



# HHS Public Access

Author manuscript

*Soc Sci Q.* Author manuscript; available in PMC 2015 December 01.

Published in final edited form as:

*Soc Sci Q.* 2014 December ; 95(4): 1086–1100. doi:10.1111/ssqu.12114.

## Homeownership and Housing Displacement after Hurricane Katrina among Low-Income African-American Mothers in New Orleans

**Elizabeth Fussell, Ph.D.** and

Population Studies and Training Center, Brown University, Box 1836, 68 Waterman St., Providence, RI 02912

**Elizabeth Harris, M.A.**

Sociology Department, Washington State University, PO Box 644020, Pullman, WA 99164-4020

Elizabeth Fussell: Elizabeth\_Fussell@brown.edu; Elizabeth Harris: elizabeth.harris@email.wsu.edu

### Abstract

**Objective**—We evaluate the effect of pre-Katrina housing tenure and post-disaster financial resources on the odds of housing displacement after Hurricane Katrina for a sample of low-income African-American mothers.

**Methods**—Using longitudinal data from a sample of low-income African-American mothers with pre-Katrina measures of housing tenure and individual characteristics and post-Katrina indicators of disaster impacts, we estimate a multinomial logistic regression model predicting post-Katrina housing outcomes.

**Results**—Among low-income African-American mothers, homeowners' odds of being in their pre-Katrina home rather than a new home are greater than those of renters, while renters' odds of being in a pre-Katrina home are greater than those of subsidized housing residents, *ceteris paribus*. The difference in homeowners' and renters' odds is reduced to insignificance when access to private insurance is added to the model, although the difference for subsidized housing residents remains.

**Conclusion**—Homeownership and disaster assistance protect against housing displacement. Renters, especially those in subsidized housing, were more vulnerable to housing loss after this disaster.

### Introduction

After Hurricane Katrina struck New Orleans on August 29, 2005 many observed that low-income, African-American, and female residents of the city often experienced more prolonged and difficult recoveries than other socio-demographic groups. Disaster scholars have often noted that disasters disproportionately affect members of low-income, female-

---

Direct correspondence to Elizabeth Fussell, Population Studies and Training Center, Brown University, Box 1836, 68 Waterman St., Providence, RI 02912 or Elizabeth\_Fussell@brown.edu. The corresponding author will share all data and coding for replication purposes.

headed, and racial and ethnic minority households, especially by displacing them from their homes (Cutter, Boruff, and Shirley 2003; Morrow-Jones and Morrow-Jones 1991; Peacock and Girard 1997; Wisner 1993). However, while these demographic and economic characteristics are correlates of disaster vulnerability, they are not causes. To make this literature more useful for reforming social policies, Wisner (1993) urged scholars to identify processes that cause some groups to be more vulnerable to disasters' effects. Fothergill and her colleagues (Fothergill, Maestas, and Darlington 1999; Fothergill and Peek 2004) respond to this call by positing that disaster vulnerability is at least partially due to higher rates of renting, rather than homeownership, among the groups most vulnerable to disaster. In making this argument they connect the disaster literature to a broader sociological literature on the consequences of unequal access to homeownership.

Social scientists have argued that homeownership is an important mechanism for accumulating wealth and accessing valued social goods like high quality and less crowded housing, better schools, safer neighborhoods, more diverse social capital, and better health (e.g. Aaronson 1999; Dietz and Haurin 2003; Rossi 1996). The ample literature on determinants of homeownership finds that those with more income and wealth and individuals who are older, married, and parents are more likely to own than rent their homes, and that African-Americans and Latinos are less likely to own their homes than whites (e.g., Alba and Logan 1992; Linneman 1985). The very same factors predicting homeownership negatively predict housing loss after a disaster, suggesting that housing tenure, or factors associated with it, are part of the process that increases homeowners and decreases renters vulnerability to housing displacement.

