interpreted as follows: "In Louisiana, an estimated 9 percent of all hurricane-affected properties located on significantly affected blocks currently contain no permanent residential structure. In addition, an estimated 16 percent of hurricane-affected properties on significantly affected blocks have a residential structure that shows substantial repair needs based on windshield observation. Taken together, an estimated 26 percent of hurricane-affected properties on SABs in Louisiana either no longer have a permanent residential structure or have a permanent residential structure with substantial damage."

Exhibit 3-7 suggests interesting patterns in the geographic distribution of current housing conditions. First, some areas have a much higher proportion of properties where the residential structure no longer exists (Column B). Within Louisiana, the Lower Ninth Ward Planning District of New Orleans and St. Bernard Parish have the highest percentage of properties without a permanent residential structure. In both of these areas, as of early 2010 about 30 percent of the hurricane-affected properties on significantly affected blocks are empty or vacant lots or places where the pre-storm residential structure no longer exists.

Other Current Research on Housing Recovery in New Orleans

A recent report by the Greater New Orleans Community Data Center (GNOCDC) provides alternative estimates of vacancies and blight in New Orleans as of March 2010. The GNOCDC report found that, of the approximately 216,000 residential addresses in New Orleans in March 2010, 50,076 were still blighted or contained empty lots (23 percent). This is down from approximately 34 percent in 2008. (http://www.gnocdc.org/BenchmarksForBlight/)

Our study differs from that of GNODC because the windshield observations are representative only of hurricane-affected properties on significantly affected blocks. In Orleans Parish, some 94,415 addresses were on these blocks. Based on the windshield observation data, we estimate that 6.7 percent of the addresses were empty lots as of early 2010, and another 27.7 percent contain structures with significant repair needs. Thus, a total of 34.4 percent of addresses were either blighted or contained empty lots. This percentage is higher than the 23 percent found in the GNOCDC analysis. The likely reason that the windshield observation data show a higher percentage of blighted addresses than the GNOCDC study is that our observations were only conducted on significantly affected blocks, not across the entire city.

Exhibit 3-7. Number of Hurricane-Affected Properties with Current Repair Needs.

Stratum	(A) All Affected Properties	(B) No Residential Structure		(C) Substantial Repair Needs	
	Number	Percent[a]	95% CL	Percent[b]	95% CL
Louisiana	**217,401**	**9.4**	**4.7-14.1**	**16.1**	**12.5-19.8**
Calcasieu and Cameron Parishes	12,041	6.1	0*-14.7	25.3	0*-53.1
Jefferson Parish	46,930	1.2	0.1-2.3	3.1	0*-6.3
Orleans Parish	94,415	6.7	4.6-8.7	27.7	21.9-33.5
MidCity Planning District	15,291	3.2	0.7-5.8	54.3	38.4-70.3
Lakeview Planning District	7,258	13.4	3.6-23.1	10.8	1.3-20.4
Gentilly Planning District	16,011	5.3	0*-11.7	14.9	6.5-23.2
ByWater Planning District	11,278	8.5	0.4-16.5	39.9	29.3-50.5
Lower 9th Ward Planning District	6,621	29.8	9.4-50.2	22.6	13.6-31.6
New Orleans East Planning District	15,193	1.9	0*-4.0	14.2	2.5-26.0
Uptown Planning District	11,006	2.8	0*-8.8	21.5	4.5-38.4
St. Bernard Parish	24,025	32.5	13.7-51.2[c]	5.9	0*-16.2
St. Tammany Parish	25,610	10.3	5.6-20.1	6.0	0*-13.6
Mississippi	**76,499**	**16.9**	**10.2-23.7**	**7.5**	**4.8-10.1**
Hancock County	7,789	44.7	23.7-65.7	6.3	2.7-10.0
Waveland and Bay St. Louis	4,192	23.9	3.5-44.3	8.0	4.0-11.9
Harrison County	31,247	13.3	6.5-20.1	7.3	2.3-12.4
Biloxi	6,323	32.4	15.7-49.2	12.4	4.9-19.9
Gulfport	11,701	3.8	0*-10.2	3.1	0*-8.1
Pass Christian and Long Beach City	8,506	19.5	4.1-34.8	13.4	0*-27.0
Jackson County	32,571	15.4	2.0-28.8	6.5	2.4-10.6
Pascagoula	9,363	9.4	0*-20.4	0.0	0.0
Texas	**18,563**	**2.4**	**0*-5.7**	**25.4**	**9.0-41.8**
Total: All States	**312,463**	**10.8**	**7.3-14.4**	**14.6**	**11.8-17.3**

Source: Windshield observations conducted in January and February 2010.

[a] This is the percent of properties in each geographic area with no residential structure (that is, N=the number of affected properties in the stratum.)

[b] This is the percent of properties in each geographic area with substantial repair needs (that is, N=the number of affected properties in the stratum.)

[c] The unusually wide confidence interval is driven by the fact that one of the blocks selected for observation in St. Bernard Parish contained 74 properties without a residential structure, eight times as many as the other blocks sampled for that Parish.

* The lower bound confidence interval was rounded up to 0.

Like Louisiana, Mississippi also has some areas—notably Hancock County, Biloxi, and Waveland and Bay St. Louis—where a high proportion of affected properties on SABs no longer contain permanent residential structures. Overall, Mississippi has the highest estimated percentage of hurricane-affected properties without residential structures in early 2010: 17 percent, compared to 9 percent in Louisiana and 2 percent in Texas. At the same time, Mississippi has a relatively low percentage of residential structures with substantial repair needs. In Mississippi, hurricane-affected structures that still exist tend to be in relatively good condition.

The opposite is true in Texas, which has a very low percentage of properties where no residential structure remains but where one-quarter of the structures that remain show substantial repair needs based on external observation. This is likely due to Hurricane Ike, which caused substantial additional damage in Texas in 2008. Additionally, according to CDBG program administrators, the severe rains that continued following Hurricane Rita in Texas caused considerable added damage (particularly for homes with roof damage) after the FEMA inspection.

In Louisiana overall, 16.1 percent of hurricane-affected properties have substantial repair needs, but this percentage is much higher in parts of the city of New Orleans, such as the MidCity Planning District and the ByWater Planning District. The actual percentage of affected properties in Louisiana with substantial repair needs is almost certainly greater than 16.1 percent, because these estimates are based only on external observation.

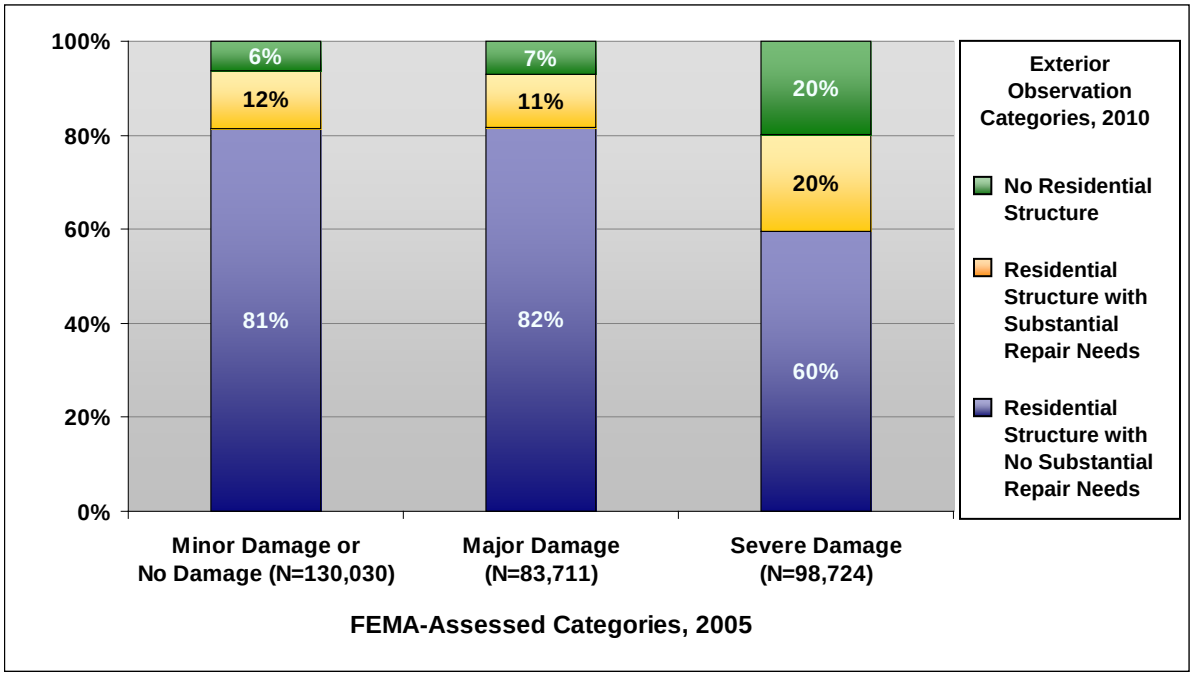
Exhibit 3-8 presents the estimates of housing conditions for the full study sample by FEMA damage assessment category. The exhibit clearly shows that properties that suffered "severe" damage in 2005 (based on FEMA assessment) are the most likely to be damaged as of early 2010. About 20 percent of the properties with severe damage in 2005 no longer contain a residential structure, and another 20 percent have a residential structure with substantial repair needs. At the same time, 60 percent of properties with severe damage in 2005 currently contain housing that does not have substantial repair needs in 2010 that can be observed from the outside.

Properties that experienced "severe" damage in 2005 are significantly more likely than properties with "minor or no" damage to have no residential structure in 2010. Properties with "severe" damage are also significantly more likely than properties with "minor or no" damage to contain a residential structure with substantial repair needs in 2010. These differences are statistically significant at the 5 percent level. At the same time, properties in the "major" damage category are *not* significantly different in their current repair needs from properties assessed as having "minor or no" damage in 2005.

This last finding is puzzling, but there are several contextual factors to keep in mind. First, it has been five years since Hurricanes Katrina and Rita, and the study has no way to control for damage that might have occurred in the meantime. Texas, in particular, experienced a great deal of damage from hurricanes in 2008, and we do not know whether current repair needs observed on properties are from the 2005 hurricanes or subsequent storms. Another factor is that there may be little difference at the margins between properties in the "major" and "minor" damage categories—that is, if properties in both categories were clustered around the cutoff point, the differences between them in the severity of damage might be small. Finally, the decision to repair, demolish, or leave standing but unrepaired may be influenced by factors other than the level of damage from the storm, such as the economic

value of the property and the neighborhood and the availability of financial assistance through programs such as CDBG. Chapters 4 and 5 examine the role of neighborhood characteristics and CDBG receipt in explaining patters of rebuilding. These and other factors affecting rebuilding will be analyzed more fully and definitively following the owner survey in the final report.

Exhibit 3-8. Estimates of Repair Needs by Assessed Damage Category



Source: Windshield observations conducted in January and February 2010.

Minor Damage or No Damage = Damage estimate of less than $5,200.
Major Damage = Damage estimate of $5,200 - $29,999, or less than 50 percent of the property value.
Severe Damage = Damage estimate of $30,000 or more, or more than 50 percent of the property value.

3.3 Habitability and Occupancy

This section provides estimates of habitability and occupancy rates among hurricane-affected properties on significantly affected blocks. As described in Chapter 2, the windshield observations considered a residential structure to be habitable if it was closed to the elements—with intact roof, windows, and doors—and had at least one point of entry and exit. Observers were instructed to code a property as non-habitable if these conditions were not met on any part of the property, so it is possible for a property to be non-habitable and occupied if part of the house is not sealed to the elements but people are living in another part.

The windshield observers counted a structure as occupied if they observed one or more signs of occupancy: occupants observed, vehicles in the driveway, lights on inside, furniture visible through the window, landscaping or yard or porch furniture, satellite dish, garbage can out front, or other signs of occupancy (see discussion in Section 2.4). Exhibit C-6 in Appendix C shows the distribution of the signs of occupancy observed.

We also used U.S. Postal Service (USPS) data from December 2009 to estimate occupancy rates among the properties in the windshield sample.[19] If an address has not received mail for 90 days or more, it is coded in the USPS data as "vacant." If the address does not contain a residential unit or is not receiving mail for other reasons it is coded "no status."[20] If an address is not in one of those two categories, mail has been actively delivered within the past 90 days and we consider the property to be occupied for the purpose of this analysis.

One advantage of the USPS measure compared to windshield observation is that it does not rely on an observer recording signs of occupancy at a given point in time. The two occupancy measures are generally consistent with one another but do not perfectly overlap. The correlation coefficient is 0.67. The USPS measure indicates occupancy for properties without an observed sign of occupation in roughly eight percent of cases. At the same time, four percent of properties that show signs of occupancy based on windshield observation are not currently receiving mail according to USPS records. These differences are not surprising, given the different types of information used to define occupancy and the different timeframes captured by the USPS and observation data. In the exhibits that follow, we present the two estimates of occupancy (observed and USPS) side by side.

Exhibit 3-9 presents estimates of habitability and occupancy for all hurricane-affected properties on significantly affected blocks in Louisiana, Mississippi, and Texas. Overall, we estimate that about 83 percent of all properties are habitable (that is, closed to the elements with at least one point of entry). If we exclude from the denominator those properties that no longer have a residential structure, 93 percent of properties with standing residential structures are habitable. Habitability varies somewhat by state; it is highest in Texas (92.4 percent) and lower in Louisiana and Mississippi (83.4 percent and 80.9 percent). The higher proportion of non-habitable properties in Louisiana and Mississippi may reflect the difficulty of making properties habitable after they experienced deep flooding.

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19 Documentation for the USPS vacancy data is available on the HUD User website [http://www.huduser.org/portal/datasets/usps.html]. Users can also download quarterly occupancy data for aggregated geographies. USPS vacancy data was available for 3,414 of the 3,511 addresses in our analysis sample. The 97 addresses with missing USPS data were dropped from analyses using the USPS measure of occupancy.

20 In our research sample, more than 90 percent of the addresses that are unoccupied based on USPS records are in the "no status" category. Excluding the addresses with missing USPS records, 65 percent of the properties with no signs of occupancy based on windshield observation are "no status" in the USPS records.

Exhibit 3-9. Estimates of Habitability and Occupancy by State

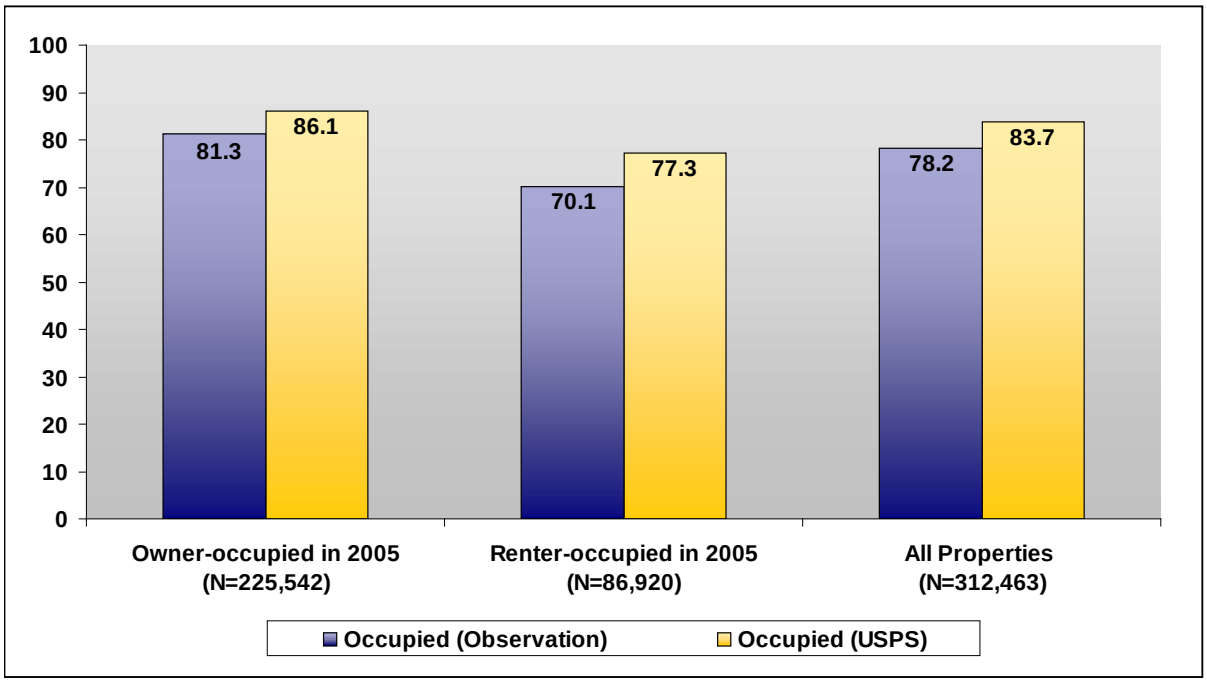
	Louisiana (N=217,401)			Mississippi (N=76,499)			Texas (N=18,563)			All (N=312,463)		
	Number	%	95% CL	Number	%	95% CL	Number	%	95% CL	Number	%	95% CL
Habitable	181,268	83.4	79.0-87.7	61,866	80.9	74.2-87.5	17,150	92.4	83.4-101.4	260,285	83.3	79.9-86.7
Occupied (windshield)	169,624	78.0	73.7-82.3	59,338	77.6	70.5-84.7	15,328	82.6	71.8-93.3	244,290	78.2	74.7-81.7
Occupied (USPS)	174,953	82.3	76.7-88.0	64,433	86.4	79.4-93.4	16,401	89.1	78.5-99.7	255,787	83.7	79.3-88.1

Source: Windshield observations conducted in January and February 2010; USPS vacancy data from December 2009, geo-coded to the addresses in the observation sample.

Occupancy rates among the three states range from 78.0 to 82.6 percent based on windshield observation and from 82.3 percent to 89.1 percent based on USPS records. Considering both data sources, Louisiana has the lowest occupancy rate and Texas the highest. The windshield observations result in lower estimates of occupancy than the USPS records. This is not surprising, given that the windshield observations are measuring occupancy based on signs of occupancy (such as cars in the driveway) at one point in time, which could be during the day when people are typically at work.

Exhibit 3-10 compares occupancy rates for owner- and renter-occupied properties. Properties that were owner-occupied in 2005 are more likely to be occupied as of 2010, while properties that were renter-occupied are more likely to be vacant. The difference is statistically significant at the five percent level for both the observed occupation measure and the measure based on USPS records. This is consistent with the earlier finding that owner-occupied properties are less likely to have substantial repair needs than renter-occupied properties (see Exhibit 3-6).

Exhibit 3-10. Estimates of Occupancy by 2005 Tenure



Source: Windshield observations conducted in January and February 2010; USPS vacancy data from December 2009, geo-coded to the addresses in the observation sample.

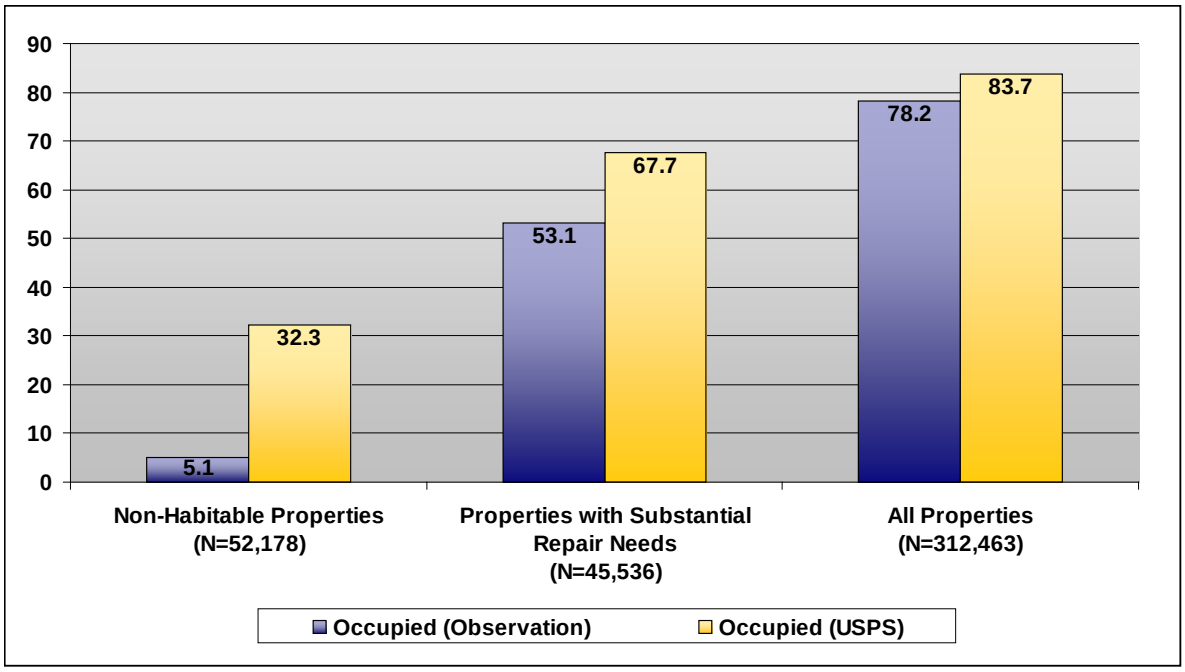
As might be expected, occupancy rates vary substantially by the condition of the property. As shown in Exhibit 3-11, occupancy rates are lower for properties with substantial repair needs and for properties that do not appear to be habitable based on windshield observation. Nonetheless, the estimates suggest that a non-trivial number of households may be living in housing that has substantial repair needs or that does not meet the Census definition of habitability.

The occupation of non-habitable properties is a puzzle. Given how we defined habitability—the house is sealed to the elements with at least one point of entry—it is possible that the property as a whole fails the criteria for habitability while sections of the house can be lived in. An example would be a house with a boarded-up front door but a working back door; the observers would not necessarily see the working point of entry. However, that house could have visible signs of occupancy, such as cars in the driveway, or be receiving mail. Another example is a house where part of the structure has broken windows and doors but another part is intact and sealed from the elements. This house would have been coded by the windshield observers as non-habitable even if there were signs that people were living there.

People may also continue to receive mail at an address when they are no longer living there. They may have moved somewhere nearby and still collect their mail from the old address periodically, or they may have neighbors or relatives collecting the mail. This would explain why 32 percent of the properties rated as non-habitable based on windshield observation in early 2010 appear to have received mail in the last three months of 2009 according to USPS records.

Properties that were renter-occupied as of 2005 are more likely to be non-habitable but occupied as of 2010 than properties that were owner-occupied. Renter-occupied properties represent 63 percent of properties that are non-habitable but occupied based on USPS records, but only 28 percent of all hurricane-affected properties on SABs. However, we do not yet know the extent to which these properties that were renter-occupied as of 2005 are also renter-occupied as of 2010. This is something that we will learn more about through the owner survey in the second part of the study.

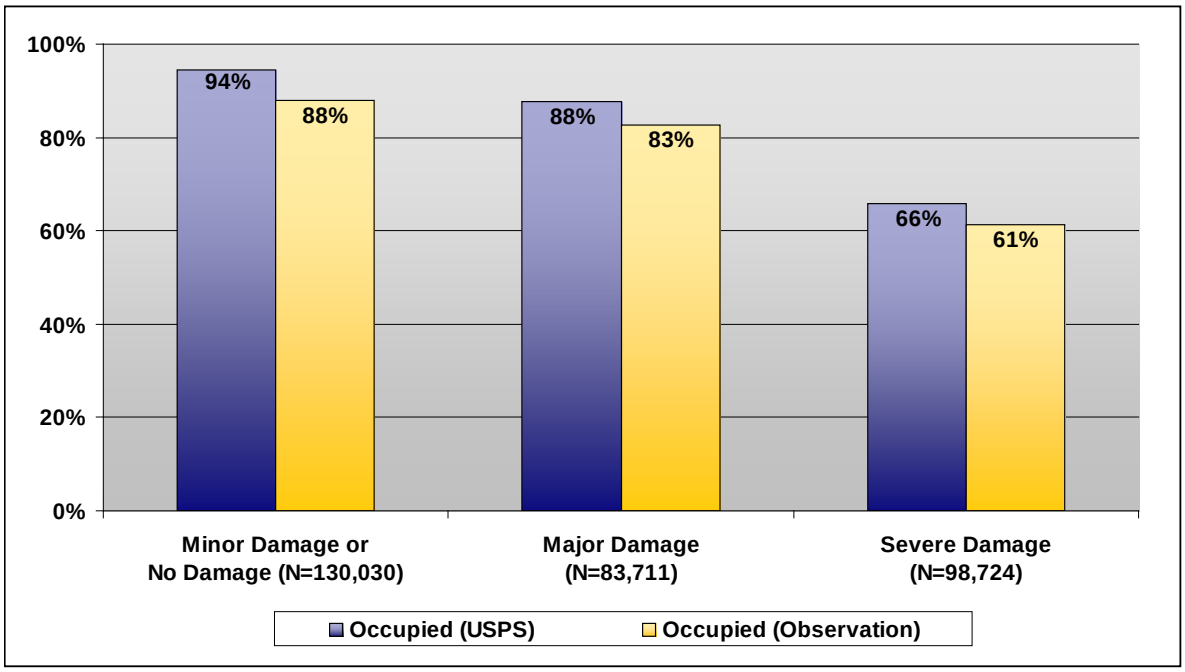
Exhibit 3-11. Estimates of Occupancy for Non-Habitable Properties and Properties with Substantial Repair Needs Based on 2010 Observation



Source: Windshield observations conducted in January and February 2010; USPS vacancy data from December 2009, geo-coded to the addresses in the observation sample.