The aim of our research is to provide evidence of a causal linkage between housing tenure and housing displacement for a vulnerable group of low-income African-American mothers. The consequences of housing displacement underscore the importance of this topic. A growing body of research on the effects of Hurricane Katrina shows that disaster-induced displacement is not only associated with chronic stress and poor mental health outcomes (Abramson et al 2008; Hori and Schafer 2010), but also unemployment (Zottarelli 2008), loss of government benefits (Lein, et al 2012; Pardee 2012), educational disruptions for children (Peek and Richardson 2010) and loss of access to primary health care providers (Hori and Schafer 2010). In addition, displaced residents lose fragile social support networks made up of family, friends, neighbors that low-income households often depend upon to make ends meet (Litt 2012). Even those who relocate to new homes within a metropolitan area may suffer these neighborhood-based losses, especially when they lack private transportation. Insofar as homeownership protects against involuntary post-disaster mobility, it also protects against other harms suffered by those who were displaced after Hurricane Katrina.

## **Housing tenure and vulnerability to disaster-induced displacement**

The similarity of the social and economic determinants of renting a home and post-disaster housing displacement is a strong indication that housing tenure is part of the process that produces different housing outcomes for homeowners and renters after a disaster. The literature offers several tentative explanations. Homeowners are better prepared for

disasters, on average, because they invest more in their housing than owners of rental properties (Iwata and Yamaga 2008). Some of these investments serve to mitigate the effects of an environmental disaster, such as maintaining roofs, repairing structural damage, installing insulation and durable windows, trimming trees and removing hazards that may cause damage in a weather event, and repairing damages quickly and thoroughly. In contrast, renters have minimal interest in the future value of their homes and therefore have no incentive to make these investments. Landlords of rental property, especially multi-unit dwellings, are often reluctant to invest in disaster mitigation measures, or other types of improvements because they are much more complicated and expensive and the costs must be recovered through rent increases over a long period (Burby et al. 2003). These decisions accumulate so that, on average, owner-occupied housing is higher quality than rental housing.

Another reason homeowners may be more prepared for disasters is their longer residence in their homes and therefore greater familiarity with neighbors or authorities who might inform them of location-specific hazards and the appropriate preparation for and responses to those hazards. Furthermore, local agencies charged with disaster preparedness pay most attention to homeowners, often neglecting outreach to renters (Kamel and Loukaitou-Sideris 2004). A unique study by Burby, Steinberg and Basolo (2003) of renters' and homeowners' disaster preparedness and risk perception demonstrates that homeowners are more prepared for disasters than renters, net of their income, race, ethnicity, community attachment, or length of residence. They find that while homeowners and renters were equally likely to perceive hazards, homeowners were more likely to have experienced a disaster before, which may explain why they take steps to prepare for a repeat event.

After a disaster strikes and housing damage occurs, the decision to return home is very different for homeowners and renters. While homeowners retain control over their homes, renters rely on their landlord's permission to reoccupy their homes. Landlords are typically slower to make repairs if they own many units and are averse to letting tenants live in damaged properties, both of which delay residents' returns. Furthermore, they may be reluctant to repair and rebuild rental property in low-income markets where such housing may be socially contentious or less profitable (Bolin and Stanford 1998). Instead they may take advantage of the disaster to rebuild their properties for a higher rent market (Comerio et al 1994; Pais and Elliott 2008; Zhang and Peacock 2010). The delayed recovery of the rental housing market displaces renters and limits the number of low- and moderate-priced rental units available, all of which make it especially difficult for low-income households to return.

Disaster assistance from the Federal Emergency Management Agency (FEMA) is typically too slow to counter these political and market forces in the rental market (Fothergill and Peek 2004). For example, FEMA assistance for owners of small rental properties through the Road Home Program began to be issued in the summer of 2007, nearly two years after Hurricane Katrina (U.S. Government Accountability Office 2010). In New Orleans these social and economic pressures on the rental market translated into large increases in rents, which were accompanied by the loss of low-income housing when the Housing Authority of New Orleans prohibited re-occupancy of four large housing projects in order to redevelop them as mixed-income housing (Henrici, Helmuth, and Fernandez 2010). Renters were

eligible for FEMA's temporary rental assistance, but they often used these vouchers on more affordable, higher quality housing outside of the New Orleans area.

Homeowners confront a qualitatively different set of circumstances and decisions after a disaster. Most homeowners, and all homeowners with mortgages, have homeowners' insurance to protect their investment in their home. Those living in flood zones are required to have flood insurance as well. Insurance companies act quickly to assess damages and issue checks after a disaster occurs, facilitating repairs and rebuilding. Private insurance covers much of the cost of repairing housing. For example, in the New Orleans metropolitan area 81% of homeowners received at least one form of financial assistance: 71% received payments from homeowner's insurance; 20% received federal flood insurance payments, and 7% received other federal financial assistance (U.S. Census 2011). These insurance payments and disaster assistance are often used to improve homes, a windfall that is confined to homeowners (Comerio 1998; Zhang and Peacock 2010). Although homeowners are eligible for low-interest rebuilding loans and other disaster-specific housing recovery assistance programs, these programs are mostly aimed at underinsured or low-income homeowners and are less efficient than private insurance. For example, the Road Home homeowners' assistance program only began accepting applications in October 2006, more than a year after Hurricane Katrina struck, leaving underinsured homeowners in temporary housing for extended periods (U.S. Government Accountability Office 2010).

Differences between renters and homeowners in housing quality, disaster preparedness, control over housing decisions, and access to financial assistance are all links in the causal chain which connects housing tenure to housing displacement after a disaster and demonstrates a homeowner bias in post-disaster housing recovery. However, to our knowledge, no existing studies demonstrate this causal relationship at the individual level. Some studies show statistical correlations between neighborhood socio-demographic characteristics, such as the percentage of owner-occupied homes before a disaster and population mobility after a disaster (Kamel 2012; Myers, Slack, and Singelmann 2008; Zhang and Peacock 2010). Our research advances the field by demonstrating that pre-Katrina housing tenure is associated with post-Katrina housing displacement in this sample of low-income African-American mothers, a population extremely vulnerable to disaster-induced housing displacement.

## Data and methods

The survey data used for this study come from a longitudinal study of low-income parents who were enrolled in a study of community college retention and graduation at Delgado Community College and Louisiana Technical College in New Orleans (Brock and Richburg-Hayes 2006). Of the 1,019 students enrolled in the study, 492 had completed a follow-up survey by the time Hurricane Katrina struck on August 29, 2005. Data collection was halted due to the disaster and investigators redesigned the study to focus on disaster recovery in a vulnerable population. Between May 2006 and March 2007, eight to eighteen months after Hurricane Katrina, they traced and re-interviewed 402 (81.7%) of the 492 students. Of those 402, 392 had lived in an area that was affected by Hurricane Katrina. This longitudinal study design includes pre- and post-event observations for the participants that allow us to control

for differences between subjects that may be associated with both housing tenure and displacement, such as socioeconomic differences and personal resources (Galea, Maxwell, and Norris 2008). Such data is extremely rare in disaster studies (Norris 2006). However, our sample is not representative of the New Orleans population because the majority of the study participants were African-American (86%) and female (96%), so we cannot generalize from our conclusions. Instead, the results shed light on housing tenure as an underlying cause of housing displacement in this vulnerable population.

Our analysis focuses on the African-American mothers in the sample, and follows them from just before Hurricane Katrina (N=384) to the time they were relocated and interviewed, 8 to 18 months later (N=308). The follow-up response rate of 80.2% is impressive given the difficulty of tracing disaster-affected populations. Those who did not participate in the follow-up survey did not differ significantly from those who did participate in their socio-demographic characteristics. However, those who lived in public housing were slightly less likely to participate in the follow-up (29% of non-respondents lived in public housing versus 19% of respondents; t-test;  $p=.08$ ) and those who worked more months in the year previous to the first survey were slightly more likely to participate (1.9 months for non-respondents and 2.3 months for respondents; t-test;  $p = .06$ ). The data analysis includes only the 302 participants in the post-hurricane survey and who gave valid answers to the question about current housing. The Stata 12 multivariate normal multiple imputation procedure was used for the independent variables, setting the number of imputations to 10. The likelihood-ratio tests that are used to assess model fit are not available with multiple imputation results (StataCorp 2013). However, all models were fit without imputation of missing values (using casewise deletion) and those results are available upon request.

These community college students are not typical college students because of the catchment area of the college and the selection criteria of the study. Most participants obtained their secondary education in New Orleans's poorly performing public schools and therefore many were taking remedial and career-oriented courses and not college-prep or college-level courses. Furthermore, the participants were selected on characteristics that placed them at risk of dropping out. Specifically, they were all living in households with incomes less than twice the poverty level and were custodial parents of minor children. This means that the sample is slightly older (25.5) than traditional college-age students at the time of the pre-Katrina survey (Table 1). All were parents, with an average of 1.9 dependent children. A third (34%) was married or cohabiting and about a quarter (23%) resided with their parents. Although 61% were employed, many lived in households receiving public assistance (90%), usually food stamps. More than two-thirds (69%) owned or had access to a car. These community college students share characteristics with populations found to be highly vulnerable to poor outcomes after a disaster – an unanticipated feature of the original study but one which makes the sample very useful for examining vulnerability to housing displacement after a disaster.