As shown in Exhibit 3-12, properties that suffered "severe" damage in 2005 (according to the FEMA assessment) are least likely to be occupied as of early 2010. Vacancy rates among properties with severe damage, including those properties where the permanent residential structure no longer exists, range from 34 to 39 percent, compared to 12 to 17 percent among properties with major damage and 6 to 12 percent among properties with minor damage or no damage.

Exhibit 3-12. Current Occupancy Rates by 2005 FEMA Damage Assessment Categories



Source: Windshield observations conducted in January and February 2010; USPS vacancy data from December 2009, geo-coded to the addresses in the observation sample.

The correlation between the severity of damage and occupancy rates can also be seen in the estimates of occupancy by geographic area. Exhibit 3-13 shows, for each geographic area, the estimated percentages of properties that are occupied as of early 2010, based on windshield observation and USPS records. The areas with highest vacancy rates—New Orleans (LA), Hancock County (MS), and Biloxi (MS)—are also places where large shares of properties were assessed as having severe damage in 2005. Vacancy rates (based on USPS records) exceed 25 percent in Orleans Parish as a whole and in several of the New Orleans planning districts, as well as in Hancock County and Biloxi.

Exhibit 3-13. Percent of Properties with Observed Outcomes by Geography

Stratum	Total Affected Properties	Percent Occupied (Windshield Observation) [a]	Percent Occupied (USPS Data) [a]
Louisiana	**217,401**	**78.0%**	**82.3%**
Calcasieu and Cameron Parishes	12,041	88.9%	96.8%
Jefferson Parish	46,930	93.5%	98.2%
Orleans Parish	94,415	70.4%	74.1%
MidCity Planning District	15,291	68.9%	74.2%
Lakeview Planning District	7,258	66.9%	69.4%
Gentilly Planning District	16,011	74.0%	78.4%
ByWater Planning District	11,278	56.8%	64.2%
Lower Ninth Ward Planning District	6,621	46.4%	45.7%
New Orleans East Planning District	15,193	79.1%	83.2%
Uptown Planning District	11,006	74.4%	73.8%
St. Bernard Parish	24,025	62.6%	57.6%
St. Tammany Parish	25,610	87.5%	92.2%
Mississippi	**76,499**	**77.6%**	**86.4%**
Hancock County	7,789	50.0%	63.6%
Waveland and Bay St. Louis	4,192	70.1%	84.5%
Harrison County	31,247	80.4%	88.0%
Biloxi	6,323	59.7%	63.8%
Gulfport	11,701	87.7%	95.9%
Pass Christian and Long Beach City	8,506	76.1%	88.0%
Jackson County	32,571	80.3%	88.9%
Pascagoula	9,363	88.3%	88.6%
Texas	**18,563**	**82.6%**	**89.1%**
Total: All States	**312,463**	**78.2%**	**83.7%**

Source: Windshield observations conducted in January and February 2010; USPS vacancy data from December 2009, geo-coded to the addresses in the observation sample.

[a] This is the percent of properties that are occupied in each geographic area (that is, N=the number of affected properties in the stratum.)

3.4 Rebuilding Activity

This section presents estimates of rebuilding activity among hurricane-affected properties on significantly affected blocks. We analyze two measures of rebuilding activity: "observed rebuilding" and "inferred rebuilding." The observed rebuilding measure captures ongoing rebuilding activity as of early 2010 and comes directly from the windshield observations.[21] The inferred rebuilding

[21] The observers were instructed to note any signs of ongoing repair or rebuilding activity, such as construction workers on site, new construction materials on site, and temporary electrical meters on poles.

measure attempts to gauge the extent of rebuilding activity that has occurred since the 2005 hurricanes. We infer that rebuilding has occurred when a property assessed as having experienced "major" or "severe" damage does not have substantial repair needs as of 2010, based on windshield observation.

The measure of inferred rebuilding may undercount overall rebuilding since 2005, since some properties assessed as having minor or even no damage may have required rebuilding, and these are not counted. Furthermore, rebuilding may have occurred that returned the property to fair condition with repair needs remaining. Such properties would end up in the "substantial repair needs" category and would be coded as having not been rebuilt, even though partial rebuilding occurred. A factor working in the opposite direction is that the assessment of property conditions is based on external observation only. The proportion of damaged properties that have actually been rebuilt would be lower if properties that appear to be in good condition from the outside continue to have hurricane damage on the inside. We expect that the owner survey—to be conducted in the second part of the study—will provide more precise measures of habitability and past or present rebuilding activity.

The owner survey will also provide information on the extent to which the rebuilding that has taken place is new construction, versus repairs to a structure that pre-dated the 2005 hurricanes. Although the windshield observation instrument asked the observers to categorize each residential structure as either newly-constructed or pre-existing, in most cases it was not possible for them to make the distinction.

Observed Rebuilding

The windshield observations in early 2010 detected little ongoing repair or rebuilding activity: only 3.8 percent of hurricane-affected properties on significantly affected blocks had observed rebuilding as of early 2010 (Exhibit 3-14).[22] The rate of observed rebuilding varied somewhat by damage category, with the highest rate occurring among properties with "major" damage in 2005. We found no significant difference between owner-occupied and renter-occupied properties.

Exhibit 3-14. Properties with Observed Rebuilding Activity by 2005 FEMA Damage Category

	Total Number of Properties	Number of Properties with Observed Rebuilding	Percent of Properties with Observed Rebuilding
Minor Damage or No Damage	130,030	3,060	2.4%
Major Damage	83,711	5,439	6.5%
Severe Damage	98,724	3,414	3.5%
Total: All Properties	**312,465**	**11,913**	**3.8%**

Source: Windshield observations conducted in January and February 2010.

[22] Observed rebuilding includes any type of rebuilding or renovation work, including minor rehabilitation. This is a broader definition of rebuilding than that used in Exhibit 3-5, which showed that 0.4 percent of properties were undergoing such extensive reconstruction that their condition could not be assessed.

Exhibit 3-15 presents estimates of observed rebuilding activity by geographic area. The places with the largest share of observed properties showing signs of active rebuilding as of early 2010 are the Lakeview Planning District of New Orleans (13.4 percent), the Gentilly Planning District of New Orleans (8.1 percent), and the municipalities of Waveland and Bay St. Louis in Mississippi (9.3 percent).

Exhibit 3-15. Observed Rebuilding Activity by Geography

Stratum	All Affected Properties	Properties with Observed Rebuilding	
	Number	Percent[a]	95% CL
Louisiana	**217,401**	**3.7%**	**2.6-4.8**
Calcasieu and Cameron Parishes	12,041	3.9%	0.3-7.6
Jefferson Parish	46,930	3.0%	1.0-5.0
Orleans Parish	94,415	5.4%	3.3-7.4
MidCity Planning District	15,291	1.6%	0*-4.1
Lakeview Planning District	7,258	13.4%	0*-28.9
Gentilly Planning District	16,011	8.1%	4.7-11.5
ByWater Planning District	11,278	5.1%	1.4-8.9
Lower 9th Ward Planning District	6,621	1.2%	0*-2.9
New Orleans East Planning District	15,193	0.9%	0*-2.4
Uptown Planning District	11,006	5.5%	0.8-10.3
St. Bernard Parish	24,025	2.0%	0.4-3.7
St. Tammany Parish	25,610	1.0%	0*-2.7
Mississippi	**76,499**	**4.3%**	**3.0-5.6**
Hancock County	7,789	6.0%	2.5-9.5
Waveland and Bay St. Louis	4,192	9.3%	4.6-14.0
Harrison County	31,247	5.2%	3.1-7.3
Biloxi	6,323	2.8%	0*-6.8
Gulfport	11,701	5.6%	3.8-7.3
Pass Christian and Long Beach City	8,506	7.2%	1.0-13.4
Jackson County	32,571	3.4%	1.3-5.6
Pascagoula	9,363	2.6%	0.0-5.2
Texas	**18,563**	**3.0%**	**0*-7.1**
Total: All States	**312,463**	**3.8%**	**2.9-4.7**

Source: Windshield observations conducted in January and February 2010.

[a] This is the percent of properties in each geographic area with observed rebuilding (that is, N=the number of affected properties in the stratum.)

* The lower bound confidence interval was rounded up to 0.

Inferred Rebuilding

Exhibit 3-16 presents summary estimates of the current repair needs and inferred rebuilding status of properties that experienced major or severe damage in 2005. Among properties that experienced severe damage, we estimate that 59.6 percent contain permanent residential structures with no substantial repair needs as of early 2010. Another 20.5 percent contain residential structures with substantial repair needs, and 19.9 percent contain no residential structure at all. We know that those properties that no longer contain permanent housing structures have not been rebuilt. We cannot be sure that properties where the residential structure continues to have substantial repair needs have had no rebuilding activity since the hurricanes. However, we can infer safely that properties that were severely damaged in 2005 and now have no substantial repair needs have been rebuilt. This is the inferred rebuilding estimate: **59.6 percent of properties that suffered severe damage in 2005 have been rebuilt, as have 81.6 percent of properties that suffered major damage in 2005, and 69.7 percent of properties across both categories.**

Properties with inferred rebuilding are properties that were assessed with "major" or "severe" damage in 2005 and that contained a permanent residential structure with no substantial repair needs in 2010.

Exhibit 3-16. Estimates of Current Condition and Inferred Rebuilding Status of Properties with Major or Severe Hurricane Damage in 2005

	Severe Damage			Major Damage			Major or Severe Damage		
	Number	Percent	95% CL	Number	Percent (S.E.)	95% CL	Number	Percent (S.E.)	95% CL
Property contains **no residential structure**	19,639	19.9	12.7-27.1	5,970	7.1	5.1-9.1	25,608	14.0	9.4-18.7
Property contains a residential structure with **substantial repair needs**	20,227	20.5	14.5-26.5	9,429	11.3	8.6-14.0	29,656	16.3	12.9-19.6
Property contains a residential structure with **no substantial repair needs**	58,857	59.6	53.9-65.3	68,312	81.6	78.3-84.9	127,170	69.7	65.5-73.9
Total	**98,723**	**100**		**83,711**	100		**82,435**	100	
Property has been "rebuilt" (Inferred Rebuilding)	**58,857**	**59.6**	**53.9-65.3**	**68,312**	**81.6**	**78.3-84.9**	**127,170**	**69.7**	**65.5-73.9**

Source: Windshield observations conducted in January and February 2010.

The rate of inferred rebuilding among properties identified as owner-occupied in 2005 is higher than among properties identified as renter-occupied. Of the owner-occupied properties that experienced major or severe damage in 2005, we can infer that an estimated 74.1 percent have been rebuilt. This compares to 60.4 percent for renter-occupied properties.

Exhibit 3-17 presents estimates of inferred rebuilding by geographic area. The areas with the highest rates of inferred rebuilding are Jefferson Parish (94.7 percent) and St. Tammany Parish (86.2 percent)

in Louisiana, and Pascagoula in Mississippi (89.2 percent). Three New Orleans Planning Districts – MidCity, Lower Ninth Ward, and ByWater – as well as Biloxi, Mississippi, have inferred rebuilding rates of less than 50 percent. In other works, in these areas, fewer than half the properties that experienced major or severe damage in 2005 contain housing without substantial repair needs as of early 2010. Some of the geographic areas with the lowest rates of rebuilding are those that had the highest number of properties with major or severe damage in 2005, but this is not true in all cases.

Exhibit 3-17. Inferred Rebuilding by Geography

Stratum	Properties with Major or Severe Damage in 2005	Properties with Inferred Rebuilding in 2010	
	Number	Percent[a]	95% CL
Louisiana	**136,926**	**69.4**	**64.7-74.2**
Calcasieu and Cameron Parishes	3,124	66.7	48.1-85.3
Jefferson Parish	21,073	94.7	91.4-98.1
Orleans Parish	79,925	63.7	57.7-69.8
MidCity Planning District	13,638	43.0	26.5-59.5
Lakeview Planning District	6,981	74.8	61.7-88.0
Gentilly Planning District	12,123	76.1	64.3-87.8
ByWater Planning District	10,144	49.4	37.2-61.6
Lower 9th Ward Planning District	6,385	47.5	30.2-64.9
New Orleans East Planning District	14,041	82.6	70.2-95.0
Uptown Planning District	9,222	71.1	50.2-91.9
St. Bernard Parish	20,742	61.2	46.3-76.0
St. Tammany Parish	5,631	86.2	73.1-99.2
Mississippi	**41,072**	**69.4**	**59.7-79.2**
Hancock County	6,812	50.8	30.4-71.2
Waveland and Bay St. Louis	3,695	67.7	45.7-89.6
Harrison County	12,551	64.8	55.6-74.0
Biloxi	4,250	49.6	33.0-66.1
Gulfport	3,755	81.9	67.6-96.3
Pass Christian and Long Beach City	3,488	54.2	32.9-75.6
Jackson County	20,726	78.2	59.8-96.6
Pascagoula	8,166	89.2	76.9-1**
Texas	**4,436**	**80.7**	**67.9-93.5**
Total: All States	**182,434**	**69.7**	**65.5-73.9**

Source: Windshield observations conducted in January and February 2010.

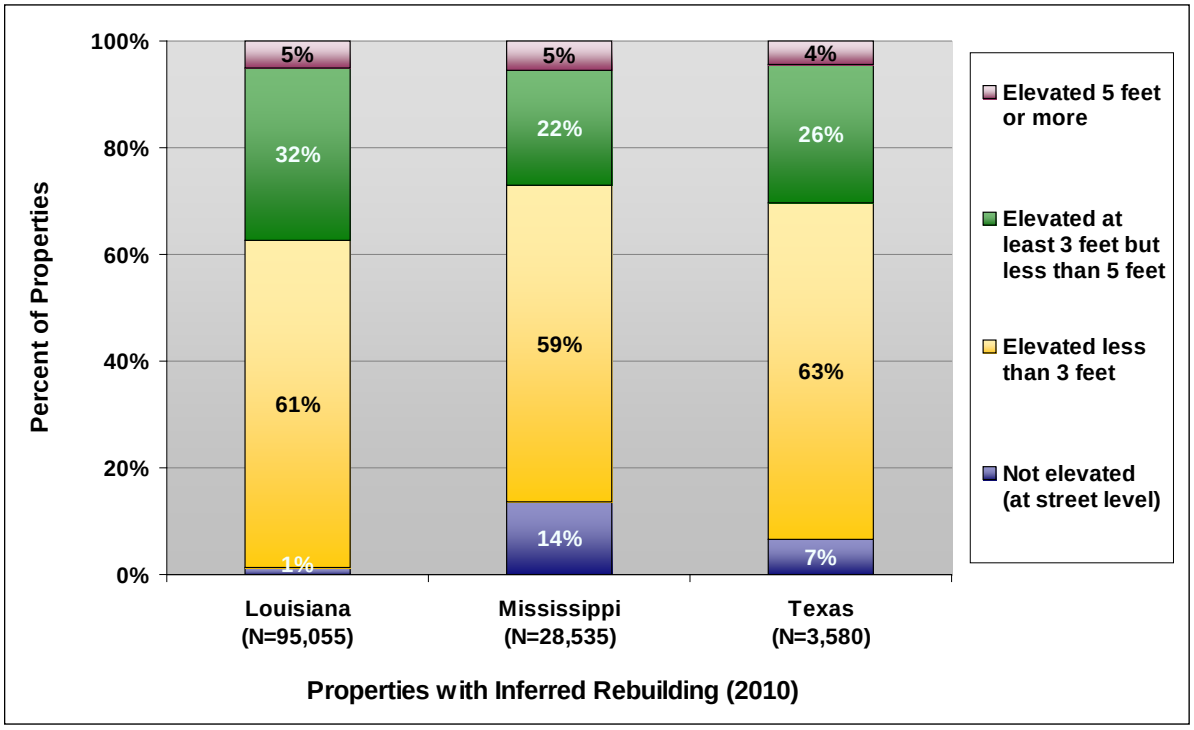
[a] Properties with inferred rebuilding as a percent of properties with major or severe damage in each geographic area.

**The upper bound confidence interval was rounded down to 1.

The inferred rebuilding measure in Texas is hard to interpret because of the major damage to housing in the state caused by Hurricane Ike in 2008. Texas had a relatively low number of properties assessed as having sustained major or severe damage in 2005 (4,436 of 18,693 assessed properties, or 24 percent), but many more properties were likely affected in 2008. Properties that suffered minor or no damage in 2005, but major damage from Hurricane Ike, are not captured by the inferred rebuilding measure. The owner survey will provide more detailed information on the extent of rebuilding that has taken place since 2005 in all three states in the study.

Exhibit 3-18 presents estimates of the current elevation of rebuilt properties based on the windshield observations. In all three states, the majority of rebuilt properties are either not elevated or elevated less than three feet from street level. Louisiana has the largest share of properties elevated three feet or more (37 percent). These findings are difficult to interpret, given that we do not know the recommended elevation for each property. In the next phase of the study, we will analyze the observed and owner-reported elevation for each rebuilt property against the Base Flood Elevation or Advisory Base Flood Elevation for that property.[23]

Exhibit 3-18. Observed Elevation Among "Rebuilt" Properties



Source: Windshield observations conducted in January and February 2010.

[23] The Base Flood Elevation (BFE) is the computed elevation to which floodwater is anticipated to rise during the base flood (also known as the "100-year flood"). BFEs are shown on Flood Insurance Rate Maps (FIRMs) and on the flood profiles. The BFE is the regulatory requirement for the elevation of structures. The relationship between the BFE and a structure's elevation determines the flood insurance premium. Advisory Base Flood Elevations (ABFEs) are in place in some communities while new FIRMs are being completed.

3.5 Summary of Findings

This chapter presented estimates of housing conditions across all significantly affected blocks in Louisiana, Mississippi, and Texas, based on property observations conducted on a sample of 230 such blocks across the three states. We obtained the estimates by weighting the property-level windshield observations in each geographic area to represent all hurricane-affected properties on SABs in that area. We also provided estimates on parcel contents and repair needs of residential structures, habitability and occupancy of residential structures, and rebuilding activity.

Parcel Contents and Repair Needs

We estimate that across the three states in the study, some 312,463 residential properties located on SABs were affected by the hurricanes. (Properties affected by the hurricanes but not located on a significantly affected block are not part of the study.) Based on the windshield observations, we estimate, of all affected properties on SABs, that:

- ***10.8 percent did not contain a permanent residential structure as of early 2010***. In other words, the lot was empty or contained only temporary housing such as a FEMA trailer. Given that these properties contained housing that was assessed for damage in 2005, we can assume the housing was either destroyed by the hurricanes or demolished at some point since.
- ***14.6 percent contained a residential structure with substantial repair needs as of early 2010***. Substantial repair needs means the property has at least one observable repair need and is not in excellent or good condition overall.
- ***74.6 percent contained a residential structure with no substantial repair needs.*** That is, about three-quarters of all assessed properties on significantly affected blocks are in good condition as of early 2010.

The extent to which properties contain no permanent residential structure or contain a structure with substantial repair needs varies based on the level of hurricane damage assessed in 2005, the tenure of the property at the time of the hurricanes, and the location of the property:

- ***Properties that experienced "severe" damage in 2005 are more likely to have no residential structure or a residential structure with substantial repair needs as of 2010***. We estimate that 20 percent of the properties with severe damage in 2005 currently have no residential structure, and another 20 percent have a structure with substantial repair needs. By contrast, 11-12 percent of properties with major or minor damage in 2005 have no residential structure, and 6-7 percent have a structure with substantial repair needs.
- ***Properties that were owner-occupied in 2005 are significantly less likely to contain a residential structure with substantial repair needs in 2010*** than properties that were renter-occupied in 2005. Owner-occupied properties are as likely as renter-occupied properties to have no residential structure at all.

- ***Some areas have much higher proportions of properties with no residential structure or substantial repair needs than others***. In Louisiana, the Lower Ninth Ward Planning District of New Orleans and St. Bernard Parish have the highest percentage of properties without a residential structure. In Mississippi, Hancock County, Biloxi, and Waveland/Bay St. Louis are most likely to have empty lots. Overall, Mississippi has the highest estimated percentage of properties without residential structures, but it has a relatively small share of structures with substantial repair needs. By contrast, Texas has a low percentage of properties with no residential structure but where one-fourth of the existing structures have substantial repair needs.

Habitability and Occupancy

We estimated the percentage of properties that are habitable and occupied as of early 2010, using the Census definition of habitability: sealed from the elements and with at least one point of entry). We estimated occupancy rates based on windshield observation and compared these estimates to data from USPS records matched to the observation sample. We found that:

- ***About 83 percent of properties overall, and 93 percent of properties with a standing residential structure, meet the criteria for habitability.***
- ***Occupancy rates among the three states range from 78.0 to 82.6 percent based on windshield observation and from 82.3 percent to 89.1 percent based on USPS records.*** Considering both data sources, Louisiana has the lowest occupancy rate and Texas the highest.
- ***Properties that were owner-occupied in 2005 are significantly more likely to be occupied as of 2010 than properties that were renter-occupied.*** The occupancy rate for properties that were owner-occupied at the time of the hurricanes is 86.1 percent based on USPS records, compared to 77.3 percent for properties that were occupied by renters.
- ***Occupancy rates vary by the condition of the property.*** Occupancy is lower among properties with substantial repair needs and properties that do not appear to be habitable. Nonetheless, the estimates suggest that a non-trivial number of households may be living in housing that has substantial repair needs or that does not meet the Census definition of habitability.

Rebuilding Activity

We examined rebuilding activity among hurricane-damaged properties. We used two measures of rebuilding: *observed rebuilding*, which captures ongoing construction activity as of early 2010, and *inferred rebuilding*, which considers the percentage of properties that sustained major or severe damage in 2005 and that have residential structures with no substantial repair needs in early 2010.

We observed very little active rebuilding on the properties in our sample. ***Based on the observations, we estimate that less than four percent of affected properties on SABs were actively under construction in January-February 2010. At the same time, we infer from exterior observation that approximately 69.7 percent of properties have been "rebuilt" since 2005.*** The rate of rebuilding is

higher among properties that were owner-occupied in 2005 (74.1 percent) and highest (among the geographic areas) in Jefferson Parish and St. Tammany Parish (Louisiana) and Pascagoula (Mississippi). Three New Orleans Planning Districts – MidCity, Lower Ninth Ward, and ByWater – as well as Biloxi, Mississippi, have inferred rebuilding rates of less than 50 percent, meaning that less than half the properties with major or severe damage no longer have substantial repair needs.

4. Repair Needs and Rebuilding by Block and Neighborhood

This chapter examines the extent to which properties in the study that continue to have substantial repair needs in early 2010 are concentrated or clustered on certain blocks and in certain neighborhoods. Where Chapter 3 documented the current condition and repair needs of individual properties, states, and geographies such as cities and parishes in Louisiana, this chapter describes the distribution of repair needs across blocks and neighborhoods.

The presence of clustered repair needs is important because property owners' rebuilding decisions may be interdependent, with remaining damage to one or several properties on a block affecting the outcomes for neighboring properties. Vacant and damaged properties reduce the value of neighboring properties to the extent that they visibly affect the block face. The decisions of some property owners not to rebuild can also affect the local property tax base and the public services provided to returning residents. As a result, rebuilding activity may be slower among blocks with large numbers of properties in need of repair than among blocks where repair needs are less concentrated.

This chapter is organized into four sections. Section 4.1 examines the extent to which observed repair needs and inferred rebuilding activity cluster in neighborhoods. Section 4.2 identifies blocks with concentrated repair needs and then compares the characteristics of these blocks to blocks without concentrated repair needs. Section 4.3 uses multivariate regression analysis to identify neighborhood characteristics associated with inferred rebuilding. Section 4.4 documents the condition of block infrastructure. Section 4.5 summarizes the findings of the chapter.