Since we are investigating how housing tenure affects housing displacement we include measures in our model that are associated with both so that we can isolate the effect of housing tenure. We measure pre-Katrina housing tenure as living in a home that is owner-occupied (10%), rented (59%), a public housing or Section 8 rental unit (17%), or shared

with family or friends (14%). Of this last group, about half (56%) was living with their parents, while the other half (44%) was living with friends. None of those living with their parents reported the tenure of their home, introducing ambiguity into the meaning of the category; because of this we do not interpret any effects associated with this category. In our low-income sample of parents enrolled in school, we do not include a measure of personal or household earnings because a large proportion of the sample is not currently employed (39%) and therefore have no earnings to report. Instead we use pre-disaster indicators of whether participants (1) lived with their parents; (2) were currently employed; (3) owned or had access to a working car; and (4) whether they or another member of their household received unemployment benefits, Supplemental Security Income or Disability payments, Cash Assistance/welfare or Temporary Aid to Needy Families (TANF), or food stamps. These serve as controls for socio-economic differences within the sample.

We also include two measures of personal resources which may differ by pre-disaster housing tenure and may be useful in recovering housing after Hurricane Katrina. The first, frequency of church attendance, is an indicator of social support. Frequency of church attendance, ranges from (1) never attending (5%) to attending (2) several times a year (20%); (3) once or twice a month (26%); (4) once a week (23%); and (5) several times a week (25%). Our sample is very religious, with 81% saying religion was very important and only 0.6% saying that religion was not at all important or not too important in their lives. We also include a measure of pre-Katrina non-specific psychological distress, the K6 scale, which is a self-reported measure used to screen for anxiety and mood disorders (Furukawa, Kessler, Slade, and Andrews 2003). The six items in the scale ask about feeling hopeless, sad, nervous, restless, worthless, and “like everything is an effort” during the past month. Responses are coded from 0 (none of the time) to 4 (all of the time) and summed across the six items. Cronbach’s alpha was .78 with a mean K6 score before Hurricane Katrina of 5.5. Participants with less social support or mental health problems before the hurricane may have had more difficulty recovering their homes afterwards. Among this sample of young parents living in low-income households these financial and personal resources may be associated with both pre-Katrina housing tenure and post-Katrina housing displacement.

We model post-Katrina housing type using a multinomial logistic regression model. We measure housing displacement with current housing type, specifically, whether a person is living in a pre-Katrina residence (19%), a new home (64%), temporary housing (6%), or with family, friends or in some other arrangement (11%). FEMA’s post-disaster sheltering programs included rental assistance programs, which helped displaced residents to afford market rent for between one and two years after Hurricane Katrina, as well as the provision of FEMA trailers, which were offered to displaced residents who could not find reasonable rental housing within commuting distance of their damaged home. The majority of participants (87%) received some FEMA assistance, but those living in pre-Katrina homes were less likely to have received assistance (81%) than those in new homes (87%) and those living with family or friends (90%), while those in temporary housing were most likely to have received FEMA assistance (95%).

We build our argument with four regressions equations. The first includes pre-Katrina housing tenure plus a control for the number of days since Hurricane Katrina to the follow-

up interview. Days to follow-up may be associated with movement from temporary housing to a pre-Katrina home or a new home. The second adds the socio-demographic characteristics associated with pre-Katrina housing tenure to control for any confounding with pre-disaster housing tenure. The third adds Hurricane Katrina impacts, which includes housing damage, an important obstacle to returning to a pre-Katrina home, as well as evacuation timing and a count of Hurricane Katrina-related traumas. All participants experienced at least some housing damage, although there was variability in the extent of damages. Most participants (84%) evacuated prior to the hurricane, thereby limiting their personal exposure to the direct effects of the disaster. Regardless of whether they were directly exposed to the Hurricane, trauma may have occurred during the evacuation or displacement. We measure hurricane-related trauma using a count of participants' positive answers to eight questions about whether in the week after Hurricane Katrina they lacked enough drinking water, food, necessary medicine, necessary medical care, knowledge of the safety of their children, knowledge of the safety of other family members, and finally, whether a family member lacked necessary medical care and whether they felt their life was in danger. These questions were based on items from a survey of hurricane evacuees conducted shortly after the hurricane, jointly designed by the *Washington Post*, the Kaiser Family Foundation, and the Harvard School of Public Health (Brodie, Weltzien, Altman, Blendon, and Benson, 2006). The answers were coded 1 (yes) or 0 (no) and summed to create a scale ranging from 0 to 8 with a mean of 3.25. The fourth model adds receipt of disaster assistance. At the time of the survey many participants were in the middle of complicated financial proceedings with insurance companies, so rather than measure receipt of insurance payments we measure whether participants possessed any private insurance to cover damage to their home, car, or personal belongings (25%). We also include a measure of whether respondents had received any money from FEMA (87%), which would include rental assistance, a FEMA trailer, or other payments for which disaster-affected residents were eligible. We include a similar measure of receipt of assistance from any non-FEMA group (82%). The results of all four models are reported in a summary table which shows the change in the pre-Katrina housing tenure coefficients. The complete models of post-Katrina housing type are available upon request.

## Results

To answer our research question – whether pre-disaster housing tenure, and factors associated with it, affects post-Katrina housing displacement – we present the odds ratios of being in a pre-Katrina home, temporary housing, or living with family and friends versus being in a new home for each pre-Katrina housing tenure status (Table 2). Model 1 includes only the instrumental control for days since Katrina and shows that, net of this control, the odds that homeowners were in their pre-Katrina home rather than in a new home is 2.8 ( $p=.03$ ) times that of renters. Residents of public housing before Katrina were 60% less likely ( $(.40 - 1.0) * 100$ ;  $p=.05$ ) than renters to be living in their pre-Katrina home compared to a new home. (Participants living with family or friends before Hurricane Katrina resided in both owner-occupied and rental housing, so we do not discuss them.) This pattern is consistent with the explanation derived from previous research that homeowners' legal access to their pre-disaster homes increased their likelihood of being back in their original home, while

renters, and particularly low-income renters, are more likely to be displaced from their homes.

When the participants' demographic characteristics and financial and social resource measures are added in model 2 the magnitude of the effect of pre-Katrina housing tenure status on being in a pre-Katrina home remains large and significant: homeowners' odds of being in their pre-Katrina home are greater than those of renters, and public housing residents' odds of being in their pre-Katrina home are much lower than those of renters. These controls did not improve the model significantly. The addition of housing damage, Katrina traumas, and evacuation timing (model 3), all of which affect participants' ability to return to their pre-Katrina homes, slightly increases the magnitude of effect of pre-Katrina housing tenure on the odds of being in a pre-Katrina home, but does not change the pattern from models 1 and 2. In contrast, the controls for disaster impacts, specifically housing damage, significantly improved the fit of the model. In short, the expected relationship between housing tenure and being displaced from a pre-Katrina home remains strong and statistically significant in all three of these models: homeowners are more likely to be back in their pre-Katrina homes than renters and public housing residents, and public housing residents are less likely than renters to have returned to their pre-disaster homes. This supports the contention that homeowners are protected from housing displacement after a disaster; in contrast, those in rental housing, particularly subsidized rental housing, are especially vulnerable to displacement.

Only when the receipt of different types of disaster assistance is taken into account does the effect of pre-Katrina housing tenure on current housing become statistically insignificant. However, the indicator for possessing an insurance policy cover losses of property, cars, and personal possessions, approaches, but does not reach, statistical significance. This provides weak support for the contention that private insurance is an important safety net facilitating the recovery of owner-occupied homes after a disaster. This weak finding may be due to participants' limited financial resources, which may mean that their insurance coverage was insufficient to enable many to rebuild without additional assistance FEMA or other sources.