4.1 Clustering of Repair Needs and Rebuilding Across Blocks

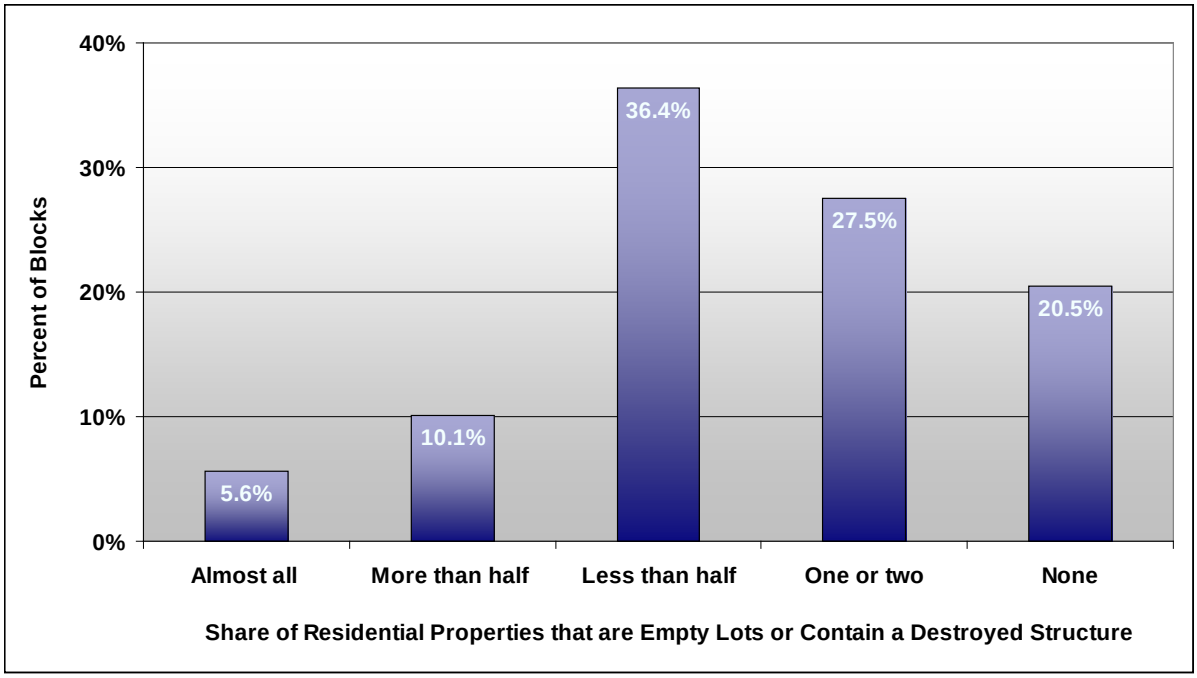
There are two ways to produce estimates of the concentration of repair needs at the block level. First, the windshield observations included a block-level observation that asked observers to record information on the condition of the housing stock and the block infrastructure for each block as a whole. Second, we can aggregate the property-level observations discussed in Chapter 3 to produce estimates of repair needs and rebuilding at the block level.

Exhibit 4-1 shows the clustering of vacant and severely damaged housing across significantly affected blocks (SABs) based on the block-level observations. For each block, the observers recorded the proportion of *residential properties* on the block that were vacant, empty, or destroyed.[24] Exhibit 4-1 should be read as follows: on 5.6 percent of SABs, almost all the residential properties are empty lots or contain a destroyed structure; on 10.1 percent of SABs, more than half (but not almost all) the residential properties are empty lots or contain a destroyed structure, etc.

[24] Vacant, empty, or destroyed means that either there is no structure on the property ("vacant" or "empty") or the structure is present but very severely damaged ("destroyed").

The estimates presented in Exhibit 4-1 suggest that, as of early 2010, on 15.7 percent of SABs, half or more of all residential lots are empty or contain a destroyed structure. At the other end of the spectrum, one-fifth of all SABs (20.5 percent) have no empty residential lots or residential lots with a destroyed structure, and another 27.5 percent of blocks have only one or two residential lots that are empty or contain a destroyed structure.[25]

Exhibit 4-1. Percent of Significantly Affected Blocks by Proportion of Residential Properties that are Empty Lots or Contain a Destroyed Structure in 2010



Source: Windshield observations conducted in January and February 2010.

Note: Empty lots mean properties that contain not permanent residential structure as of early 2010.

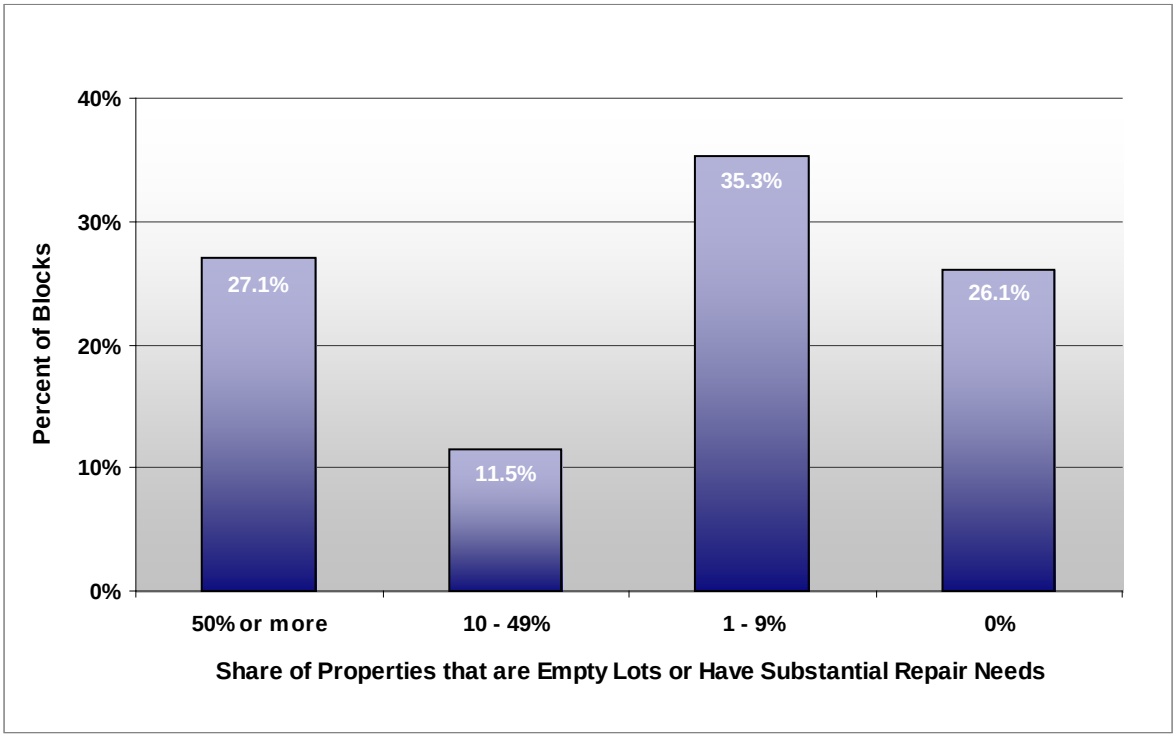
N=230 blocks, weighted to represent 15,399 SABs.

An alternative measure of the clustering of repair needs by block can be created from aggregating the property-level observations. Exhibit 4-2 presents the distribution of blocks by the percent of observed properties that are either empty lots or contain residential structures with substantial repair needs. Fewer empty lots appear in this measure than in Exhibit 4-1, because lots that were empty prior to the hurricanes were not assessed by FEMA and, therefore, were not included in the property-level windshield observations. These lots were included, however, in the block-level assessment of the share of residential properties on the block that are vacant, empty, or destroyed.

[25] We also analyzed non-residential properties and found that most SABs (69.8 percent) do not contain any non-residential properties. About 17 percent of SABs have one or more non-residential properties, but none of these were observed to be empty lots or contain a destroyed structure. Overall, we estimate that 95.5 percent of SABs contain two or fewer non-residential properties that are empty lots or lots containing a destroyed structure.

Exhibit 4-2 should be read as follows: on 27.1 percent of SABs, a majority of residential properties (50 percent or more) are either empty lots or have substantial repair needs. At the same time, 26.1 percent of SABs have no residential empty lots and no residential properties with substantial repair needs. The remaining 46.7 percent of blocks have some number of properties (more than zero but less than 50 percent of all properties) that as of 2010 are empty lots or have substantial repair needs.[26] The overall finding from Exhibit 4.2 is consistent with that from Exhibit 4.1: empty lots and housing with substantial repair needs tend to be clustered on certain blocks.

Exhibit 4-2. Condition of Sampled Blocks in 2010 based on Observed Properties



Source: Windshield observations conducted in January and February 2010.

N=230 blocks, weighted to represent 15,399 SABs.

[26] Empty lots and structures with substantial repair needs do not necessarily cluster on the same blocks. The correlation coefficient between the percent of properties on the block that have no residential structure and the percent of properties on the block that contain structures with substantial repair needs is -.18, indicating that clusters of each type of property are more likely to appear on different blocks than on the same blocks.

Exhibit 4-3 describes the distribution of significantly affected blocks by the percent of properties rebuilt, using the inferred rebuilding measure described in Chapter 3. We estimate that there are 3,499 SABs across the three states in the study where fewer than 50 percent of the properties that suffered major or severe damage in 2005 have been rebuilt as of early 2010. This represents 23 percent of all SABs. At the other end of the spectrum, there are 4,595 SABs (30 percent of the total) where we estimate that 100 percent of properties with major or severe damage have been rebuilt.

Properties with inferred rebuilding =
Properties with major or severe damage in 2005 and a permanent residential structure with no substantial repair needs in 2010.

Exhibit 4-3. Inferred Rebuilding on Significantly Affected Blocks

	Percent of properties on the block with inferred rebuilding as of early 2010:					
	<50%	50-74%	75-89%	90-99%	100%	Total
Estimated number of SABs	3,499	3,480	2,638	1,187	4,595	15,399
Percent of SABs	23%	23%	17%	8%	30%	100%

Source: Windshield observations conducted in January and February 2010.

Exhibit 4-4 shows the estimated number of properties with major or severe initial damage that were not repaired by early 2010. This includes properties that were vacant or empty, as well as properties that contained residential structures with substantial repair needs. The exhibit also shows the percent of unrepaired properties that showed signs of rebuilding activity at the time of the windshield observation (observed rebuilding). Generally, the percent of unrepaired properties with observed rebuilding is higher on blocks where a large share of properties have been rebuilt. For example, 8.7 percent of unrepaired properties have observed rebuilding activity on blocks where 75-89 percent of the properties have been rebuilt, compared to 1.6 percent of properties on blocks where less than 50 percent of the properties have been rebuilt.

Exhibit 4-4. Number of Unrepaired Properties on Significantly Affected Blocks, By Percent of Damaged Properties on the Block that Are Rebuilt

	Percent of properties on the block with inferred rebuilding as of early 2010:					
	<50%	50-74%	75-89%	90-99%[a]	100%	Total
Estimated number of unrepaired properties on SABs	27,406	19,919	6,782	1,796	0	55,902
Percent of unrepaired properties *with* construction activity	1.6%	3.2%	8.7%	9.5%	N/A	3.3%
Percent of unrepaired properties *without* construction activity	98.4%	96.8%	91.3%	90.5%	N/A	96.7%

Source: Windshield observations conducted in January and February 2010.

[a] Estimates in this category should be interpreted with caution because they are based on only 14 windshield observations.

4.2 Characteristics of Blocks with Concentrations of Empty Lots and Housing with Concentrated Repair Needs

The previous exhibits show that properties with substantial repair needs are not distributed evenly across significantly affected blocks. Instead, blocks vary in the extent to which affected properties have been rebuilt and contain units without substantial repair needs. This section of the chapter and the next examine whether the presence of concentrated repair needs is associated with neighborhood housing and demographic characteristics. The analysis relies on data from the 2000 Census, which provide detailed neighborhood characteristics at the Census block group level. The neighborhood for each sample block is defined as the surrounding block group, using Census boundaries. The information drawn from the 2000 Census provides pre-storm characteristics that reflect the state of the neighborhood some time prior to the 2005 hurricanes.

In this section, we examine the characteristics of the blocks that have ***concentrated repair needs*** in 2010, defining this term to include blocks where at least 50 percent of affected properties are either empty lots (with no residential structure) or contain residential structures with substantial repair needs.[27] As shown in Exhibit 4.2, 27.1 percent of SABs have concentrated repair needs.

Concentrated repair needs means that at least 50 percent of the hurricane-affected properties on the block are either empty lots or contain a residential structure with substantial repair needs as of early 2010.

The analysis in this section does not control for initial damage assessed by FEMA from the 2005 storms. Instead, it seeks to identify the characteristics of the neighborhoods that currently have concentrations of repair needs. Section 4.3 presents multivariate models that control for initial damage in examining neighborhood patterns of housing recovery.

Exhibits 4-5 through 4-7 compare the neighborhood characteristics of blocks with and without concentrated repair needs in early 2010. The first column presents the overall mean for all SABs, the second column presents the mean for SABs with concentrated repair needs, and the third column presents the mean for SABs without concentrated needs. The final column tests whether the difference between the mean values for blocks with and without concentrated repair needs are statistically significant, displaying the p-value of the T-test of the difference in means.[28]

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[27] This measure identifies blocks where fewer than one in two *FEMA-assessed* properties has been rebuilt. In some cases FEMA may not have assessed all properties and, therefore, blocks we identify as having at least 50 percent of properties may have a lower percentage.

[28] The p-value indicates the probability that the difference between the means for blocks with and without concentrated repair needs is due purely to chance. For example, a p-value of .05 indicates that there is a 95 percent chance that the difference in means would not appear in a random distribution.

Exhibit 4-5. Housing Characteristics in 2000 of Blocks with Concentrated Repair Needs in 2010

Neighborhood Characteristics, Census 2000	All Blocks[a]	Blocks with Concentrated Repair Needs[b]	Blocks without Concentrated Repair Needs[c]	T-test of Difference in Means
	Mean	Mean	Mean	p-value
Median home value	$87,024	$71,705	$92,442	.001**
Percent of housing units owned	66.6%	58.8%	69.4%	.001**
Percent of housing units occupied	89.6	85.3	91.1	<.001**
Median age of housing stock	33.1	37.8	31.5	.003**
Median tenure of tract residents	8.3	8.3	8.3	.958
Percent small multifamily: 2-4 units	27.8	31.6	26.5	.064
Percent large multifamily: 5+ units	16.0	17.5	15.4	.395
Urban (vs. rural)	85.3	90.0	83.6	.135

Source: Block group counts from the 2000 decennial Census.

[a] N=230 blocks weighted to represent 15,399 SABs.

[b] N=64 blocks weighted to represent 4,023 SABs with concentrated repair needs. Concentrated repair needs means that at least 50 percent of hurricane-affected properties are empty lots or have substantial repair needs as of 2010.

[c] N=166 blocks weighted to represent 11,376 SABs without concentrated repair needs. No concentrated repair needs means that fewer than 50 percent of hurricane-affected properties are empty lots or have substantial repair needs as of 2010.

*p<.05; **p<.01

Exhibit 4-5 shows that blocks with concentrated repair needs are clustered in neighborhoods that, five years before the hurricanes, had lower home values, older housing, lower rates of homeownership, and higher vacancy rates. In neighborhoods with concentrated repair needs as of 2010, only 59 percent of housing units were owner-occupied in 2000, compared with 69 percent in neighborhoods without concentrated repair needs. Similarly, the median home value in 2000 in neighborhoods with concentrated repair needs was $71,705, compared with $92,442 for neighborhoods without concentrated repair needs.

The 2000 occupancy rate (one minus the vacancy rate) for neighborhoods with concentrated repair needs is also significantly lower than the rate for neighborhoods without concentrated repair needs. The difference is six percentage points relative to occupancy rates between 80 and 90 percent.

The average housing unit in the neighborhoods around blocks with concentrated repair needs was 38 years old in 2000, compared to 31 years for other neighborhoods. The difference between neighborhoods with and without concentrated repair needs is also marginally significant with respect to the proportion of small multifamily units. However, no significant differences across neighborhoods are found with respect to the median tenure of neighborhood residents and the urban (vs. rural) location of the neighborhood.

Exhibit 4-6 examines the demographic composition in 2000 of neighborhoods containing blocks with concentrated repair needs. The patterns shown are similar to the socioeconomic differences implied by the gaps in home value and homeownership rates shown in Exhibit 4-5. Neighborhoods containing blocks with concentrated repair needs had significantly lower median household incomes in 2000, averaging $28,386 compared to $38,370 for neighborhoods that do not contain blocks with concentrated repair needs. At the lower end of the income distribution, neighborhoods with concentrated repair needs also contained significantly more households receiving public assistance income, as well as significantly more households whose income fell below 150 percent of the poverty line. The percent of working-age residents (ages 21-64) who reported employment in 2000 was also significantly lower among neighborhoods with concentrated repair needs.

Exhibit 4-6. Demographic Characteristics in 2000 of Blocks with Concentrated Repair Needs in 2010

Neighborhood Characteristics, Census 2000	All Blocks[a]	Blocks with Concentrated Repair Needs[b]	Blocks without Concentrated Repair Needs[c]	T-test of Difference in Means
	Mean	Mean	Mean	p-value
Median household income	$35,761.4	$28,385.7	$38,370.2	<.001**
Percent population below 150% poverty line	29.2%	36.3%	26.7%	<.001**
Percent population receive public assistance	3.8	5.5	3.2	.002**
Percent employed (age 21-64)	66.7	61.5	68.5	<.001**
Percent with a college degree	17.8	12.5	19.6	<.001**
Percent with some post-secondary education	57.2	57.3	57.2	.922
Percent married/partnered	51.3	45.0	53.5	<.001**
Average household size	2.6	2.6	2.7	.297
Percent black	38.3	45.9	35.6	.079
Percent Hispanic	3.2	2.2	3.6	.018*
Percent other minority	4.2	3.8	4.4	.436
N	**230**	**64**	**166**	

Source: Block group counts from the 2000 decennial Census.

[a] N=230 blocks weighted to represent 15,399 SABs.

[b] N=64 blocks weighted to represent 4,023 SABs with concentrated repair needs. Concentrated repair needs means that at least 50 percent of hurricane-affected properties are empty lots or have substantial repair needs as of 2010.

[c] N=166 blocks weighted to represent 11,376 SABs without concentrated repair needs. No concentrated repair needs means that fewer than 50 percent of hurricane-affected properties are empty lots or have substantial repair needs as of 2010.

*p<.05; **p<.01

In addition to these differences in income and employment, the demographic variables in Exhibit 4-6 also show statistically significant differences in education, marital status, and ethnic composition. First, neighborhoods containing blocks with concentrated repair needs contained fewer college graduates in 2000 than other neighborhoods. Second, although neighborhoods with and without concentrated repair needs had similar household sizes, the proportion of residents who were married is significantly lower in neighborhoods with concentrated repair needs. Lastly, neighborhoods with concentrated repair needs have a significantly lower proportion of Hispanic residents.[29]

4.3 Association of Neighborhood Characteristics with Rebuilding

In this section, we present a series of regression models designed to identify the association between neighborhood characteristics and the likelihood that a property is currently rebuilt. ***We limit the analysis to properties assessed by FEMA as having experienced major or severe damage from the hurricanes*** in order to be able to isolate those properties with inferred rebuilding. Focusing on properties with major or severe assessed damage in 2005 does not control perfectly for differences in initial damage, but it enables us to do exploratory analysis of neighborhood patterns of rebuilding activity.[30]

We developed three regression models in which the dependent variable is a binary (yes/no) indicator of inferred rebuilding and the independent (explanatory) variables are the demographic and housing characteristics of the neighborhoods in which the properties are located. We infer that a property has been rebuilt if it had major or severe damage in 2005 and as of 2010 contains a residential structure with no substantial repair needs based on windshield observation. The independent variables in the model come from the 2000 Census, and thus they describe neighborhood conditions prior to the 2005 hurricanes. The Census data are at the block group level, so we make the assumption that the characteristics of the block group accurately represent the characteristics of the neighborhood in which the property is located.

Exhibit 4-7 presents the estimation results from the three regression models. Model I includes the set of housing characteristics, Model II includes the demographic characteristics, and Model III presents the fully-specified model—both housing and neighborhood characteristics. For each model, the exhibit presents the odds ratio and significance level produced by the logistic regressions. The odds ratio measures the relative change in the likelihood of the outcome that is associated with a one unit change in the independent variable. An odds ratio of 1 indicates that no association exists. An odds ratio above 1 indicates that an increase in the independent variable (for example, in percent of housing units owned) is associated with a higher likelihood that the outcome (in this case, inferred rebuilding) is observed. An odds ratio below 1 indicates that a decrease in the independent variable is associated with a lower likelihood that the outcome is observed.

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[29] Neighborhoods with concentrated repair needs also have a higher percentage of African-American residents, but this difference is not statistically significant.

[30] We also ran regression models to explain (a) the likelihood that a property is an empty lot as of 2010 (i.e., does not contain a residential structure) and (b) the likelihood that a property contains a residential structure with substantial repair needs as of 2010. These models do not control for initial damage from the 2005 hurricanes. They are presented in Appendix D.

Exhibit 4-7. Neighborhood Predictors of Inferred Rebuilding as of 2010 among Properties with Major or Severe Damage in 2005 (Logit estimation)

	Model I: Housing Characteristics Only		Model II: Demographic Characteristics Only		Model III: Housing and Demographic Characteristics	
	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value
Initial Damage Severity						
FEMA assessment: Severe damage	.361**	<.001	.361**	<.001	.315**	<.001
Housing Characteristics						
Median home value	1.009**	.002			1.014**	<.001
Percent of housing units owned	.998	.801			1.009	.224
Percent of housing units occupied	1.018	.181			1.017	.179
Median age of housing stock	.994	.569			.990	.298
Median tenure of tract residents	1.006	.733			.994	.738
Urban (vs. rural) location	.996	.429			.993	.127
Demographic Characteristics						
Median household income			1.018	.199		
Percent receive public assistance			.998	.944	1.000	.988
Percent with a college degree			1.018	.115		
Percent with some post-secondary			1.001	.926		
Percent black			1.006	.092	1.013**	<.001
Percent Hispanic			1.064*	.040	1.068*	.011
Percent other minority			1.004	.845	1.022	.293

Source: Windshield observations conducted in January and February 2010 and block group counts from the 2000 decennial Census.

N=3,511 properties

*p<.05; **p<.01

The exhibit shows that within the group of properties with major or severe damage in 2005, the relative severity of the damage strongly predicts whether a property is rebuilt in 2010. Properties with "severe" damage in 2005 are only 31-36 percent as likely to be rebuilt in 2010 as properties with "major" damage in 2005.

The results for Model I show that, among housing characteristics, only median home value is significantly associated with rebuilding. The higher the median home value for the neighborhood in 2000, the more likely the property is to be rebuilt in 2010. Specifically, a $1,000 increase in the median home value of the block group in 2000 is associated with a 0.9 percent increase in the likelihood that a property is rebuilt in 2010. None of the remaining housing characteristics is significantly associated with rebuilding activity.

Model II includes only the set of demographic characteristics. Both median household income in 2000 and the percent of residents with a college degree are positively associated with the likelihood that a property is rebuilt in 2010. While neither variable is statistically significant, the precision of both estimates is limited by multicollinearity between the two measures. Excluding education from the model results in a significant effect on the college education measure, and vice versa. As a result, the estimates in Model II are consistent with the finding from Model I that the financial resources of neighborhood residents influence rebuilding activity.

The racial and ethnic composition of neighborhood residents also predicts rebuilding activity in the Model II. After controlling for income and initial damage, higher proportions of both black and Hispanic residents in a block group as of 2000 are associated with an increased likelihood that a property is rebuilt as of 2010. The regression models presented in Appendix D show that SABs in neighborhoods with higher proportions of minority residents are less likely to have empty lots than other neighborhoods. Taken together, the findings from Model II and Appendix D suggest that residents of high-minority neighborhoods may be more likely to rebuild destroyed properties or to return damaged structures to rebuilt condition rather than clearing the lot.

The results for Model III, which includes both housing and demographic characteristics, are consistent with the findings from Models I and II. The median home value of the neighborhood prior to the hurricanes is significantly and positively associated with rebuilding. Specifically, a $1,000 increase in the median home value of the block group in 2000 is associated with a 1.4 percent increase in the likelihood that a property is rebuilt in 2010.

The presence of racial and ethnic minorities in the neighborhood is also significantly and positively associated with rebuilding. A one percent greater percentage of block group residents who are black is associated with a 1.3 percent increase in the likelihood of rebuilding, and a one percent increase in the percent of block group residents that are Hispanic is associated with a 6.8 percent increase in the likelihood of rebuilding. Each of these estimates with respect to the percent of black and Hispanic residents is larger than those in the simpler models. The relationship between the racial and ethnic composition of the neighborhood and rebuilding strengthens as controls for more socioeconomic and housing attributes are added.