Consistent with models 1 through 3, model 4 shows that public housing and Section 8 residents—a low-income subset of renters—were 70%  $((.30 - 1.0) * 100; p=.05)$  less likely to be in their pre-Katrina homes than were market renters. We have no additional information in our study on post-disaster housing decisions, but the sharp increase in rents in New Orleans after Hurricane Katrina suggests that rent inflation is part of the explanation for the lower odds of returning to a pre-Katrina home among renters relative to homeowners, which would be particularly important for low-income renters. Many disaster researchers have found that rent inflation is common after a disaster (Comerio et al 1994; Pais and Elliott 2008; Zhang and Peacock 2010). Another factor is the Housing Authority of New Orleans's decision to categorically deny occupancy to residents of the four largest housing projects (but not to Section 8 residents) in order to redevelop these properties as mixed income housing developments (Henrici, et al 2010). We cannot demonstrate that these were the cause of lower odds of return among renters and public housing residents in our sample, but the patterns of pre-Katrina housing tenure and post-Katrina housing outcomes supports this explanation.

## Conclusions

Our longitudinal study of a sample of low-income African American mothers spanning the disaster produced by Hurricane Katrina shows that although homeowners and renters alike suffered enormous damage to their homes, homeowners were more likely than renters to be back in their homes at the time of the follow-up study (eight to eighteen months after Hurricane Katrina). Furthermore, we find that homeowners' recovery of their housing was facilitated by access to disaster assistance. This bolsters the contention that there is a homeowner bias in housing recovery policies (Comerio 1998; Zhang and Peacock 2010). In contrast, renters were more likely to be in new homes, which were often located outside of the city and sometimes the state. Residents of Section 8 and public housing were even more likely to be in new homes than market renters.

Some have argued that displaced New Orleanians were better off in their new homes and communities. However, research to date shows that New Orleanians' displacement from their pre-Katrina homes and neighborhoods is associated with worse employment (Zottarelli 2008), education (Peek and Richardson 2010), mental and physical health outcomes (Abramson et al 2008; Hori and Schafer 2010), loss of access to health care and public benefits (Hori and Schafer 2010; Lein et al 2012; Pardee 2012), and deterioration of the fragile support systems of low-income parents (Litt 2012). These losses were even greater for public housing and Section 8 residents, since these very low-income participants may suffer additional hardships associated with re-establishing access to subsidized housing and public benefits in new communities or states (Henrici, et al 2012; Lein et al 2012; Pardee 2012). Although disaster housing assistance allowed many study participants to relocate, the non-monetary losses that accompany relocation must be included in the tally of losses associated with housing displacement. Homeowners surely suffered as well but were better able to maintain stability in most domains of their lives, such as employment, and ties to family and friends remaining in New Orleans, even as they were exposed to the strains of living in a recovering city.

The unequal housing outcomes by pre-disaster housing tenure that we find even in this relatively homogeneous sample of low-income African-American mothers is consistent with the hypothesis offered by Fothergill and her colleagues (Fothergill et al 1999; Fothergill and Peek 2004). They proposed that the greater vulnerability to disaster impacts among low-income and female or minority headed households is at least partially due to their greater likelihood of renting their homes. Previous research has supported this hypothesis on the basis of correlations between pre-disaster neighborhood socio-demographics and post-disaster population statistics (Kamel 2012; Myers, Slack, and Singelmann 2008; Zhang and Peacock 2010). To our knowledge, no previous research has observed this relationship among a sample of disaster-affected individuals, largely because most disaster studies collect data after a disaster has occurred and those who have been displaced are no longer present in the disaster-affected community. Because of this lack of pre-disaster measures they cannot rule out that post-disaster outcomes were associated with unobserved pre-disaster characteristics (Galea, Maxwell and Norris 2008; Norris 2006). Our study meets this standard with a wide range of pre-disaster socio-demographic, economic, and behavioral measures.

Although the strength of our design is its ability to demonstrate causal validity, its weakness is its lack of external validity. The original study was designed to study educational outcomes among disadvantaged community college students, not recovery from a disaster. Because it is not a random sample, we cannot generalize to the entire disaster-affected population. Furthermore, although we include a wide range of controls in the models, there may be unobserved differences between study participants for which we are unable to account. Nevertheless, the sample of low-income, African American mothers is theoretically interesting because this is precisely the group that is especially vulnerable to housing displacement after a disaster. By identifying how pre-Katrina housing tenure affects post-Katrina housing type both directly (through differences in legal rights to a home) and indirectly (through access to private insurance) this research provides empirical support for the argument that housing tenure and housing recovery policies are associated with unequal vulnerability to housing displacement after a disaster.