4.4 Infrastructure Repair Needs

The final analysis in this chapter examines the data from the windshield observations of block infrastructure. After observing the individual properties on a block, each windshield observer completed a brief assessment of block infrastructure, documenting the presence of any damage or repairs to roads, sidewalks, curbs and gutters, and other elements of the infrastructure.

Exhibit 4-8 presents estimates of the extent of infrastructure repair needs and ongoing repairs on significantly affected blocks across the three states. The findings are based on the windshield survey observations of the 230 observed blocks weighted to reflect all SABs. Because the number of observations is small in many cases, some of the estimates may be imprecise, as evidenced by the confidence intervals shown. Exhibit C-8 in Appendix C presents more detail on the types of infrastructure damage observed, as well as areas in which ongoing infrastructure repairs were noted.

The first row of Exhibit 4-8 shows the estimated percentage of SABs with visible damage as of early 2010 to one or more parts of the block infrastructure: roads, sidewalks, curbs or gutters, or signage. For example, 35 percent of SABs in Louisiana showed one or more signs of damage to the block infrastructure. The second row of the exhibit presents estimates of infrastructure repair work ongoing as of early 2010.

Exhibit 4-8. Percent of Significantly Affected Blocks with Infrastructure Damage and Ongoing Repairs as of 2010

	Louisiana[a]	Mississippi[b]	Texas[c]	All States
	Percent (95% CL)	Percent (95% CL)	Percent (95% CL)	Percent (95% CL)
Visible damage to roads, sidewalks, curbs/gutters, or signage	35.0 (28.0-41.9)	44.0 (31.7-56.3)	50.0 (12.3-87.7)	37.9 (31.9-43.8)
Repairs being made to roads, sidewalks, curbs/gutters, signage, electrical lines, or hydrants	4.3 (1.0-7.5)	8.6 (2.0-15.1)	10.0 (0.0-32.6)	5.6 (2.6-8.5)

Source: Windshield observations conducted in January and February 2010.

[a] N=150 blocks weighted to represent 10,960 SABs.

[b] N=70 blocks weighted to represent 3,663 SABs.

[c] N=10 blocks weighted to represent 776 SABs.

Exhibit 4-8 shows that more than a third of all SABs blocks (37.9 percent) still have visible damage to roads, sidewalks, curbs/gutters, or signage. Blocks in Texas have the highest incidence of remaining visible damage of the three states. Half of the SABs in that state still have visible damage, compared to 44 percent of blocks in Mississippi and 35 percent in Louisiana. Given the wide confidence intervals, these differences are not statistically significant.

Current infrastructure repairs were observed at the time of the windshield survey in areas where visible damage remained. This included repairs to roads, sidewalks, curb/gutters, signage, electrical lines, or hydrants. As of early 2010, 10 percent of blocks in Texas showed signs of current repairs, as did 8.6 percent of blocks in Mississippi and 4.3 percent of blocks in Louisiana.

4.5 Summary of Findings

This chapter examined the extent to which remaining damage to the housing stock is concentrated within a few neighborhoods. We first described the extent to which empty lots and structures with substantial repair needs are clustered in a few neighborhoods. We then described the characteristics of neighborhoods with concentrated repair needs.

The main findings are that:

- ***Many blocks are substantially rebuilt.*** The majority of SABs contain few to no empty lots or properties with remaining substantial repair needs.

- ***Properties with remaining repair needs are clustered geographically.*** A small number of blocks show remaining repair needs affecting more than half of the properties.
- ***Blocks with concentrated repair needs are clustered in neighborhoods with fewer resources***, as indicated by lower home values, incomes, and rates of occupancy and homeownership.
- ***The racial and ethnic composition of neighborhood residents predicts rebuilding activity.*** After controlling for income and the level of hurricane damage, neighborhoods with higher proportions of black and Hispanic residents show significantly greater rebuilding activity.
- ***Thirty-eight percent of SABs across Louisiana, Mississippi, and Texas have visible damage to the block infrastructure***, and 6 percent of SABs show signs of ongoing infrastructure repair.

5. Repair Needs, Rebuilding, and CDBG

This chapter discusses the relationship between the receipt of CDBG awards in the years following hurricanes Katrina and Rita and the rebuilding and repair status of properties observed in early 2010. The analysis is based on property-level administrative data on CDBG applicants and awardees that the administrators of the CDBG programs in each state provided to HUD in March 2010. We matched the administrative data to our sample of SABs and properties to identify which property addresses—among those for which we conducted a windshield observation—had a CDBG award associated with them. Any property with a CDBG award amount greater than $0 was considered to be a CDBG recipient.

We begin the chapter by describing briefly the CDBG housing recovery programs in the three study states, to provide context for the analysis. The next two sections examine the rate of CDBG receipt among significantly affected blocks in the three states (Section 5.2) and the amounts of the CDBG awards relative to assessed damage (Section 5.3). Sections 5.4 and 5.5 analyze the association between receipt of CDBG funds and the likelihood that a property will be rebuilt or reoccupied as of early 2010 (as captured through windshield observation). Section 5.6 summarizes the chapter findings.

5.1 CDBG Housing Recovery Programs

This brief overview describes the CDBG-funded housing recovery programs for homeowners and owners of small rental properties administered by the three states in the study. The program descriptions were compiled primarily from documents available online from the web sites of the three agencies with primary responsibility for administering the programs: the Louisiana Office of Community Redevelopment, the Mississippi Development Authority, and the Texas Department of Housing and Community Affairs.

Louisiana

In Louisiana, the CDBG-funded disaster recovery program is known as the Road Home program. The Road Home program provides compensation to homeowners and owners of small rental properties whose properties were damaged by Hurricanes Katrina and Rita and for whom the other sources of disaster assistance funding (private insurance, FEMA housing assistance, and SBA loans) did not cover the cost of repairing or rebuilding the property. The Road Home program has been closed to new applicants for some time, but the state continues to process applications and appeals and distribute funds.

Road Home Homeowner Program

The Road Home Homeowner Program provided financial compensation for Louisiana homeowners whose residences were damaged as a result of the 2005 storms. To be eligible for a Road Home grant, homeowners had to have owned and occupied the residence at the time of Hurricane Katrina or Rita, and the residence had to have sustained major or severe storm damage. The damage criteria

became somewhat more stringent over time.[31] The basic compensation grant was available to owners of all income levels.

Applicants to the Road Home homeowner program were required to choose one of three options, which affected the calculation and amount of the compensation:

- Option 1: Remain in the home.
- Option 2: Sell to the state and purchase another home in the state.
- Option 3: Sell to the state and become a renter in Louisiana or move out of state.

The majority of Road Home recipients (92 percent) chose Option 1.[32] The maximum compensation amount for all three options was $150,000, including the basic compensation grant, the home elevation grant, and supplemental grant (discussed further below.)

Owners who chose Option 1 were not required to use the grant to rebuild or repair their homes. However, as a condition of accepting the grant, they agreed to place covenants on the property to ensure that any future rebuilding or repair would be made in accordance with local codes, that the home would be elevated in accordance with FEMA advisory flood elevations, that the property would remain owner-occupied for at least three years, and that the owner would maintain homeowners' insurance on the home (as well as flood insurance if the home was located in a flood plain).

Homes sold to the state under Options 2 and 3 were transferred to the Louisiana Land Trust (LLT), the holding agency for properties owned by the State of Louisiana. LLT has nearly 10,400 homes in its inventory.[33] When a home comes into LLT's inventory, it is assessed for damage and secured. LLT works with local parishes and planning districts to determine whether the home will be demolished and the property sold as an empty lot, or whether there is potential to repair or rebuild the home. LLT then works with the parishes and planning districts to sell the properties to neighborhood residents (via the "lot next door" program), to developers, or to the general public via auction. Each parish and planning district has its own approach for how the properties should be transferred to new ownership.

The **basic compensation grant** for Road Home recipients was based on either the *uncompensated damage cost* (that is, the estimated cost of damage minus any other compensation the applicant

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[31] Prior to June 12, 2007, eligible units had to: a) have been determined by FEMA to have sustained major or severe damage; or b) have been determined by a Road Home inspector to have sustained at least $5,200 of storm damage. From June 12, 2007 on, eligibility was restricted to: a) units that were destroyed by the storms or determined by a Road Home inspector to require rebuilding; and b) units that suffered more than 600 feet of roof damage, had more than one foot of standing water on the first floor, or sustained damage to their structural integrity.

[32] Based on analysis of state CDBG administrative data from March 2010. Ninety-two percent of recipients of Road Home homeowner funds selected Option 1, six percent selected Option 2, and two percent selected Option 3.

[33] *Current Property Listing as of 8/6/10*, downloaded from www.lalandtrust.us.

received, including FEMA individual assistance, FEMA National Flood Insurance Program Insurance, USDA assistance, private insurance, and SBA loans) or the *uncompensated loss of value* (that is, the pre-storm value minus any other compensation the applicant received).

In addition to the basic compensation grant, which was the primary tool used to assist homeowners, two other types of assistance were available:

- **Additional Compensation.** The additional compensation grant offered up to $50,000 to owners with incomes at or below 80 percent of AMI and who chose to remain in their homes or sell their homes to the state.
- **Elevation Incentive.** Owners who opted to rebuild their homes and who were located in a floodplain based on FEMA's Base Flood Elevation (BFE) or Advisory Base Flood Elevation (ABFE) were eligible to apply for additional funds to elevate their homes to meet the BFE or ABFE standard. The award amount is $30,000 for site built homes and $20,000 for mobile homes. These funds were distributed so long as they did not duplicate benefits received from other sources and did not result in total compensation exceeding the $150,000 Road Home maximum.

Road Home Small Rental Property Program

The Road Home Small Rental Property Program offered funding to encourage property owners to repair their one- to four-unit rental properties and make these dwellings available to low- and moderate-income tenants at affordable rents. Funding was offered in the form of a no-interest, no-payment, forgivable loan, provided after repairs had been made and the property met local building codes. In return, the owner agreed to maintain affordable rent levels for 10 years. The amount of funding available varied based on the income level of the tenants to be served, with the largest amount of funding available to owners who agreed to offer the lowest rents. The total loan amount could not exceed 100 percent of the estimated cost to repair or reconstruct the rental property.

Program eligibility was limited to residential rental properties containing one to four units on an individual parcel of land and located in one of nine specified parishes. In addition, the properties had to have suffered at least $5,200 in damage from Hurricane Katrina or Rita, and at least one of the owners of the property must have lived in Louisiana at the time of the storms, although not necessarily have owned the damaged property at the time.

Mississippi

Mississippi's CDBG-funded programs for homeowners and small landlords are administered by the Mississippi Development Authority (MDA). The program for homeowners is the Homeowner Assistance Program (HAP). The program for owners of one- to four-unit rental properties is the Small Rental Property Assistance Program. The HAP and Small Rental Property Assistance programs have been administered in three phases or rounds of funding. As of August 2010, neither the HAP programs nor the Small Rental Program are accepting new applications. However, MDA continues to process applications and disburse funds for all program phases.

Homeowner Assistance Program (HAP)

HAP provided financial compensation for Mississippi homeowners whose residences were damaged as a result of Hurricane Katrina. As in Louisiana, the program provided one-time grant payments to homeowners with no requirement to rebuild. The maximum grant amount was $150,000 for Phase I, $100,000 for Phase II, and either 50 or 70 percent of the Phase I or Phase II grant for Phase III.

Although HAP recipients were not required to use the grant to rebuild or repair their homes, Phase I and Phase II recipients agreed to place covenants on the storm-damaged property to ensure that any rebuilding or repairs would be made in accordance with local codes, that the home would be elevated in accordance with FEMA advisory flood elevations, and that the homeowner and successors in title would obtain and maintain both homeowners' insurance and flood insurance on the property, whether or not the property was located in a flood plain.

Phase III of the HAP, also know as the Sold Home program, was designed for grant applicants who no longer own their damaged residence and who have not been able to attach the required covenants to the damaged residence property. Originally, MDA had allowed applicants who had sold their homes to receive grant funds if a covenant was attached to the damaged residence by the new owners of that property. But many Phase I and Phase II applicants indicated that the new homeowners were unwilling to sign the covenants. As a result, MDA created the Sold Home program to allow these applicants to qualify for grant money, independent of the cooperation of the new owner(s) of their former damaged residence.

Elevation grants in an amount up to $30,000 were also available to homeowners to defray the cost of elevating homes to FEMA's flood requirements. Elevation grant funds could be used to raise homes on the same footprint or on expanded or changed footprints, or to replace an existing unit with an elevated one. Elevation grant funds could be combined with Phase 1 or Phase 2 HAP grants, but could only be used to cover the increased cost of elevating the structure.

In order to be eligible for HAP funds, the property had to be located in one of four Mississippi counties (Hancock, Harrison, Jackson, or Pearl River) and to have suffered flood damage as a result of Hurricane Katrina. (Properties that sustained only wind damage were not eligible.) In addition, the applicant had to have owned and occupied the property at the time of the storm. Within those overall criteria, the three Phases targeted different owner groups:

- **Phase I** targeted homeowners living outside the established flood zones and who had homeowners' insurance at the time of the storm.
- **Phase II** was designed to assist homeowners not eligible under Phase I. Phase II applicants were not required to have carried homeowners' insurance, and their homes could have been located inside or outside the 100-year flood plain.[34] Eligibility was also limited to owners with incomes at or below 120 percent of AMI.

[34] The 100-year flood plain is the area that would be expected to be inundated only in very extreme floods (happening approximately once every 100 years, or with a probability of 1 percent in any year).

- **Phase III**, the Sold Home Program, was available for applicants under Phases I or II who sold their damaged homes and were not been able to attach the covenants to the damaged property required to receive assistance through Phase I or Phase II.

The majority of awards made under the homeowner program were made under Phase I (67 percent) and Phase 2 (31 percent).[35]

Small Rental Assistance Program

The Small Rental Assistance Program targeted owners of small rental properties in Hancock, Harrison, Jackson, and Pearl River counties, with a goal of renovating and restoring small rental properties in storm-damaged neighborhoods. The program provided five-year forgivable loans under one of four program options:

- Option A – Rental subsidy
- Option B – Rehabilitation or construction of Katrina damage
- Option C – Reconstruction or conversion of non-Katrina damage property
- Option D – New construction reimbursement

The maximum award was $30,000 for a four-bedroom rental unit, which means that the maximum award that any one property could receive was $120,000 (for a four-unit property in which the units all have four bedrooms). Recipients agreed to attach a covenant to the property for five years, which includes compliance with local and state building code requirements, maintenance of hazard, flood, and commercial liability insurance, and an agreement to rent 51 percent or more of the available units to tenants with an income at or below 80 percent of the AMI, with 100 percent of units being rented to tenants with incomes at or below 120 percent of AMI.

In order to be eligible for Small Rental Assistance awards, properties had to be located in Hancock, Harrison, Jackson, or Pearl River County, have one to four rental units, and pass a site inspection and environmental review at MDA's expense. Applicants also had to have a good credit history and a satisfactory owner-manager experience surrounding the property. Applicants did not have to have owned the property at the time of Hurricane Katrina, and individuals, corporations, partnerships, trusts, churches, and non-profits were eligible to apply.

Texas

The state of Texas received two rounds of CDBG disaster recovery funding to address damage caused by Hurricane Rita.[36] The Texas Department of Housing and Community Affairs (TDHCA) used this funding for three separate homeowner programs: the Council of Government (COG) Programs, the Homeowner Assistance Program (HAP), and the Sabine Pass Restoration Program. Texas did not create a program specific to owners of small-scale rental properties.

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[35] Based on analysis of state CDBG administrative data from March 2010.

[36] In 2008, Texas also received $3.1 billion in supplemental CDBG funding to address damage caused by Hurricanes Ike and Dolly. The use of those funds for housing recovery is outside the scope of this study.

COG Programs

TDHCA allocated $40 million in supplemental CDBG funds to homeowner assistance programs administered by three Councils of Government (COGs): Deep East Texas COG, Houston-Galveston Area COG, and the Southeast Texas Regional Planning Commission. Together, these COGs are assisting approximately 400 homeowners to repair or replace their homes damaged by Hurricane Rita. As of August 2010, the COG programs are closed to new applicants but construction work is ongoing.

In the COG programs, as in the other Texas programs, CDBG funds are used to pay for contractors to perform the rehab or reconstruction work. If the property is located in a flood zone, the owner assumes a zero-interest, three-year forgivable loan for the amount of the funding. The three COGs vary in the amount of assistance provided:

- Deep East Texas offered up to $40,000 for rehabilitation and up to $65,000 for reconstruction and new construction;
- Houston-Galveston offered up to $25,000 for rehabilitation and up to $65,000 for reconstruction and new construction;
- Southeast Texas offered up to $65,000 for rehabilitation and up to $100,000 for reconstruction and new construction. The program also offered up to $35,000 for elevation of properties in certain flood zones and $5,000 per lot for demolition. Total assistance could not exceed $100,000.

Eligibility for the program was restricted to single-family homes located in certain specified counties and damaged or destroyed by Hurricane Rita. Applicants also had to have incomes at or below 80 percent of AMI and had to have owned and occupied the property at the time of the hurricane. Additional more minor eligibility criteria varied by COG.

About one-third of the approximately 1,500 homeowners that received CDBG disaster recovery assistance in Texas are being served through the COG program.[37] As of August 2010, construction and rehabilitation work on homes assisted through the COG program is approximately 95 percent complete.

Homeowner Assistance Program (HAP)

The Homeowner Assistance Program (HAP) provided assistance in the form of a forgivable loan for properties located in special flood hazard areas; otherwise, the assistance took the form of a grant. HAP is now closed to new applicants but construction work is ongoing.

The maximum award amount in HAP is $75,000 per property.[38] The award is calculated based on the Storm Damage Cost Gap, which is the amount of storm damage (based on the cost of completed repairs or a damage assessment by FEMA, SBA, private insurance, or another approved damage assessor) minus any assistance received from FEMA grants, insurance proceeds, National Flood

[37] Based on analysis of state CDBG administrative data from March 2010.

[38] Interview with TDHCA staff, August 20, 2009.

Insurance Program proceeds, or SBA loans. As with the COG program, HAP funds are disbursed directly to contractors selected by TDHCA at specified intervals in the construction process.

Only owners of single-family homes with income at or below 80 percent of AMI were eligible to apply for HAP funds. In addition, the owner must have occupied the property as a primary residence at the time of Hurricane Rita. Finally, the property had to be located in one of the 22 counties eligible for FEMA assistance and have sustained major or severe storm damage.

Sixty percent of the approximately 1,500 homeowners served through Texas' CDBG program are being served through HAP. As of August 2010, construction and rehabilitation work on homes assisted through HAP is approximately 70 percent complete.

Sabine Pass Restoration Program

The Sabine Pass Restoration Program provided assistance to residents of the coastal community of Sabine Pass. The program is now closed to new applicants but construction work is ongoing. The program offered three types of assistance, all in the form of a deferred forgivable loan:

- Up to $40,000 to assist with home rehabilitation and reconstruction.
- Up to $30,000 to help with the costs of elevating repaired or rebuilt homes.
- Up to $15,000 for accessibility-related costs associated with elevating the dwelling.

As with the HAP, funds are disbursed directly to contractors selected by TDHCA at specified intervals in the construction process.

In order to be eligible for the Sabine Pass Restoration program, homeowners had to have lived in Census Tract 4824501160 and have storm damage to their home caused by Hurricane Rita. The program was available to families who had insurance (but with an insufficient amount of coverage), as well as those who did not have homeowners' insurance. Owners with income up to 150 percent of AMI were eligible to apply for rehabilitation and reconstruction assistance. Households of all income levels were eligible to apply for elevation assistance.

Five percent of the approximately 1,500 homeowners served through Texas' CDBG program are being served through the Sabine Pass Restoration Program. As of August 2010, construction and rehabilitation work on homes assisted through the Sabine Pass Program is approximately 70 percent complete.

5.2 Rates of CDBG Receipt on Sampled Blocks

Exhibit 5-1 shows the rate of CDBG receipt among sampled properties with major or severe hurricane damage by state and by tenure at the time of the hurricanes. We focus on properties with major or severe storm damage because the FEMA assessment serves as a proxy for eligibility for the CDBG

housing recovery assistance.[39] Exhibit 5-1 shows the raw numbers, based on the 3,018 properties in the research sample, as well as the weighted estimates for *all properties with major or severe damage on significantly affected blocks*. Where the number of sampled properties or CDBG recipients is very small (fewer than 25 sampled properties and fewer than 10 CDBG recipients), we did not produce weighted estimates. This is the case for the entire Texas sample.

Exhibit 5-1. CDBG Receipt among Properties with Major or Severe Damage, by State

	Louisiana		Mississippi		Texas	
	Raw Numbers	Weighted Estimates	Raw Numbers	Weighted Estimates	Raw Numbers	Weighted Estimates
Owner-Occupied Properties						
Total properties with major or severe damage	1,398	99,042	699	34,169	60	
Number with CDBG awards	840	58,055	399	18,818	1	
Percent with CDBG awards	60.1%	58.6%	57.1%	55.1%	1.7%	
Renter-Occupied Properties						
Total properties with major or severe damage	615	42,923	246		13	
Number with CDBG awards	74	4,985	2		0	
Percent with CDBG awards	12.0%	11.6%	0.8%		0%	

Source: HUD address data for sampled blocks, provided September 2009, matched to CDBG administrative data, provided March 2010.

Among owner-occupied properties, Louisiana and Mississippi have similar rates of CDBG receipt. The estimated rate of CDBG receipt among owner-occupied properties is 58.6 percent for Louisiana and 55.1 percent for Mississippi. A property in Louisiana or Mississippi with major or severe damage might not have received a CDBG award for several reasons. First, the sum of the other resources available to the owner and counted in the calculation of the CDBG award could have equaled or exceeded the amount of assessed damage. Second, some owners might not have met the eligibility criteria for the programs, such as having homeowners' insurance in Mississippi (for Phase I applicants) or meeting the higher thresholds for damage in Louisiana in effect from June 2007 onwards. Finally, some owners might not have applied for assistance. We will learn more about why some properties did not receive CDBG awards in the second phase of the study.

[39] Not all properties that received CDBG awards were assessed as having major or severe damage by FEMA. Of the 1,599 properties in the research sample that received CDBG awards, 1,316 (82 percent) were assessed as having major or severe damage and 283 (18 percent) were assessed as having minor damage or no damage. Properties with minor or severe damage are excluded from the analysis of rates of CDBG receipt because we cannot determine which properties in the minor and no damage categories might have been eligible for CDBG awards.

Among renter-occupied properties in Louisiana and Mississippi, the rate of CDBG receipt is much lower: 11.6 percent for Louisiana and 0.8 percent for Mississippi. The estimated number of renter-occupied properties shown in Exhibit 5-1 includes some properties with more than four rental units. Limiting the sample to properties with two to four units (that is, small rental properties) would increase the rate of CDBG receipt somewhat among renter-owned properties.

In Texas, only one of the properties in the research sample received a CDBG award. Overall, the Texas CDBG program for housing recovery from Hurricane Rita was much smaller than those of Louisiana and Mississippi, with about 1,500 awards made across the three program phases (see Exhibit 1-4).[40] The lower observed rate of CDBG receipt in Texas could also reflect the restriction of the research sample to properties assessed by FEMA. Discussions with program administrators in Texas suggest that some properties that received CDBG awards in that state were not assessed by FEMA. Also, the CDBG programs in Texas, unlike those in Louisiana and Mississippi, were targeted to homeowners with incomes at or below 80 percent of AMI or to residents of a specific community. Our 10-block research sample in Texas was selected to be representative only of significantly affected blocks in the state, not of lower-income blocks or of blocks in Sabine Pass. As a result, the sample may have missed concentrations of CDBG awards in Texas.

Exhibit 5-2 presents estimates of rates of CDBG receipt among owner-occupied properties with major or severe damage in select parishes, counties, cities, and planning districts in Louisiana and Mississippi. (Texas is not included in included in this exhibit or subsequent analyses because of the small number of CDBG recipients in the research sample.) Within Louisiana, two parishes—Orleans and St. Bernard—and five planning districts—MidCity, Gentilly, ByWater, Lower Ninth Ward, and New Orleans East—have above-average rates of CDBG receipt among owner-occupied properties with major or severe damage. The highest concentration of CDBG receipt is in the ByWater Planning District, where an estimated 82.7 percent of owner-occupied properties with major or severe damage received a CDBG award. Only in one Louisiana parish—St. Tammany—was the rate of CDBG receipt lower than 30 percent.

In Mississippi, rates of CDBG receipt are highest in Jackson County and Hancock County, and in Pascagoula and Waveland and Bay St. Louis. In these areas, 65 to 74 percent of owner-occupied properties with major or severe damage received CDBG. The rate of CDBG receipt among owner-occupied properties with major or severe damage is lowest in Gulfport (23.1 percent) and Pass Christian and Long Beach City (31.3 percent).

[40] Texas received additional CDBG funds for housing recovery after Hurricane Ike, but the use of these funds is not part of the present study.

Exhibit 5-2. Rates of CDBG Receipt among Owner-Occupied Properties with Major or Severe Damage in Louisiana and Mississippi, by Geography

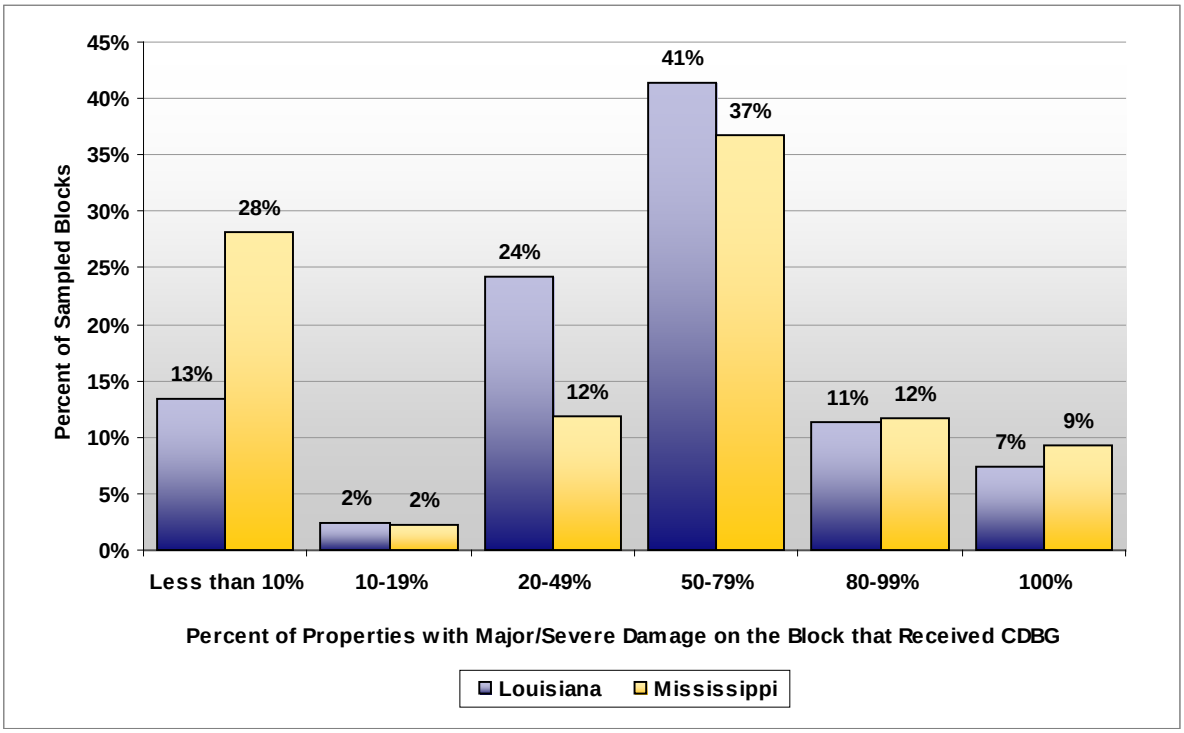
	Total Properties	Percent with CDBG
Louisiana	99,042	58.6%
Calcasieu and Cameron Parishes	2,531	53.8%
Jefferson Parish	13,612	38.1%
Orleans Parish	52,299	66.2%
MidCity Planning District	6,511	62.0%
Lakeview Planning District	5,716	52.4%
Gentilly Planning District	9,198	73.6%
ByWater Planning District	4,820	82.7%
Lower Ninth Ward Planning District	3,694	76.6%
New Orleans East Planning District	10,770	73.3%
Uptown Planning District	5,928	57.7%
St. Bernard Parish	18,749	60.7%
St. Tammany Parish	5,097	28.8%
Mississippi	34,169	55.1%
Hancock County	6,111	65.4%
Waveland and Bay St. Louis	3,241	66.7%
Harrison County	9,845	32.2%
Biloxi	2,925	51.3%
Gulfport	2,704	23.1%
Pass Christian and Long Beach City	3,352	31.3%
Jackson County	17,234	67.6%
Pascagoula	7,160	74.0%

Source: HUD address data for sampled blocks, provided September 2009, matched to CDBG administrative data, provided March 2010.

Note: This exhibit presents weighted estimates for 133,211 properties with major or severe damage based on 2,097 observations.

Exhibit 5-3 provides estimates of how CDBG receipt among owner-occupied properties with major or severe damage is concentrated across SABs. The chart shows that, for the majority of blocks in both states, at least 50 percent of the owner-occupied properties with major or severe damage received a CDBG award. Furthermore, around 20 percent of blocks (18 percent in Louisiana and 21 percent in Mississippi) have rates of CDBG receipt of 80 percent or higher. At the same time, the rate of CDBG receipt among owner-occupied properties with major or severe damage is less than 10 percent for 13 percent of SABs in Louisiana and 28 percent of SABs in Mississippi.

Exhibit 5-3. Rates of CDBG Receipt among Owner-Occupied Properties with Major or Severe Damage by Block, Louisiana and Mississippi



Source: HUD address data for sampled blocks, provided September 2009, matched to CDBG administrative data, provided March 2010.

N=10,463 SABs in Louisiana and 3,611 SABs in Mississippi. Only blocks with at least one property that was owner-occupied in 2005 and assessed by FEMA as having major or severe damage are included in the analysis.

5.3 Estimated Damage and CDBG Award Amounts

This section analyzes the estimated damage amounts and CDBG award amounts for owner-occupied properties in Louisiana and Mississippi that received CDBG awards. The analysis includes *all recipients of CDBG homeowner awards* and is not restricted to properties with FEMA assessments of major or severe damage.

As described above, the purpose of the CDBG homeowner awards in Louisiana and Mississippi was to make up for the shortfall between the cost to repair the damage to the home and the resources available to the owner from insurance payouts and FEMA assistance. However, the programs used somewhat different methods of estimating the damage amount (or cost to repair) for the purposes of calculating the CDBG award amount. In Mississippi, the estimated damage amount was based on damage assessments conducted by MDA and SBA. In Louisiana, the award calculation was based either on the assessed damage to the home or on the loss of value to the home (that is, the cost of replacing the home), depending on the relative amounts and extent of damage. The Mississippi program only covered homes that experienced flood damage and both states had maximum CDBG grant amounts, so that the CDBG award amount does not necessarily fill the entire gap between the amount of damage and the resources available from insurance payouts and FEMA assistance.

Exhibit 5-4 shows the range of estimated damage amounts used to calculate the award amounts for the properties that received CDBG homeowner awards. The damage amounts are drawn from the administrative data provided by the states in March 2010 and weighted to reflect the distribution of damage amounts among CDBG recipients on SABs. Estimated damage amounts are substantially higher for Louisiana recipients than for Mississippi recipients. The median damage amount for Louisiana recipients is $170,289, nearly double that for Mississippi. Furthermore, the 75th percentile damage amount for Louisiana is $229,007, compared to $164,716 for Mississippi.

Exhibit 5-4. Estimated Damage Amounts among Recipients of CDBG Homeowner Awards on SABs, Louisiana and Mississippi

	Louisiana (N=1,048)	Mississippi (N=442)
25th Percentile	$82,230	$59,580
50th Percentile (median)	$170,289	$92,938
75th Percentile	$229,007	$164,716

Source: HUD address data for sampled blocks, provided September 2009, matched to CDBG administrative data, provided March 2010.

Exhibit 5-5 shows the shows the distribution of CDBG award amounts among homeowner recipients on SABs. Consistent with the wider range of damage amounts, Louisiana has a wider range of award amounts than Mississippi. However, the difference in award amounts between the two states is not as great as the difference in damage amounts. The median award amount in Louisiana is about $2,000 lower than in Mississippi ($65,000 compared to $66,750). At the same time, the 25th percentile amount is approximately $14,000 lower, meaning that more owners in Louisiana received grants at the lower end of the range. There are also more owners in Louisiana with grants in excess of $100,000.

The distribution of CDBG award amounts in Mississippi in Exhibit 5-5 is very similar to the distribution for the overall homeowner program shown in Exhibit 1-4. In Louisiana, the distribution of CDBG award amounts closely aligns with the distribution of all Road Home grants awarded to properties on SABs. However, the Road Home program also includes a large number of smaller awards to properties on blocks that were not significantly affected. The distribution for the overall Road Home program in Exhibit 1-4 therefore reflects the larger proportion of grants with small award amounts in Louisiana. The higher grant amounts in the study sample reflects the design of the study, which focused exclusively on significantly affected blocks.

Exhibit 5-5. Distribution of CDBG Award Amounts among Recipients of CDBG Homeowner Awards on Sampled Blocks, Louisiana and Mississippi

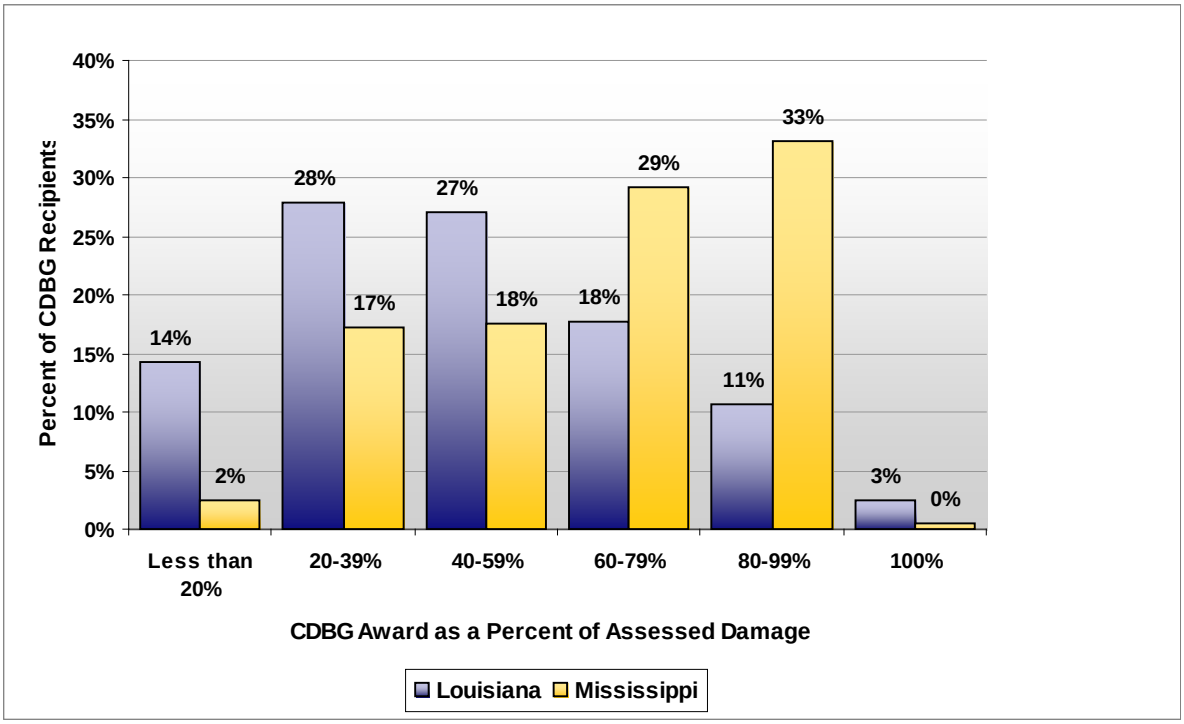
	Louisiana (N=1,055)	Mississippi (N=442)
25th Percentile	$30,131	$43,851
50th Percentile (median)	$65,000	$66,750
75th Percentile	$106,700	$100,000

Source: HUD address data for sampled blocks, provided September 2009, matched to CDBG administrative data, provided March 2010.

Note: Exhibit 5-5 includes four Louisiana properties that received CDBG awards for more than $150,000. The exhibit excludes one Mississippi property with an award of $229,082, which was assumed to be an error in the dataset.

With the large differences in assessed damage amounts (Exhibit 5-4) and the moderate differences in award amounts (Exhibit 5-5), one would expect to find a greater gap between the damage estimate and the amount of the award in Louisiana than in Mississippi. We analyzed the amount of the CDBG award as a percentage of the estimated damage used by the program in calculating the award, for each property in the research sample that received a CDBG homeowner award. This analysis confirmed that the CDBG awards in Mississippi are larger relative to the estimated damage than the awards in Louisiana. For example, Exhibit 5-6 shows that, in Mississippi, 33 percent of the CDBG awards made to homeowners with major or severe damage covered at least 80 percent of the estimated damage to the property. This compares to 14 percent of awards in Louisiana. Sixty-two percent of awards in Mississippi were at least 60 percent of the assessed damage amount, compared to 32 percent of awards in Louisiana.

Exhibit 5-6. CDBG Award Amounts Relative to Estimated Damage among Properties in the Research Sample that Received CDBG Homeowner Awards in Louisiana and Mississippi



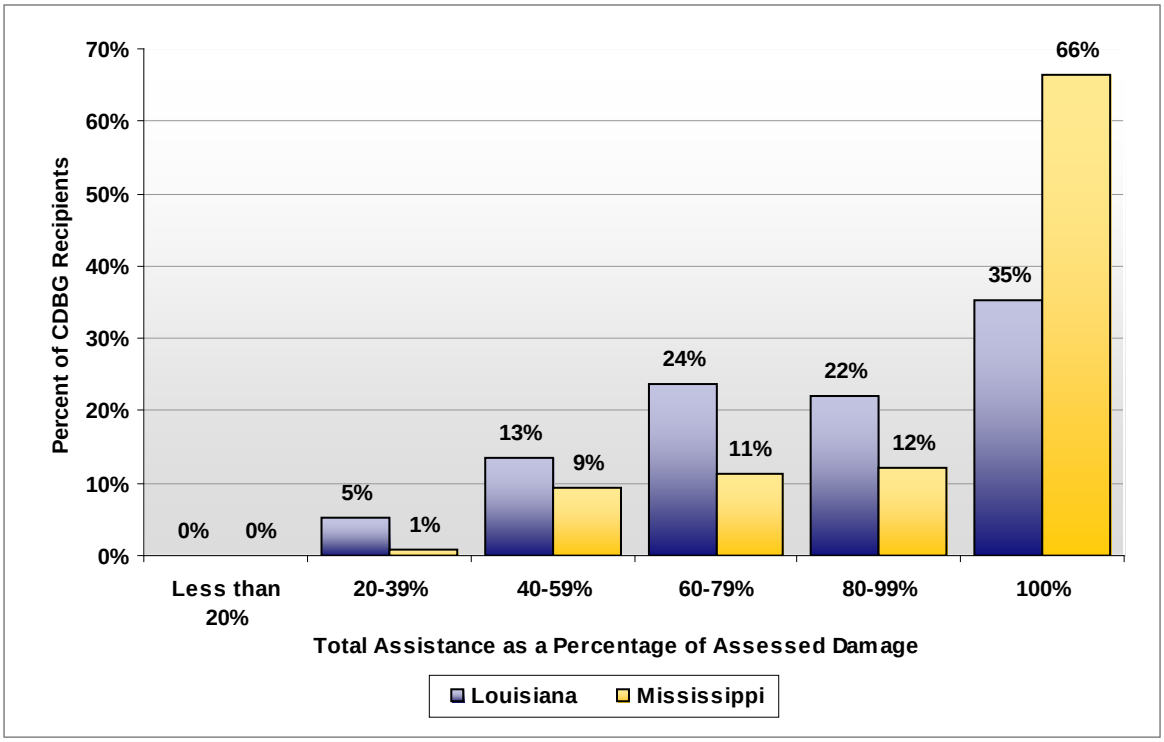
Source: HUD address data for sampled blocks, provided September 2009, matched to CDBG administrative data, provided March 2010.

N=75,275 properties in Louisiana and 19,023 properties in Mississippi. These are weighted estimates based on 1,048 CDBG recipients in Louisiana and 394 CDBG recipients in Mississippi.

Exhibit 5-7 presents the *total amount of assistance* received by recipients of CDBG homeowner awards as a percentage of assessed damage to the property. The total assistance amount is based on the state administrative records and sums the CDBG grant amount (but not the elevation grant amount, as this was not directly linked to damage) to the private insurance amount (including home insurance, flood insurance, and wind insurance) and the FEMA assistance amount. The findings are striking: for 66 percent of CDBG recipients in Mississippi, the total amount of assistance equaled the assessed damage to the property, meaning that the owner should have had sufficient resources to repair the damage, assuming the damage assessment was accurate. By contrast, only 35 percent of CDBG recipients in Louisiana were in this position. Furthermore, for 78 percent CDBG recipients in Mississippi, the total amount of assistance was at least 80 percent of the assessed damage. This compares to 57 percent in Louisiana.

For five percent of the Louisiana recipients in the sample, the total assistance amount was less than 40 percent of the estimated damage amount. The damage amounts for these properties were quite high, with a median damage amount of $275,700 and a maximum damage amount of $1,072,520.

Exhibit 5-7. Total Assistance Relative to Assessed Damage among Properties in the Research Sample that Received CDBG Homeowner Awards in Louisiana and Mississippi



Source: HUD address data for sampled blocks, provided September 2009, matched to CDBG administrative data, provided March 2010.

N=75,275 properties in Louisiana and 19,023 properties in Mississippi. These are weighted estimates based on 1,064 CDBG recipients in Louisiana and 394 CDBG recipients in Mississippi.

5.4 Property Conditions and Occupancy by CDBG Receipt

This section and the next examine the relationship between CDBG receipt in Louisiana and Mississippi and the observed condition of hurricane-damaged properties as of early 2010. The analysis is limited to owner-occupied properties with major or severe hurricane damage in 2005. We present descriptive statistics and multivariate analyses that examine:

1) Whether CDBG recipients and non-recipients exhibit different rates of rebuilding and occupancy, once geographic differences are controlled for (Section 5.4).

2) Whether the likelihood that a CDBG recipient has rebuilt is related to the amount of assistance available to that recipient, measured as a percentage of the estimated damage to his/her property (Section 5.5).

Both comparisons examine homeowners' rebuilding activities with respect to four outcomes related to rebuilding and occupancy:

- ***Rebuilt*** – The property has no substantial repair needs;
- ***Habitable*** – The property is sealed from the elements with at least one functioning entrance;
- ***Occupied (windshield)*** – The property exhibits one or more visible signs of occupancy;
- ***Occupied (USPS)*** – The property has had mail delivered within the previous 90 days.

2010 Property Conditions for CDBG Recipients and Non-Recipients

Exhibit 5-8 shows the rebuilding status, habitability, and occupancy of owner-occupied properties as of early 2010, comparing properties that received CDBG to properties that did not receive CDBG. The exhibit presents the weighted mean percentage of properties that are rebuilt, habitable, and occupied for CDBG recipients and non-recipients for Louisiana and Mississippi together and for each state individually. The exhibit is based on 1,875 windshield observations, of which 1,804 observations (96 percent) have complete information on all measures of interest. The application of sampling weights makes the information presented in the exhibit representative of the set of owner-occupied properties with major or severe damage on significantly affected blocks in Mississippi and Louisiana.

We present estimates for two groups of CDBG recipients: all recipients of CDBG homeowner awards and recipients of CDBG awards *excluding* those owners that received CDBG grants through Road Home Options 2 and 3 in Louisiana. The rationale for excluding properties that received awards under Options 2 and 3 is that these properties were sold to the state and transferred to Louisiana Land Trust before having a chance to be rebuilt. (Mississippi's CDBG program did not have a comparable option.) LLT generally does not rehabilitate or rebuild the properties in its inventory, most of which have extensive hurricane damage. Instead, LLT typically maintains the landscaping and checks that the property is secured and unoccupied while it works with parishes and planning districts to sell the property to a permanent owner.

LLT has moved properties out of its inventory slowly; as of January 2010, LLT had transferred only about 10 percent of its properties to new ownership. The windshield observation sample included 121 properties that received Road Home awards under Options 2 and 3. As of early 2010, 68 percent of these properties contained no permanent residential structure, 30 percent contained a permanent residential structure with substantial repair needs, and 2 percent contained a permanent residential structure with no substantial repair needs (see Exhibit C-8 in Appendix C). The third column of Exhibit 5-8 shows the weighted mean for the sample of CDBG recipients that excludes Louisiana homeowners that received grants through Road Home Options 2 and 3.

Exhibit 5-8. Percent of Properties Rebuilt, Habitable, and Occupied by CDBG Receipt

	Non-Recipients	All CDBG Recipients	Exclude LA Options 2 & 3
	Mean	Mean	Mean
Panel 1: Louisiana and Mississippi			
Percent rebuilt	75.1%	70.4%	79.0%
Percent habitable	81.5%	77.5%	86.3%$^{+}$
Percent occupied – windshield	75.9%	70.9%$^{+}$	79.5%
Percent occupied – USPS	79.4%	75.2%$^{+}$	83.9%
N	802	974	873
Panel 2: Louisiana Only			
Percent rebuilt	76.8	67.6%*	79.0%
Percent habitable	83.6	76.2%*	88.1%
Percent occupied – windshield	77.1	68.3%**	79.7%
Percent occupied – USPS	78.3	72.2%*	83.8%
N	531	663	562
Panel 3: Mississippi Only			
Percent rebuilt	70.4%	79.0%$^{+}$	
Percent habitable	76.0%	81.5%	
Percent occupied – windshield	72.5%	78.9%	
Percent occupied – USPS	82.6%	84.2%	
N	271	311	

Source: Windshield observations conducted in January and February 2010.

Note: Estimates are weighted to be representative of the set of owner-occupied properties with major or severe damage on significantly affected blocks in Mississippi and Louisiana.

**p<.01; *p<.05; $^{+}$p<.10

Considering estimates for Louisiana and Mississippi combined (Panel 1), we find only small differences between CDBG recipients and non-recipients. CDBG recipients as a whole are less likely to be occupied than non-recipients, but not significantly less likely to be rebuilt or habitable. Based on USPS records, 75.2 percent of CDBG-recipient properties are occupied as of early 2010, compared to 79.4 percent of non-recipient properties; this difference is statistically significant at the 10 percent level.

The difference in occupancy rates changes when recipients of Road Home Option 2 and 3 awards are excluded from the sample of CDBG recipients. Excluding Option 2 and 3 properties, CDBG-recipient properties are more likely to be occupied than non-recipient properties, but this difference is not statistically significant. CDBG recipient properties are also more likely to be rebuilt and habitable than non-recipient properties. Some 79 percent of recipient properties have been rebuilt, compared to 74.6 percent of non-recipients, although this difference is not statistically significant. Furthermore, 86.3 percent of properties that received CDBG grants are in habitable condition, compared with 81.5 percent of non-recipients, and this difference is statistically significant at the 10 percent level.

When we look at Louisiana on its own without excluding properties transferred to LLT under Road Home Options 2 and 3, we find that properties of owners that received CDBG awards are significantly *less* likely to be rebuilt, habitable, and occupied than properties of owners that did not receive CDBG awards. However, these differences disappear when properties transferred to LLT under Road Home Options 2 and 3 are removed from the analysis.

The estimates for Mississippi alone show that 79 percent of properties owned by CDBG recipients are rebuilt as of 2010, compared to 70.4 percent of properties owned by non-recipients. This difference is significant at the 10 percent level. Similar modest differences are found for the measures of habitability and occupancy, with CDBG recipient properties more likely to be habitable and occupied than non-recipients, but these differences are not statistically significant.

Effect of CDBG Receipt on Rebuilding, Habitability, and Occupancy, Controlling for Geographic Location and Neighborhood Characteristics

One of the purposes of the CDBG housing recovery program was to make it possible for all property owners to rebuild, regardless of their incomes or the resources of the communities in which they were located. In order to determine the extent to which CDBG had this intended effect of "leveling the playing field," we conducted multivariate analysis that controlled for the geographic location in Louisiana and Mississippi of properties with and without CDBG grants. For this analysis, each of the four measures of rebuilding, habitability, or occupancy is defined as a binary outcome variable and the estimation uses logistic regression. The model includes a covariate to control for whether the initial FEMA damage estimate indicated "major" versus "severe" damage.

For each of the four measures of rebuilding and occupancy, we estimate a county-level fixed effects model that controls for variation among counties and parishes in the amount of rebuilding that occurred as of 2010, for both properties whose owners received CDBG grants and properties whose owners did not. Because this model compares the observed outcomes of CDBG recipients and non-recipients within the same county or parish, it eliminates differences in the patterns of CDBG receipt and rebuilding activity that appear across counties/parishes.[41]

Even within counties or parishes, owners who received CDBG awards may be different in terms of their insurance status, financial situation, and other characteristics from owners who did not receive awards. For example, non-recipients might more often have had sufficient insurance, income, or assets to cover their estimated costs to rebuild without waiting for a CDBG grant. We do not have enough information on the individual owners at this stage of the study to include their characteristics in the model directly. Instead, we use a set of Census neighborhood characteristics that proxy for the differences in the characteristics of individual homeowners. (These are the same Census

[41] An alternative specification of the estimated model is to replace the county-level fixed effects and Census neighborhood characteristics with fixed effects for each of the 230 sampled blocks. This block-level fixed effects model may control more precisely for geographic differences in CDBG receipt and rebuilding activity. However, any block that does not contain variation in the outcome measure of interest must be excluded from the analysis, resulting in sample loss of 20 to 50 percent. For all four outcomes of interest, the estimates from the block-level fixed effects model are similar to the results presented for the county-level specification.

characteristics that were used in the model of the effect of neighborhood characteristics on rebuilding presented in Chapter 4.)

Exhibit 5-9 presents the estimates of the model using county-level fixed effects and Census characteristics to examine the differences between CDBG recipients and non-recipients. In each panel, the first set of results shown are for the full sample. The second set of results excludes from the sample CDBG recipients under Options 2 and 3 in Louisiana's Road Home program.[42]

Exhibit 5-9. Estimated Difference between CDBG Recipients and Non-Recipients from County-Level Fixed Effects Models

	Rebuilt	Habitable	Occupied (windshield)	Occupied (USPS)
	Odds Ratio (z-statistic)	Odds Ratio (z-statistic)	Odds Ratio (z-statistic)	Odds Ratio (z-statistic)
Panel 1: Louisiana and Mississippi				
All Observations:				
CDBG recipient	1.080 (0.37)	.974 (0.11)	.968 (0.20)	.928 (0.51)
Excluding Road Home Options 2 & 3:				
CDBG recipient	1.978** (4.28)	2.064** (4.25)	1.672** (3.04)	1.655* (2.45)
Panel 2: Louisiana Only				
All Observations:				
CDBG recipient	.869 (0.63)	.793 (0.90)	.826 (1.08)	.850 (1.02)
Excluding Road Home Options 2 & 3:				
CDBG recipient	1.926** (3.29)	2.218** (3.66)	1.694* (2.54)	1.802* (2.50)
Panel 3: Mississippi Only				
All Observations:				
CDBG recipient	2.451** (3.01)	2.313** (3.08)	2.176** (2.59)	2.004* (2.07)

Note: Each estimate is produced from a separate estimation of the fixed effects logit model. Each model includes covariates that reflect the FEMA damage estimate, the Census neighborhood characteristics, and county/parish-level fixed effects. The full estimates for the models are presented in Exhibit C-9 and Exhibit C-10 in Appendix C.

N=1,804 properties; N=1,703 when Options 2 & 3 are excluded; N=1,773 for the USPS occupancy measure

**p<.01; *p<.05; $^{+}$p<.10

Exhibit 5-9 does not show significant differences between CDBG recipients and non-recipients for the full sample in each panel. However, large and significant differences emerge when homeowners

[42] The sample includes eight properties in Mississippi that received CDBG grants through the MDA's Phase III Sold Home Program. Like Road Home Options 2 and 3, the Sold Home program allows homeowners who moved and sold the home to receive a CDBG grant. However, a key difference is that the properties are generally sold to private owners.

selecting Options 2 and 3 in Louisiana's Road Home program are excluded. The odds ratio of 1.978 on the measure of rebuilding implies that the remaining properties with CDBG awards are *almost twice as likely as non-recipient properties to be rebuilt.* These properties are also *twice as likely to be habitable* based on windshield observation. In addition, CDBG-recipient properties are approximately 67 percent more likely than non-recipient properties to be occupied (according to both the windshield and the USPS measures of occupancy).

Panels 2 and 3 of Exhibit 5-9 show that these estimates are consistent across Mississippi and Louisiana. In Mississippi, CDBG-recipient properties are about 2.5 times as likely as non-recipient properties to be rebuilt, about 2.3 times as likely to be habitable, and about twice as likely to be occupied based on windshield observation. All three differences are statistically significant at the one percent level. In Louisiana, recipient properties are nearly twice as likely to be rebuilt and more than twice as likely to be habitable, once CDBG grants made through Options 2 and 3 are removed from the sample. These differences are statistically significant at the one percent level.

In sum, when differences in neighborhood characteristics and community resources represented by geography and severity of damage are controlled for, and properties sold to LLT are excluded from the analysis, we find large differences in property status between CDBG recipients and non-recipients. These patterns will be reexamined in the next phase of the study following the owner survey, which will collect additional individual and property characteristics and allow the analysis to account for a broader set of mediating factors.

5.5 Property Conditions and Occupancy by Total Assistance Relative to Assessed Damage

This section analyzes the relationship between the four outcomes—inferred rebuilding, habitability, and the two measures of occupancy—and the extent to which the total assistance available to the property owner from CDBG grants, FEMA, and private insurance covers the full amount of assessed damage.

When the total resources available from private insurance and CDBG and FEMA assistance sum to less than the assessed damage (for example, because of the maximum grants available under CDBG program rules do not cover the entire gap), some homeowners may nonetheless repair their homes because they have income, assets, or the ability to borrow money to do so. At this stage in the research, we do not have information on the incomes of individual CDBG recipients. Instead, we use 2000 Census data on the median household income for the neighborhood in which the property is located as a very rough proxy for the pre-storm income of the homeowner.[43]

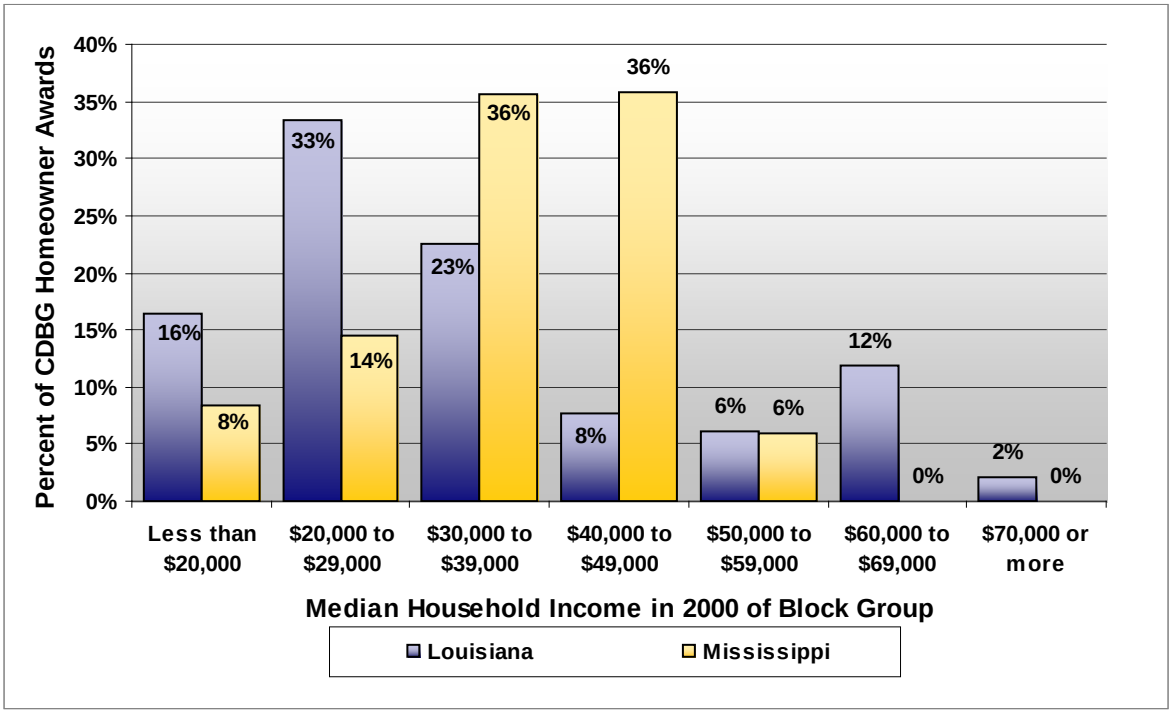
Exhibit 5-10 shows the distribution of CDBG homeowner awards in the research sample by the median household income in 2000 of the block group where the properties are located. The exhibit shows that most CDBG homeowner grant recipients in Mississippi are on blocks where the median household income in 2000 was between $30,000 and $50,000. Only six percent of Mississippi

[43] The Census data are at the block group level, so this requires assuming that the characteristics of the block group accurately represent the characteristics of the neighborhood in which the property is located.

recipients were on blocks with a median household income of $50,000 or more, and fewer than one quarter (22 percent) were blocks with a median household income under $30,000.

In comparison, CDBG recipients in Louisiana are located in neighborhoods with a wider range of incomes. Almost half of all Louisiana recipients (49 percent) are on blocks where the median income in 2000 was less than $30,000, while 20 percent are on blocks where the median income in 2000 was $50,000 or more.

Exhibit 5-10. Distribution of CDBG Homeowner Award by Neighborhood Income Level



Source: HUD address data for sampled blocks, provided 9/21/09; CDBG administrative data, March 2010; Block group counts from the 2000 decennial Census.

N=1,071 homeowner awards in Louisiana and 444 homeowner awards in Mississippi.

Exhibit 5-11 shows rebuilding, habitability, and occupancy for CDBG recipients in three categories of coverage: full coverage (that is, total assistance amount is 100 percent of the estimated damage), at least half coverage (that is, total assistance amount is 50 to 99 percent of the estimated damage), and less than half coverage (that is, total assistance amount is less than 50 percent of the estimated damage). The information presented in the exhibit is only for properties that sustained major or severe damage in 2005. The total assistance amount is the sum of the CDBG award, FEMA assistance, and private insurance available for each property, as documented in the state administrative data. The columns in Exhibit 5-11 contrast differences in the percentage of properties that are rebuilt, habitable, and occupied between full coverage properties and at least half coverage properties, and between full coverage properties and less than half coverage properties.

Exhibit 5-11. Effect on Rebuilding, Habitability, and Occupancy of the Percent of the Estimated Damage Amount Covered by Total Assistance

	Total Assistance as a Percent of the Damage Estimate		
	Full Coverage (100%)	At Least Half Coverage (50-99%)	Less than Half Coverage (<50%)
Panel 1: Louisiana and Mississippi			
All Observations:			
Percent rebuilt	81.6%	62.5%**	66.3%*
Percent habitable	87.4%	70.5%**	74.3%*
Percent occupied – windshield	82.3%	63.6%**	62.5%**
Percent occupied – USPS	87.6%	67.3%**	66.7%**
N	404	489	81
Excluding Road Home Options 2 & 3:			
Percent rebuilt	84.3%	74.4%**	79.2%
Percent habitable	90.1%	83.1%**	85.6%
Percent occupied – windshield	85.0%	74.9%**	76.5%
Percent occupied – USPS	90.2%	78.9%**	81.0%+
N	391	417	65
Panel 2: Louisiana Only			
All Observations:			
Percent rebuilt	77.9	62.7**	64.5*
Percent habitable	86.2	71.6**	73.0*
Percent occupied – windshield	78.5	64.3**	60.5**
Percent occupied – USPS	83.6	67.7**	64.9**
N	200	389	74
Excluding Road Home Options 2 & 3:			
Percent rebuilt	82.4	77.1	77.8
Percent habitable	90.9	87.1	84.7
Percent occupied – windshield	83.0	78.5	75.0
Percent occupied – USPS	88.0	82.0+	79.7
N	187	317	58
Panel 3: Mississippi Only[a]			
Percent rebuilt	87.0	61.6**	
Percent habitable	89.1	64.9**	
Percent occupied – windshield	87.6	59.8**	
Percent occupied – USPS	93.1	65.0**	
N	204	100	

Note: Estimates are weighted to be representative of the set of owner-occupied properties with CDBG awards that experienced major or severe damage on significantly affected blocks in Mississippi and Louisiana.

[a] The "Less than Half Coverage" category includes only 7 properties in Mississippi, so the values are omitted from this exhibit due to the small sample size.

**p<.01; *p<.05; $^{+}$p<.10

Exhibit 5-11 shows that full coverage properties are significantly more likely to be rebuilt, habitable, and occupied. For example, for all properties in the sample, 81.6 percent of properties that received full coverage were rebuilt, compared with 62.5 percent of those that received at least half coverage (50 to 99 percent) and 66.3 percent of those that received less than half coverage (less than 50 percent). These differences are statistically significant at the 1 and 5 percent levels.
The differences are smaller when Road Home Options 2 and 3 recipients are excluded. Properties with full coverage again show higher levels of rebuilding, habitability, and occupancy. However, the size of the differences diminishes and several differences are no longer significant. The smaller differences occur because Option 2 and 3 properties, which are less likely to be rebuilt, are concentrated in the at least half coverage and less than half coverage categories.[44]

Exhibit 5-12 presents results from a multivariate model that estimates the effect of resources available for rebuilding on property condition, habitability, and occupancy (as of 2010) for properties in Mississippi and Louisiana that sustained major or severe damage in 2005 and subsequently received CDBG awards.[45] Because of the differences in rates of rebuilding for different levels of geography, as well as differences in income and other resources available to individual homeowners, the model controls for neighborhood characteristics and county/parish fixed effects. The model also controls for whether FEMA assessment indicated "severe" versus "major" damage.

Omitting the odds ratios for each of these covariates, Exhibit 5-12 presents odds ratios for the variables that are the focus of the analysis—the set of at least half coverage properties (total assistance is 50-99 percent of estimated damage) and the set of less than half coverage properties (total assistance is less than 50 percent of estimated damage). The set of full coverage properties is the omitted category. The estimates in Exhibit 5-12 therefore identify the outcomes of properties in the at least half coverage and less than half coverage properties relative to the outcomes of properties in the full coverage category.

[44] Recipients of Option 3 received 60 percent of the potential award under Option 1. Also, 82 percent of Option 2 recipients had a total assistance amount that was less than 100 percent of estimated damage.

[45] The estimates are not replicated separately for each state due to estimation issues that arise from the small sample size in Mississippi.

Exhibit 5-12. Effect of Resources Available on Property Condition in 2010, Louisiana and Mississippi

	Rebuilt	Habitable	Occupied (windshield)	Occupied (USPS)
	Odds Ratio (z-statistic)	Odds Ratio (z-statistic)	Odds Ratio (z-statistic)	Odds Ratio (z-statistic)
All Observations:				
At least half coverage (50-99%)	.620** (2.76)	.515** (3.28)	.565** (3.02)	.452** (4.40)
Less than half coverage (<50%)	.715 (1.04)	.509+ (1.87)	.464* (2.46)	.358** (3.49)
Excluding Road Home Options 2 & 3:				
At least half coverage (50-99%)	.760 (1.31)	.720 (1.23)	.686 (1.65)	.486** (3.56)
Less than half coverage (<50%)	1.093 (0.22)	.794 (0.49)	.692 (1.00)	.473* (2.01)

Note: Each estimate is produced from a separate estimation of the fixed effects logit model. Each model includes covariates that reflect the FEMA damage estimate, the Census neighborhood characteristics, and county/parish-level fixed effects. The full estimates for the models are presented in Exhibit C-11 and Exhibit C-12 in Appendix C.

N=975 properties; N=874 when Options 2 & 3 are excluded; N=961 for the USPS occupancy measure

**p<.01; *p<.05; +p<.10

Among the full sample of observations, properties with at least half coverage were 62.0 percent as likely to be rebuilt, 51.5 percent as likely to be habitable, and 56.5 percent as likely to be occupied (based on windshield observation) as full coverage properties. Properties with less than half coverage also exhibit lower rates of rebuilding, habitability, and occupancy than full coverage properties, but the differences are less consistently significant.

The strength of these results diminishes when we remove Road Home Option 2 and 3 properties from the sample. The differences across the total assistance categories remain significant only for the USPS measure of occupancy. Excluding Option 2 and 3 properties, properties with at least half coverage are 49 percent as likely as full coverage properties to be occupied based on USPS records, and properties with less than half coverage are 47 percent as likely to be occupied. The differences in the other measures are not statistically significant. In other words, the evidence is not sufficient to conclude that properties with at least half coverage or less than half coverage are more or less likely than full coverage properties to be rebuilt, habitable, or occupied based on windshield observation.

Taken together, the estimates in Exhibit 5-12 do not provide strong evidence that rebuilding occurred less frequently among properties where total assistance did not fully cover the estimated costs of repair. While the results for the total sample show sizeable differences, these effects appear to result from the inclusion of properties in Options 2 and 3 of Louisiana's Road Home program. Once Option 2 and 3 properties are removed, we cannot confidently reject the hypothesis that rebuilding and habitability are equal across categories. It may be that neighborhood characteristics and county/parish fixed effects are not sufficient to control for individual differences in homeowner resources, including assistance from charities and other private sources, as well as differences in the

homeowner's income and assets. The owner survey will provide more complete information on the sources of funding used by all property owners, and the results in Exhibit 5-12 will be further explored in the final report.

5.6 Summary of Findings

This chapter analyzed the extent to which the properties observed for the study received CDBG awards and the amount of those awards in relation to the estimated damage to the property. The chapter then examined the condition in 2010 of owner-occupied properties with major or severe damage on SABs; we compared properties with and without CDBG awards and properties for which the CDBG award, FEMA assistance, and private insurance covered varying percentages of the estimated damage to the property.

The main findings of the chapter are as follows:

- The estimated rate of CDBG receipt among owner-occupied properties is 58.6 percent for Louisiana and 57.1 percent for Mississippi. In Louisiana, Orleans and St. Bernard parishes have above-average rates of CDBG receipt. Within Orleans parish, the highest rates of CDBG receipt are in the MidCity, Gentilly, ByWater, Lower Ninth Ward, and New Orleans East planning districts. In Mississippi, rates of CDBG receipt are highest in Jackson County and Hancock County, and in Pascagoula and Waveland and Bay St. Louis.
- The estimated rate of CDBG receipt among renter-occupied properties is much lower: 11.6 percent for Louisiana and 0.8 percent for Mississippi.
- In Texas, only one of the properties in the study sample received a CDBG award, so we were not able to develop estimates for the state. The lower rate of CDBG receipt in Texas reflects the much smaller size of the program overall. Also, the study sample was designed to be representative of FEMA-assessed properties on significantly affected blocks, while CDBG recipients in Texas were clustered by geography and income.
- The damage amounts used to calculate CDBG awards for homeowners are substantially higher for Louisiana recipients than for Mississippi recipients. The median damage amount for CDBG recipients in Louisiana is $170,289, compared to $92,938 for Mississippi. The difference in damage amounts likely reflects not only greater severity of damage in Louisiana but also differences in the method of estimating damage for the purposes of calculating the grant award.
- CDBG awards in Mississippi are larger relative to the estimated damage than CDBG awards in Louisiana. In Mississippi, 33 percent of the CDBG awards made to homeowners with major or severe damage covered at least 80 percent of the estimated property damage. This compares to 14 percent of awards in Louisiana.
- Homeowners that received CDBG awards in Mississippi also had more total assistance relative to the damage to their property than their counterparts in Louisiana. The total assistance amount sums the CDBG grant amount (but not the elevation grant amount, as this was not directly linked to damage) plus private insurance (including home insurance,

flood insurance, and wind insurance) plus FEMA assistance. For 66 percent of CDBG recipients in Mississippi, the total amount of assistance covered all the assessed damage to the property. This compares to just 35 percent of CDBG recipients in Louisiana receiving full coverage. This suggests that owners in Mississippi had more resources with which to rebuild than owners in Louisiana.

- Comparison of CDBG recipients and non-recipients shows that properties that received a CDBG award are more likely to be rebuilt, habitable, and occupied in early 2010. Comparison of the overall rates of rebuilding, habitability, and occupancy consistently show higher rates of rebuilding, habitability, and occupancy among CDBG recipients than among non-recipients. However, the differences are small and only occasionally significant. More robust differences emerge in the multivariate analyses, which adjust for differences across counties and in neighborhood characteristics and initial damage. The comparison of CDBG recipients and non-recipients in the multivariate analyses shows significantly greater rebuilding, habitability, and occupancy among CDBG recipients.
- The exception is the set of properties that received grant awards through Road Home Options 2 and 3 in Louisiana. These properties, which the owners sold to the Louisiana Land Trust rather than returning to rebuild, show notably lower levels of rebuilding, habitability, and occupancy.
- Excluding properties with grant awards through Road Home Options 2 and 3 in Louisiana, properties with CDBG grants are much more likely in both states to be rebuilt, habitable, and occupied than non-recipient properties. CDBG recipients are almost twice as likely to be rebuilt as non-recipients and about twice as likely to be habitable.
- Among CDBG recipients, analysis of the relationship between the relative amount of assistance received and the likelihood that a property is rebuilt, habitable, and occupied is not conclusive. The total amount of assistance from CDBG, FEMA, and private insurance is summed and measured as a percent of the damage estimate. Properties where the total amount of assistance covers 100 percent of the damage estimate show consistently higher levels of rebuilding, habitability, and occupancy. However, these comparisons only occasionally show differences that are statistically significant. The analysis also does not account for unobserved assistance from private sources. The property owner survey will provide more complete information on the sources of funding used by all property owners and thus will allow us to present more definitive analyses on the effect of the amount of assistance relative to damage on rebuilding and re-occupancy decisions.

Appendix A. Windshield Observation Instrument

Property-Level Observation

(Conducted for every address in the address list.)

1. Where is the parcel located relative to the Census block boundaries shown on the boundary map? [CHECK ONE]
   - ❑ Within the boundaries of the Census block
   - ❑ Outside the boundaries of the Census block but adjacent to the map-defined boundary line (i.e., on the other side of the street)
   - ❑ Outside the boundaries of the Census block and removed from the defined boundary line
   - ❑ Unable to locate parcel [END OBSERVATION]

2. When physically locating the parcel, what indicators were used to determine the correct parcel is being described? [CHECK ALL THAT APPLY]
   - ❑ Address is physically displayed on structure, sign on property, curb or mailbox
   - ❑ GPS indicates that observer's position matches address
   - ❑ Parcel's address is not visible but parcel is between two properties with visible addresses that bracket the sampled parcel
   - ❑ Parcel outlines on the Census block boundary map were used to determine the correct parcel
   - ❑ Other method

3. Is this parcel: [CHECK ONE]
   - ❑ Residential (includes parcels with slab, steps, or foundation of a previous home) [GO TO Q4]
   - ❑ Commercial [GO TO Q3a]
   - ❑ School [GO TO Q3b]
   - ❑ Other use (industrial, other institutional, …) [GO TO Q3a]
   - ❑ Empty or vacant lot (no standing structure or foundation of a previous building) [END OBSERVATION]
   - ❑ Slab or foundation is visible, but property type is unclear [END OBSERVATION]

   a. [IF Q3=COMMERCIAL OR OTHER USE] Parcel contents: [CHECK ONE]
      - ❑ Empty [END OBSERVATION]
      - ❑ Empty building: intact [END OBSERVATION]
      - ❑ Empty building: damaged [END OBSERVATION]
      - ❑ Building in use: commercial business [END OBSERVATION]
      - ❑ Building in use: other use (industrial, institutional, etc.) [END OBSERVATION]

   b. [IF Q3=SCHOOL] Does the school appear to be in use? [CHECK ONE]
      - ❑ Yes [END OBSERVATION]
      - ❑ No [END OBSERVATION]]

4. [IF Q3=RESIDENTIAL] What does the parcel contain? [CHECK ONE FOR EACH OPTION BELOW]

a.	A slab, steps, or foundation of a previous home?	❑ Yes	❑ No
b.	A residential structure or part of a residential structure (not a FEMA trailer or Mississippi cottage)?	❑ Yes	❑ No
c.	A FEMA mobile home/trailer?	❑ Yes	❑ No
d.	A Mississippi Park Model or Mississippi Cottage?	❑ Yes	❑ No

5. Is there debris on the property from damage to the home, such as materials stripped from the damaged home? (Do not count general junk around the yard or current building materials.) [CHECK ONE]
   - ❑ Yes
   - ❑ No

Answer the remaining questions (Q6-Q16) about the residential structure on the property. If there is no residential structure (i.e., Q4b=No), end the property-level observation.

6. Is or was the residential structure a: [CHECK ONE]
   - ❑ Mobile home or manufactured home
   - ❑ Site-built single-family home
   - ❑ Multifamily building with two to four units (duplex, triplex, or four-plex)
   - ❑ Multifamily building with five or more units
   - ❑ Too much damage to tell
   - ❑ Too early in construction to tell

7. Now describe any visible damage to the property:

   a. Is there visible damage to the **roof**? [CHECK ALL THAT APPLY]
      - ❑ Roof is missing or totally destroyed
      - ❑ Roof has hole(s)
      - ❑ Roof is missing shingles
      - ❑ Roof is sagging
      - ❑ Roof has blue tarp or other signs of repair
      - ❑ Roof has other signs of damage
      - ❑ *No visible damage to roof*
      - ❑ N/A: Structure is being built or undergoing complete renovation

   b. Is there visible damage to the **windows or doors**? [CHECK ALL THAT APPLY]
      - ❑ Missing or broken window pane(s)
      - ❑ Boarded up window(s)
      - ❑ Missing or broken door(s) or lock(s)
      - ❑ Boarded up door(s)
      - ❑ Open door(s)/Window(s)
      - ❑ Other signs of damage to windows or doors
      - ❑ *No visible damage to windows or doors*
      - ❑ N/A: Structure is being built or undergoing complete renovation

c. Is there visible damage to the **exterior walls or foundation**? [CHECK ALL THAT APPLY]

- ❑ Walls are missing or destroyed
- ❑ Walls have hole(s)
- ❑ Siding is damaged or missing
- ❑ Flood line is visible
- ❑ Foundation is deteriorating or has shifted
- ❑ Cement block columns used to elevate home are damaged or destroyed
- ❑ Other damage to walls or foundation
- ❑ *No visible damage to exterior walls or foundation*
- ❑ N/A: Structure is being built or undergoing complete renovation

d. Is there visible damage to any other parts of the structure (e.g. porches, stairs, gutters or fascia)? (Do not evaluate unattached structures) [CHECK ONE]

- ❑ Yes
- ❑ No
- ❑ N/A: Structure is being built or undergoing complete renovation

8a. What is the overall condition of the exterior structure? [CHECK ONE]

- ❑ Excellent or good
- ❑ Fair
- ❑ Poor
- ❑ Totally destroyed
- ❑ N/A: Structure is being built or undergoing complete renovation

8b. Is the structure habitable (i.e. sealed from the elements with at least one point of access)? [CHECK ONE]

- ❑ Yes
- ❑ No

9. Is there an Urban Search and Rescue Marking ("Katrina tattoo") on the structure? [CHECK ONE]

- ❑ Yes
- ❑ No

10. Is there an electrical meter head present? [CHECK ONE]

- ❑ Yes
- ❑ No
- ❑ Electrical meter is not visible from street

11. Based on observation (not measurement), residential structure appears to be: [CHECK ONE]

- ❑ Elevated 10 feet or more above street level
- ❑ Elevated at least 5 feet but less than 10 feet above street level
- ❑ Elevated at least 3 feet but less than 5 feet above street level
- ❑ Elevated less than 3 feet above street level
- ❑ Not elevated (i.e., at street level/slab on grade)

12. Do you see any of the following signs or notices on the structure or property? [CHECK ALL THAT APPLY]
    - ❑ Tax sale notice, condemnation notice, eviction notice, or stop work notice posted on door
    - ❑ Building permit
    - ❑ For-sale sign
    - ❑ For-rent sign
    - ❑ Notice not readable
    - ❑ None of the above

13. Do you see any of the following signs that the structure is occupied? [CHECK ALL THAT APPLY]
    - ❑ Occupant(s) observed
    - ❑ Vehicle(s) in driveway or parking area
    - ❑ Light(s) on inside
    - ❑ Furniture visible through window
    - ❑ Landscaping/yard/porch furniture suggests occupancy
    - ❑ Satellite dish on roof/attached to house
    - ❑ Garbage can out front, if others are out for "trash day"
    - ❑ Other sign(s) of occupancy
    - ❑ No signs of occupancy

14. Do you see any of the following signs of repair/rebuilding activity? [CHECK ALL THAT APPLY]
    - ❑ Workers on site
    - ❑ Work vehicle(s) on site
    - ❑ Equipment—ladders, tools, tarps, scaffolding—visible
    - ❑ Construction materials—wood, paint, etc.—visible
    - ❑ Construction sign or building permit posted
    - ❑ Electrical meter on pole
    - ❑ Construction dumpster on site
    - ❑ Other sign(s) of rebuilding/repair
    - ❑ No signs of ongoing rebuilding/repair

15. Which of the following best describes the ongoing/current repairs observable at this property? [CHECK ONE]
    - ❑ Repairs to a pre-storm (or existing) structure
    - ❑ Extensive rebuilding of a pre-storm (or existing) structure
    - ❑ Construction of a new home
    - ❑ No rebuilding activity observed

16. Which of the following best characterizes the structure? [CHECK ONE]
    - ❑ A newly-constructed home or extensively rebuilt home with signs of occupation
    - ❑ A newly-constructed or extensively rebuilt home, with no signs of occupation
    - ❑ A new home under construction
    - ❑ A pre-storm home with repair underway, with signs of occupation
    - ❑ A pre-storm home with repair underway, with no signs of occupation
    - ❑ A pre-storm home with no repair underway, with signs of occupation
    - ❑ A pre-storm home with no repair underway, with no signs of occupation

Block Observation

(Conducted once per block.)

1. Which best describes the type of block that is being observed? [CHECK ONE]
   - ❑ Standard (consecutive intersections less than ¼ mile apart)
   - ❑ Non-standard (consecutive intersections more than ¼ mile apart)
   - ❑ Rural (outside city limits and fewer than three neighbors within ¼ mile)

2. Which best describes the land use on the block? [CHECK ONE]
   - ❑ Residential
   - ❑ Residential and commercial
   - ❑ Residential and other land uses (industrial or institutional)
   - ❑ Residential, commercial, and other land uses
   - ❑ Difficult to determine/mainly vacant

Examine the infrastructure visible on the block, such as roads, sidewalks, electrical poles/lines, fire hydrants, curb and gutter, etc.

3. Do you see any of the following on the block? [CHECK ALL THAT APPLY]
   - ❑ Roads with many ruts, cracks or potholes
   - ❑ Many cracked or buckled sidewalks
   - ❑ Many cracked or buckled curbs and gutters
   - ❑ Signage is missing or makeshift
   - ❑ None

4. Is any aspect of the infrastructure currently being repaired or replaced? [CHECK ALL THAT APPLY]
   - ❑ Road
   - ❑ Sidewalks
   - ❑ Electrical poles/lines
   - ❑ Fire hydrants
   - ❑ Curbs and gutters
   - ❑ Signage
   - ❑ None

5. What proportion of the residential properties in the block are vacant, empty, or completely destroyed? [CHECK ONE]
   - ❑ Almost all of the residential properties are vacant, empty or completely destroyed
   - ❑ More than half of the residential properties are vacant, empty or completely destroyed
   - ❑ Less than half of the residential properties are vacant, empty or completely destroyed
   - ❑ One or two of the residential properties are vacant, empty or completely destroyed
   - ❑ None of the residential properties are vacant, empty or completely destroyed

6. What proportion of the non-residential properties in the block are vacant, empty, or completely destroyed? [CHECK ONE]
    - ❑ Almost all of the non-residential properties are vacant, empty or completely destroyed
    - ❑ More than half of the non-residential properties are vacant, empty or completely destroyed
    - ❑ Less than half of the non-residential properties are vacant, empty or completely destroyed
    - ❑ One or two of the non-residential properties are vacant, empty or completely destroyed
    - ❑ None of the non-residential properties are vacant, empty or completely destroyed
    - ❑ N/A: no non-residential properties in the block

7. What proportion of all properties in the block show damage requiring major repairs? (For instance, properties in poor condition and/or totally destroyed count as needing major repairs) [CHECK ONE]
    - ❑ Almost all of the properties show damage requiring major repairs
    - ❑ More than half of the properties show damage requiring major repairs
    - ❑ Less than half of the properties show damage requiring major repairs
    - ❑ One or two of the properties show damage requiring major repairs
    - ❑ None of the properties show damage requiring major repairs

8. Does the neighborhood or area in which the block is located have any of the following negative features? [CHECK ALL THAT APPLY]
    - ❑ Major industrial activity
    - ❑ Excessive trash or debris
    - ❑ Boarded up commercial or retail areas
    - ❑ None of these

9. What proportion of the residential properties in the block are vacant, empty, or completely destroyed? [CHECK ONE]
    - ❑ Almost all of the residential properties are vacant, empty or completely destroyed
    - ❑ More than half of the residential properties are vacant, empty or completely destroyed
    - ❑ Less than half of the residential properties are vacant, empty or completely destroyed
    - ❑ One or two of the residential properties are vacant, empty or completely destroyed
    - ❑ None of the residential properties are vacant, empty or completely destroyed

10. What proportion of the non-residential properties in the block are vacant, empty, or completely destroyed? [CHECK ONE]
    - ❑ Almost all of the non-residential properties are vacant, empty or completely destroyed
    - ❑ More than half of the non-residential properties are vacant, empty or completely destroyed
    - ❑ Less than half of the non-residential properties are vacant, empty or completely destroyed
    - ❑ One or two of the non-residential properties are vacant, empty or completely destroyed
    - ❑ None of the non-residential properties are vacant, empty or completely destroyed
    - ❑ N/A: no non-residential properties in the block

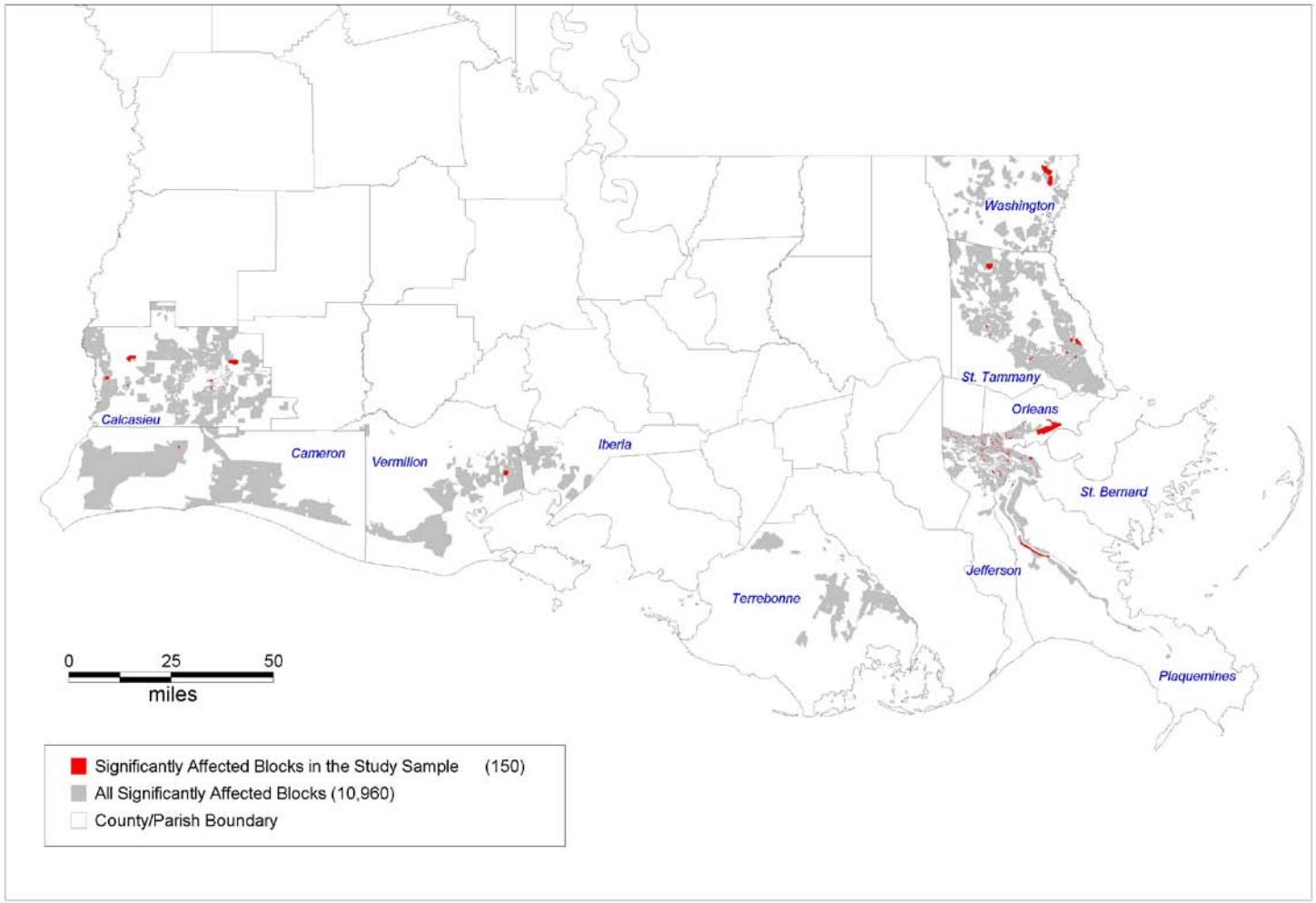
11. What proportion of <u>all properties</u> in the block show damage requiring major repairs? [Major repairs require replacing a wall/roof/porch/foundation. Also consider major repairs necessary if the property is not habitable.] [CHECK ONE]
    - ❑ Almost all of the properties show damage requiring major repairs
    - ❑ More than half of the properties show damage requiring major repairs
    - ❑ Less than half of the properties show damage requiring major repairs
    - ❑ One or two of the properties show damage requiring major repairs
    - ❑ None of the properties show damage requiring major repairs

12. Does the neighborhood or area in which the block is located have any of the following negative features? [CHECK ALL THAT APPLY]
    - ❑ Major industrial activity
    - ❑ Excessive trash or debris
    - ❑ Boarded up commercial or retail areas

Appendix B. Maps of Sampled Blocks

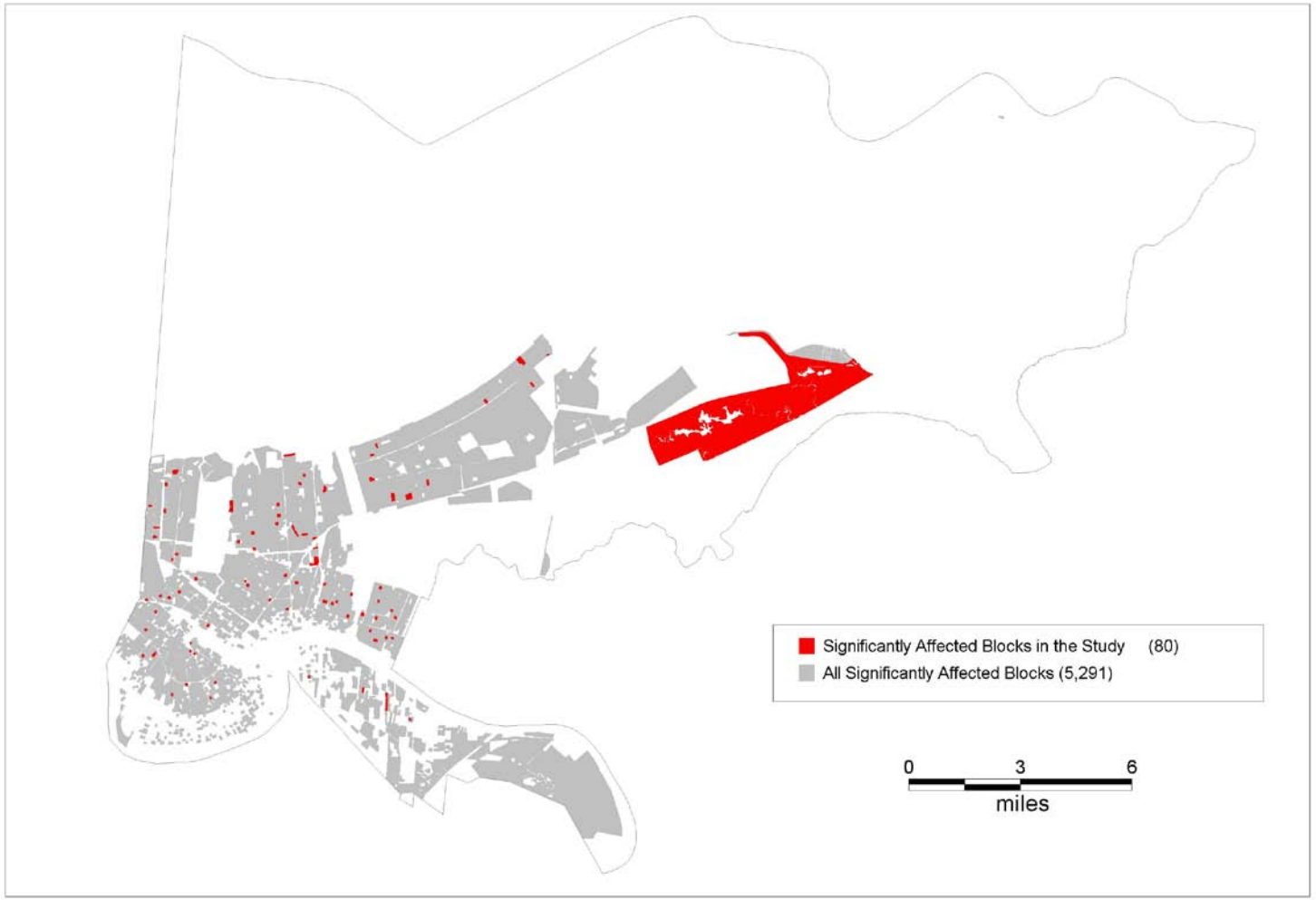
State of Louisiana

Locations of Sampled Significantly Affected Blocks by County
Louisiana



New Orleans, Louisiana

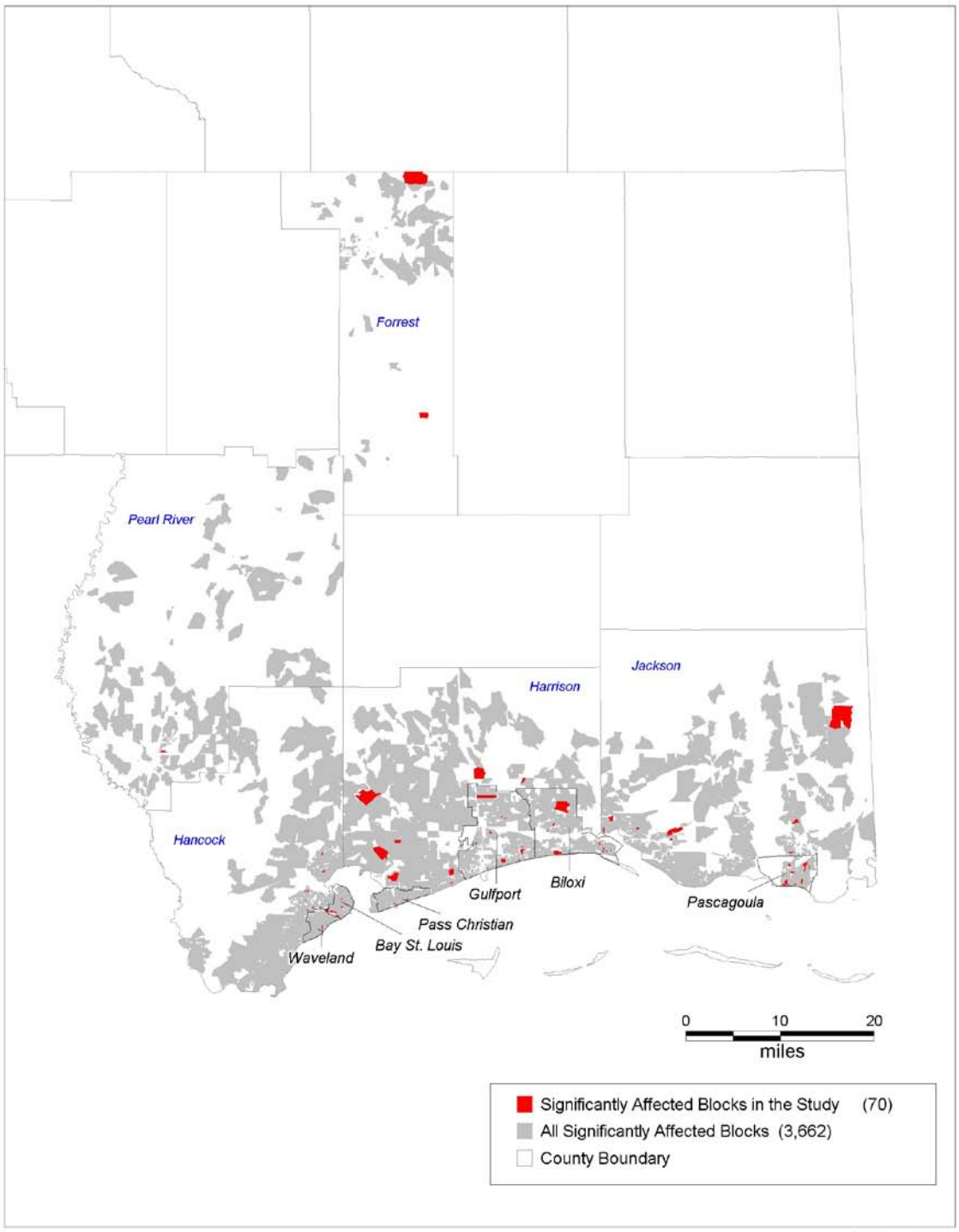
Locations of Sampled Significantly Affected Blocks
New Orleans, Louisiana (Orleans Parish)



Abt Associates Inc.
4/30/2010

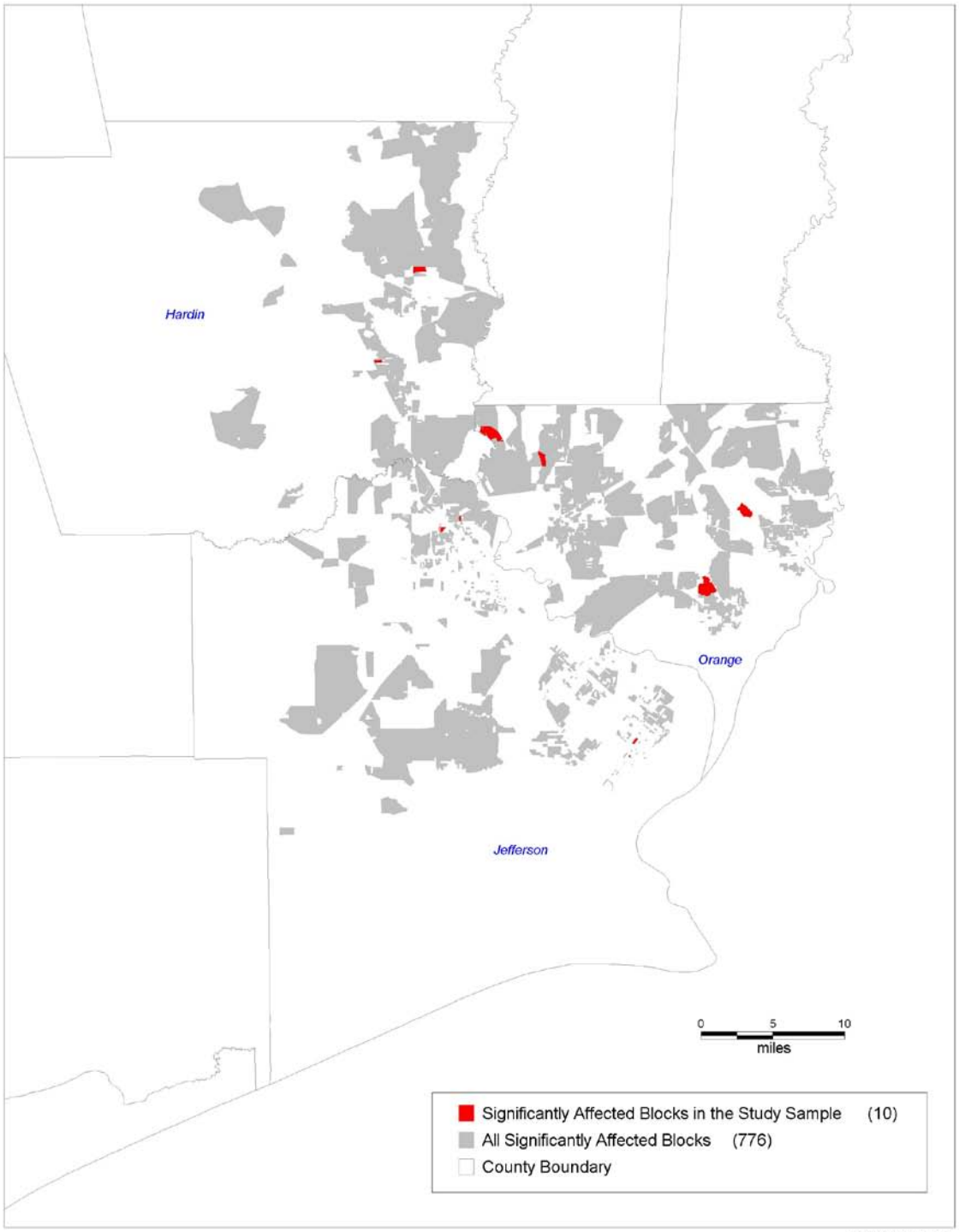
State of Mississippi

Locations of Sampled Significantly Affected Blocks by County
Mississippi



State of Texas

Locations of Sampled Significantly Affected Blocks by County
Texas



Appendix C. Supplemental Data Tables

Exhibit C-1. Roof Damage Observed in 2010

	Percent of Properties with Roof Damage Observed (N=51,708)	Percent of All Properties with a Residential Structure (N=278,684)
Roof is missing or totally destroyed	2%	0%
Roof has hole(s)	7%	1%
Roof is missing shingles	33%	6%
Roof is sagging	36%	7%
Roof has blue tarp or other	4%	1%
Roof has other signs of damage	76%	14%
Any sign of damage to roof	100%	19%

Source: Windshield observations conducted in January and February 2010.

Exhibit C-2. Damage to Windows and Doors Observed in 2010

	Percent of Properties with Window or Door Damage Observed (N=36,530)	Percent of All Properties with a Residential Structure (N=278,684)
Missing or broken window panes	4%	5%
Boarded up window(s)	6%	6%
Missing or broken door(s) or lock(s)	2%	2%
Boarded up door(s)	3%	3%
Open door(s) or window(s)	3%	3%
Other signs of damage to windows or doors	6%	7%
Any sign of damage to windows or doors	100%	13%

Source: Windshield observations conducted in January and February 2010.

Exhibit C-3. Damage to Walls and Foundations Observed in 2010

	Percent of Properties with Wall or Foundation Damage Observed (N=36,530)	Percent of All Properties with a Residential Structure (N=278,684)
Walls are missing or destroyed	3%	0%
Walls have hole(s)	9%	1%
Siding is damaged or missing	52%	8%
Flood line is visible	2%	0%
Foundation is deteriorating or has shifted	21%	3%
Cement block columns used to elevate home are damaged or destroyed	5%	1%
Other damage to walls or foundation	5%	1%
Walls are missing or destroyed	67%	10%
Any sign of damage to walls or foundations	100%	16%

Source: Windshield observations conducted in January and February 2010.

Exhibit C-4. Observed Condition of Affected Properties by Geography

Stratum	Percent of Affected Properties in Stratum					
	Excellent or Good	Fair	Poor	Destroyed	Under Construction	No Residential Structure
Louisiana	73.7	10.2	5.8	0.6	0.3	9.4
Calcasieu and Cameron Parishes	67.5	14.3	11.6	0.5	0.0	6.1
Jefferson Parish	95.7	1.6	1.3	0.2	0.0	1.2
Orleans Parish	64.8	16.8	10.5	0.8	0.4	6.7
MidCity Planning District	41.4	37.0	17.8	0.5	0.0	3.2
Lakeview Planning District	75.8	5.7	5.1	0.0	0.0	13.4
Gentilly Planning District	78.1	10.3	4.9	0.4	0.8	5.3
ByWater Planning District	50.6	20.0	18.4	2.1	0.5	8.5
Lower 9th Ward Planning District	46.4	3.0	19.6	0.0	1.2	29.8
New Orleans East Planning District	83.4	10.4	4.3	0.0	0.0	1.9
Uptown Planning District	74.4	8.3	9.7	3.5	1.4	2.8
St. Bernard Parish	60.2	5.6	0.6	0.0	1.1	32.5
St. Tammany Parish	83.7	4.8	1.2	0.0	0.0	10.3
Mississippi	74.9	6.3	1.1	0.1	0.7	16.9
Hancock County	48.3	4.6	1.7	0.0	0.7	44.7
Waveland and Bay St. Louis	66.8	6.6	1.3	0.0	1.3	23.9
Harrison County	78.5	5.7	1.5	0.1	0.9	13.3
Biloxi	52.4	11.2	1.2	0.0	2.8	32.4
Gulfport	93.0	1.8	1.3	0.0	0.0	3.8
Pass Christian and Long Beach City	67.1	10.2	2.8	0.5	0.0	19.5
Jackson County	77.6	6.2	0.3	0.0	0.6	15.4
Pascagoula	90.6	0.0	0.0	0.0	0.0	9.4
Texas	67.0	25.4	5.3	0.0	0.0	2.4
Total: All States	73.6	10.1	4.6	0.4	0.4	10.8

Source: Windshield observations conducted in January and February 2010.

Note: Exhibit shows the estimated percent of all affected properties in each geographic area by each condition category.

Exhibit C-5. Confidence Intervals for Estimates Presented in Exhibit C-4

Stratum	95% Confidence Interval					
	Excellent or Good	Fair	Poor	Destroyed	Under Construction	No Residential Structure
Louisiana	69.2-78.2	7.7-12.6	4.0-7.6	0.2-0.9	0.1-0.6	4.7-14.1
Calcasieu and Cameron Parishes	37.5-97.5	2.4-26.2	0-31.1	0-1.8	N/A	0-14.8
Jefferson Parish	92.2-99.3	0.1-3.0	0.0-3.3	0.0-0.6	N/A	0.1-2.3
Orleans Parish	58.7-70.8	12.8-20.8	7.5-13.5	0.2-1.5	0-0.9	4.6-8.7
MidCity Planning District	25.3-57.4	23.5-50.5	7.5-28.2	0-1.8	N/A	0.7-5.8
Lakeview Planning District	64.0-87.6	0-15.0	0-11.0	N/A	N/A	3.6-23.1
Gentilly Planning District	67.1-89.1	5.5-15.2	0-10.7	0-1.4	0-2.2	0-11.7
ByWater Planning District	40.8-60.3	8.7-31.2	11.5-25.2	0-5.3	0-1.8	0.4-16.5
Lower 9th Ward Planning District	29.7-63.2	0.4-6.6	11.4-27.9	N/A	0-2.9	9.4-50.2
New Orleans East Planning District	72.0-94.9	1.8-19.1	0-9.2	N/A	N/A	0-4.0
Uptown Planning District	55.2-93.6	1.4-15.2	2.3-17.1	0-8.1	0-4.7	0-8.8
St. Bernard Parish	43.2-77.2	0-16.2	0-1.4	N/A	0.2-2.0	13.7-51.2
St. Tammany Parish	70.1-97.3	0-10.8	0-3.1	N/A	N/A	0.6-20.1
Mississippi	67.5-82.4	4.1-8.5	0.3-1.9	0-0.2	0.1-1.2	10.2-23.7
Hancock County	27.4-69.1	1.7-7.5	0-4.2	N/A	0-2.2	23.7-65.7
Waveland and Bay St. Louis	43.7-89.8	3.9-9.3	0-4.1	N/A	0-4.2	3.5-44.3
Harrison County	68.2-88.8	2.1-9.3	0-3.2	0-0.4	0-2.0	6.5-20.1
Biloxi	33.5-71.3	4.3-18.2	0-3.9	N/A	0-7.3	15.7-49.2
Gulfport	82.1-100	0-5.6	0-3.3	N/A	N/A	0-10.2
Pass Christian and Long Beach City	48.2-86.0	2.0-18.3	0-8.1	0-1.4	N/A	4.1-34.8
Jackson County	64.3-90.8	2.1-10.3	0-0.9	N/A	0-1.5	2.0-28.8
Pascagoula	79.6-100	N/A	N/A	N/A	N/A	0-20.3
Texas	50.8-83.2	12.9-37.9	0-14.6	N/A	N/A	0-5.7
Total: All States	69.9-77.3	8.2-12.1	3.3-6.0	0.2-0.7	0.2-0.6	7.3-14.4

Source: Windshield observations conducted in January and February 2010.

Note: Exhibit shows the confidence intervals for the estimated percent of affected properties in each geographic area in each condition category.

Exhibit C-6. Observed Signs of Occupancy

	Percent of Properties with Signs of Occupancy (N=244,290)	Percent of All Properties with a Residential Structure (N=278,684)
Occupant(s) observed	15%	13%
Vehicle(s) in driveway or parking area	71%	62%
Light(s) on inside	7%	6%
Furniture visible through window	6%	6%
Landscaping/yard/porch furniture suggests occupancy	64%	56%
Satellite dish on roof/attached to house	19%	16%
Garbage can out front, if others are out for "trash day"	15%	13%
Other sign(s) of occupancy	54%	47%
Any sign of occupation	100%	13%

Source: Windshield observations conducted in January and February 2010.

Exhibit C-7. Observed Damage and Ongoing Repairs to Block Infrastructure

	Percent of Blocks (N=230)
Damage to Block Infrastructure	
Roads with many ruts, cracks or potholes	27.1
Many cracked or buckled sidewalks	13.2
Many cracked or buckled curbs and gutters	4.5
Signage is missing or makeshift	12.7
Any type of damage to the block infrastructure	27.1
Repairs to Block Infrastructure	
Repairs to road	4.3
Repairs to sidewalks	2.0
Repairs to electrical poles/lines	0.6
Repairs to fire hydrants	0.5
Repairs to curbs and gutters	1.9
Repairs to signage	0.5
Any type of repairs block infrastructure	5.6

Source: Windshield observations conducted in January and February 2010.

Exhibit C-8. Observed Condition in Early 2010 of Option 2 and 3 Properties in Louisiana

	Number of Properties	Percent of Properties
Property contains a permanent residential structure with no substantial repair needs	3	2%
Property contains a permanent residential structure with substantial repair needs	36	30%
Property does not contain a permanent residential structure (empty lot)	82	68%
Total	121	100%

Source: Windshield observations conducted in January and February 2010; CDBG administrative data as of March 2010.

Exhibit C-9. Estimated Difference between CDBG Recipients and Non-Recipients from County-Level Fixed Effects Models, Louisiana and Mississippi (All Observations)

	Rebuilt	Habitable	Occupied (windshield)	Occupied (USPS)
	Odds Ratio (z-statistic)	Odds Ratio (z-statistic)	Odds Ratio (z-statistic)	Odds Ratio (z-statistic)
All Observations:				
CDBG recipient	1.080 (0.37)	0.974 (0.11)	0.968 (0.20)	0.928 (0.51)
Severe damage	0.238** (4.73)	0.183** (4.64)	0.254** (4.45)	0.300** (3.63)
Median home value	1.012* (2.21)	1.011+ (1.78)	1.011 (2.36)*	1.006 (1.36)
Percent homeowner	1.002 (0.27)	0.994 (0.69)	1.001 (0.09)	1.012 (1.28)
Percent occupied	1.019 (1.41)	1.011 (0.85)	1.011 (0.99)	1.020+ (1.84)
Age of housing unit (years)	0.989 (1.06)	0.997 (0.22)	1.005 (0.52)	1.010 (0.99)
Length of occupant tenure (years)	1.001 (0.05)	1.023 (0.79)	1.008 (0.38)	0.984 (0.74)
Percent urban	0.990+ (1.95)	0.987* (2.52)	0.988 (2.76)**	0.985** (3.13)
Percent public assistance	0.988 (0.42)	0.976 (0.69)	1.018 (0.60)	1.008 (0.27)
Percent black	1.008 (1.24)	1.013+ (1.93)	1.014 (2.20)*	1.019** (3.04)
Percent Hispanic	1.041 (1.13)	1.048 (1.07)	1.028 (0.77)	1.070 (1.49)
Percent other minority	1.000 (0.02)	1.011 (0.44)	1.008 (0.36)	1.048+ (1.65)
County fixed effects, $\chi^2(9)$[a]	--** (47.12)	--** (41.35)	--** (40.37)	-- (9.85)
N	1,776	1,776	1,776	1,746

[a] This row reports the chi-squared statistic for the test of joint significance of the county fixed effects. The test statistic has 9 degrees of freedom (10 counties/categories), because several counties have very few observations and must be combined with neighboring counties. The test statistic for the model of occupancy (USPS) has 7 degrees of freedom (8 categories), because of further consolidation.

**p<.01; *p<.05; +p<.10

Exhibit C-10. Estimated Difference between CDBG Recipients and Non-Recipients from County-Level Fixed Effects Models, Louisiana and Mississippi (Excluding Road Home Options 2 & 3)

	Rebuilt	Habitable	Occupied (windshield)	Occupied (USPS)
	Odds Ratio (z-statistic)	Odds Ratio (z-statistic)	Odds Ratio (z-statistic)	Odds Ratio (z-statistic)
Excluding Road Home Options 2 & 3:				
CDBG recipient	1.978** (4.28)	2.064** (4.25)	1.672** (3.04)	1.661* (2.47)
Severe damage	0.227** (4.13)	0.159** (4.22)	0.249** (3.84)	0.310** (2.96)
Median home value	1.017** (3.44)	1.017** (2.88)	1.015** (3.38)	1.010* (2.10)
Percent homeowner	1.003 (0.37)	0.994 (0.67)	1.002 (0.24)	1.013 (1.37)
Percent occupied	1.023 (1.73)$^{+}$	1.016 (1.21)	1.015 (1.31)	1.024* (2.08)
Age of housing unit (years)	0.985 (1.36)	0.997 (0.21)	1.005 (0.57)	1.011 (1.09)
Length of occupant tenure (years)	0.998 (0.08)	1.017 (0.55)	1.003 (0.14)	0.984 (0.70)
Percent urban	0.990* (2.11)	0.985** (2.81)	0.987** (3.07)	0.983** (3.20)
Percent public assistance	0.981 (0.67)	0.973 (0.79)	1.015 (0.51)	1.007 (0.22)
Percent black	1.009 (1.33)	1.014^{+} (1.91)	1.015* (2.40)	1.022** (3.11)
Percent Hispanic	1.012 (0.38)	1.014 (0.34)	1.005 (0.15)	1.055 (1.19)
Percent other minority	1.006 (0.26)	1.021 (0.80)	1.014 (0.65)	1.052^{+} (1.72)
County fixed effects, $\chi^2(9)$[a]	--** (44.75)	--** (42.94)	--** (36.64)	-- (7.64)
N	1,675	1,675	1,675	1,649

[a] This row reports the chi-squared statistic for the test of joint significance of the county fixed effects. The test statistic has 9 degrees of freedom (10 counties/categories), because several counties have very few observations and must be combined with neighboring counties. The test statistic for the model of occupancy (USPS) has 7 degrees of freedom (8 categories), because of further consolidation.

**p<.01; *p<.05; $^{+}$p<.10

Exhibit C-11. Effect of Resources Available on Property Condition in 2010, Louisiana and Mississippi (All Observations)

	Rebuilt	Habitable	Occupied (windshield)	Occupied (USPS)
	Odds Ratio (z-statistic)	Odds Ratio (z-statistic)	Odds Ratio (z-statistic)	Odds Ratio (z-statistic)
All Observations:				
At least half coverage (50-99%)	0.620** (2.76)	0.515** (3.28)	0.565** (3.02)	0.452** (4.40)
Less than half coverage (<50%)	0.715 (1.04)	0.509+ (1.87)	0.464* (2.46)	0.358** (3.49)
Severe damage	0.234** (3.82)	0.150** (4.24)	0.220** (4.18)	0.293** (3.07)
Median home value	1.009 (1.41)	1.009 (1.33)	1.008 (1.71)	0.999 (0.15)
Percent homeowner	1.001 (0.12)	0.993 (0.64)	1.005 (0.60)	1.027* (2.42)
Percent occupied	1.016 (0.96)	1.001 (0.09)	0.999 (0.06)	0.998 (0.14)
Age of housing unit (years)	0.993 (0.54)	0.997 (0.19)	1.005 (0.47)	1.014 (1.18)
Length of occupant tenure (years)	0.993 (0.38)	1.032 (1.03)	1.010 (0.53)	0.973 (1.07)
Percent urban	0.985** (2.60)	0.984** (2.80)	0.986** (2.72)	0.993 (1.16)
Percent public assistance	1.000 (0.01)	0.947 (1.30)	1.020 (0.56)	1.012 (0.32)
Percent black	1.017* (2.33)	1.028** (3.51)	1.023** (3.38)	1.020** (2.63)
Percent Hispanic	1.080+ (1.70)	1.096+ (1.93)	1.059+ (1.84)	1.087+ (1.84)
Percent other minority	1.029 (1.02)	1.022 (0.75)	1.021 (0.85)	1.030 (1.16)
County fixed effects, $\chi^2(9)$[a]	--** (21.95)	-- (14.07)	-- (11.13)	-- (4.43)
N	974	974	974	960

[a] This row reports the chi-squared statistic for the test of joint significance of the county fixed effects. The test statistic has 9 degrees of freedom (10 counties/categories), because several counties have very few observations and must be combined with neighboring counties. The test statistic for the model of occupancy (USPS) has 7 degrees of freedom (8 categories), because of further consolidation.

**p<.01; *p<.05; +p<.10

Exhibit C-12. Effect of Resources Available on Property Condition in 2010, Louisiana and Mississippi (Excluding Road Home Options 2 & 3)

	Rebuilt	Habitable	Occupied (windshield)	Occupied (USPS)
	Odds Ratio (z-statistic)	Odds Ratio (z-statistic)	Odds Ratio (z-statistic)	Odds Ratio (z-statistic)
Excluding Road Home Options 2 & 3:				
At least half coverage (50-99%)	0.760 (1.31)	0.720 (1.23)	0.686^{+} (1.65)	0.486** (3.56)
Less than half coverage (<50%)	1.093 (0.22)	0.794 (0.49)	0.692 (1.00)	0.473* (2.01)
Severe damage	0.213** (3.08)	0.099** (3.88)	0.204** (3.32)	0.319* (2.12)
Median home value	1.019* (2.42)	1.022* (2.53)	1.015* (2.43)	1.003 (0.45)
Percent homeowner	1.004 (0.43)	0.993 (0.64)	1.009 (1.05)	1.036* (3.18)
Percent occupied	1.030* (2.00)	1.021 (1.29)	1.015 (1.09)	1.002 (0.17)
Age of housing unit (years)	0.990 (0.68)	1.001 (0.03)	1.007 (0.61)	1.019^{+} (1.68)
Length of occupant tenure (years)	0.993 (0.36)	1.049 (1.27)	1.011 (0.45)	0.971 (1.12)
Percent urban	0.985* (2.39)	0.982** (2.84)	0.986** (2.64)	0.993 (1.02)
Percent public assistance	1.005 (0.13)	0.943 (1.33)	1.030 (0.78)	1.014 (0.37)
Percent black	1.018* (2.23)	1.031** (3.41)	1.025** (3.17)	1.025* (2.49)
Percent Hispanic	1.038 (0.81)	1.061 (1.24)	1.037 (1.17)	1.078 (1.43)
Percent other minority	1.025 (1.01)	1.011 (0.38)	1.004 (0.17)	1.027 (0.96)
County fixed effects, $\chi^2(9)$[a]	--** (19.79)	--** (20.54)	--** (25.55)	-- (7.33)
N	873	873	873	863

[a] This row reports the chi-squared statistic for the test of joint significance of the county fixed effects. The test statistic has 9 degrees of freedom (10 counties/categories), because several counties have very few observations and must be combined with neighboring counties. The test statistic for the model of occupancy (USPS) has 7 degrees of freedom (8 categories), because of further consolidation.

**p<.01; *p<.05; $^{+}$p<.10

Appendix D. Supplemental Analysis of Neighborhoods with Concentrated Repair Needs

This appendix presents several regression models that examine the relative influence of neighborhood housing and demographic characteristics on property-level outcomes. The objective of these regressions is to identify the characteristics of neighborhoods that have concentrations of repair needs as of 2010. The regressions in this section do not control for initial damage assessed by FEMA from the 2005 storms, as this would affect the interpretation of the results.

The regression models presented in this appendix seek to explain two indicators of remaining damage to hurricane-affected properties. First, the models seek to explain ***the likelihood that a property is an empty lot as of 2010*** (that is, does not contain a residential structure). Second, the models seek to explain ***the likelihood that a property contains a residential structure with substantial repair needs as of 2010***. These are the two dependent variables, or outcomes, in the regression models.

The regression models examine the effects of pre-storm neighborhood characteristics (as captured by 2000 Census data at the block group level) on these two property-level outcomes. Because the neighborhood characteristics are the same for all properties on a block—they all belong to the same block group—the variation used in the models comes from differences in neighborhood characteristics across the 230 blocks.[46,47]

We ran four separate regressions for this analysis, reflecting two model specifications with respect to each outcome measure. The first specification measured the effect of neighborhood housing characteristics, such as median home values, housing tenure, and housing occupancy. The results for this model are presented in Exhibit D-1. The second specification measured the effect of neighborhood demographic characteristics such as household income, education, race, and ethnicity. The results are presented in Exhibit D-2.

Because the covariates are measured at the neighborhood level, substantial multicollinearity exists between measures. Neighborhoods with higher median home prices generally show higher median incomes, education levels, and rates of ownership and occupancy. The remaining covariates similarly show correlations that reflect the clustering of residents and property characteristics across neighborhoods. As a result, several variables were excluded from the regression specifications.

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[46] All analyses cluster standard errors at the block level, as well as specifying sampling weights and strata definitions that reflect the survey design. Analyses are implemented using PROC SURVEYLOGISTIC in SAS 9.2.

[47] This approach is similar to conducting the regression at the block level rather than the property level, which would involve regressing the percent of empty lots, or properties needing substantial repair needs on the block, against block characteristics.

Exhibit D-1 shows the association of ***neighborhood housing characteristics*** with (A) the likelihood that a property is an empty lot, and (B) the likelihood that a property contains a residential structure with substantial repair needs. For each specification, the exhibit presents the odds ratio (OR) and significance level produced by the logistic regressions. The odds ratio measures the relative change in the likelihood of the outcome that is associated with a one unit change in the independent variable.

For example, the odds ratio of .994 associated with median home value in Column (A) implies that a $1,000 increase in median home value is associated with properties being only 99.4 percent as likely as other properties to be empty lots. An odds ratio of 1 indicates that no association exists, and odds ratios significantly above one indicate that an increase in the measure (for example, in percent of owned housing units) is associated with a higher likelihood that the outcome (for example, an empty lot) is observed.

Exhibit D-1. Association of 2000 Neighborhood Housing Characteristics with Property Repair Needs in 2010 (Logit estimation)

	(A) Property is an Empty Lot		(B) Property Contains a Residential Structure with Substantial Repair Needs	
	Odds Ratio	p-value	Odds Ratio	p-value
Median home value (in $1,000s)	.994*	.050	.986**	.004
Percent of housing units owned	1.024*	.028	.983*	.025
Percent of housing units occupied	.955**	.002	.979	.183
Median age of housing stock	.976	.107	1.050**	<.001
Median tenure of tract residents	1.003	.919	.999	.957
Urban (vs. rural) location	1.011	.052	.987**	.003

N=3,511 properties

*p<.05; **p<.01

The estimates presented in Exhibit 4-11 show that empty lots and structures with substantial repair needs as of 2010 are statistically associated with neighborhoods characteristics. The presence of empty lots is associated with lower rates of housing occupancy in 2000 and higher rates of homeownership. The odds ratio for the occupancy variable implies that a one percent increase in the occupancy rate of Census block group properties is associated with a 4.5 percent decrease in the likelihood that a particular property is an empty lot. Conversely, the odds ratio for the measure of homeownership implies that a one percent increase in the block group homeownership rate is associated with a 2.4 percent increase in the likelihood that a property is an empty lot. (This finding is counterintuitive.) The presence of structures with major repair needs is predicted by lower home values and also by lower homeownership rates, older residential structures, and rural location.[48]

Exhibit D-2 shows the association of ***neighborhood demographic characteristics*** with (A) the likelihood that a property is an empty lot, and (B) the likelihood that a property contains a residential

[48] The definition of rural that we are using is the Census 2000 definition, which classifies a block group as urban if it is in an "urban area" or "urban cluster." Anything not in one of these areas is classified "rural."

structure with substantial repair needs. The findings suggest that the presence of an empty lot is associated most strongly with the racial/ethnic composition of neighborhood residents. Higher proportions of black and Hispanic residents both are associated with fewer lots that are empty.

Median household income is the only significant predictor of whether a property will contain a residential structure with substantial repair needs. A $1,000 increase in the median household income of Census block group residents is associated with a 6.1 percent reduction in the likelihood that a property contains a residential structure with substantial repair needs.

Exhibit D-2. Association of 2000 Neighborhood Demographic Characteristics with Property Repair Needs in 2010 (Logit estimation)

	(A) Property is an Empty Lot		(B) Property Contains a Residential Structure with Substantial Repair Needs	
	Odds Ratio	p-value	Odds Ratio	p-value
Median household income (in $1,000s)	1.007	.721	.939**	.006
Percent receive public assistance	.973	.605	1.032	.371
Percent with a college degree	.966	.058	1.015	.297
Percent with some post-secondary	1.000	.987	1.021	.162
Percent black	.988*	.010	1.003	.479
Percent Hispanic	.860**	.002	1.019	.365
Percent other minority	1.010	.678	.981	.397

N=3,511 properties

*p<.05; **p<.01