## Acknowledgments

This study was funded by NIH Grant R01HD046162 and the MacArthur Foundation. We thank Christina Paxson, Jean Rhodes, and Mary Waters, who are co-PIs with Elizabeth Fussell on the Resilience in Survivors of Katrina (RISK) Project (<http://www.riskproject.org/>).

## References

- Aaronson, Daniel. A Note on the benefits of homeownership. *Journal of Urban Economics*. 2000; 47:356–369.
- Abramson D, Stehling-Ariza T, Garfield R, Redlener I. Prevalence and Predictors of Mental Health Distress Post-Katrina: Findings from the Gulf Coast Child and Family Health Study. *Disaster Medicine and Public Health Preparedness*. 2008; 2(2):77–86. [PubMed: 18520693]
- Alba R, Logan J. Assimilation and Stratification in the Homeownership Patterns of Racial and Ethnic Groups. *International Migration Review*. 1992; 26(4):1314–1341.
- Bolin R, Stanford L. The Northridge Earthquake: Community-based Approaches to Unmet Recovery Needs. *Disasters*. 1998; 22:21–38. [PubMed: 9549171]
- Brock, T.; Richburg-Hayes, L. *Paying for Persistence: Early Results of a Louisiana Scholarship Program for Low-Income Parents attending Community College*. New York: Manpower Development Research Corporation; 2006.
- Brodie M, Weltzien E, Altman D, Blendon RJ, Benson JM. Experiences of Hurricane Katrina evacuees in Houston shelters: Implications for future planning. *American Journal of Public Health*. 2006; 96:1402–1408. [PubMed: 16571686]
- Burby RJ, Steinberg LJ, Basolo V. The Tenure Trap: The Vulnerability of Renters to Joint Natural and Technological Disasters. *Urban Affairs Review*. 2003; 39(1):32–058.
- Comerio, M.; Landis, J.; Rofe, Y. *Post Disaster Residential Rebuilding*. Berkeley: Institute of Urban and Regional Development, University of California; 1994.
- Comerio, MC. *Disaster Hits Home: New Policy for Urban Housing Recovery*. Berkeley: University of California Press; 1998.
- Cutter SL, Boruff BJ, Shirley WL. Social Vulnerability to Environmental Hazards. *Social Science Quarterly*. 2003; 84(2):242–261.
- Dietz RD, Haurin DR. The social and private micro-level consequences of homeownership. *Journal of Urban Economics*. 2003; 54:401–450.
- Fothergill A, Maestas EGM, Darlington JR. Race, Ethnicity and Disasters in the United States: A Review of the Literature. *Disasters*. 1999; 23(2):156–173. [PubMed: 10379098]
- Fothergill A, Peek LA. Poverty and Disasters in the United States: A Review of Recent Sociological Findings. *Natural Hazards*. 2004; 32:89–110.

- Furukawa TA, Kessler RC, Slade T, Andrews G. The performance of the K6 and K10 screening scales for psychological distress in the Australian National Survey of Mental Health and Well-being. *Psychological Medicine*. 2003; 33:357–362. [PubMed: 12622315]
- Galea S, Maxwell AR, Norris F. Sampling and design challenges in studying the mental health consequences of disasters. *International Journal of Methods in Psychiatric Research*. 2008; 17(S2):S21–S28. [PubMed: 19035439]
- Henrici, JM.; Helmuth, AS.; Carlberg, A. Doubly Displaced: Women, Public Housing, and Spatial Access after Katrina. In: David, Emmanuel; Enarson, Elaine, editors. *The Women of Katrina: How Gender, Race, and Class Matter in an American Disaster*. Nashville, TN: Vanderbilt University Press; 2012. p. 142-154.
- Henrici, Jane M.; Helmuth, Allison Suppan; Fernandes, Rhea. *Mounting Losses: Women and Public Housing after Hurricane Katrina*. Washington, DC: Institute for Women’s Policy Research; 2010.
- Hori M, Schafer MJ. Social Costs of Displacement in Louisiana after Hurricanes Katrina and Rita. *Population and Environment*. 2010; 31:64–86.
- Iwata S, Yamaga H. Rental Externality, Tenure Security, and Housing Quality. *Journal of Housing Economics*. 2008; 17(3):201–211.
- Kamel N, Loukaitou-Sideris A. Residential Assistance and Recovery Following the Northridge Earthquake. *Urban Studies*. 2004; 41(3):533–562.
- Kamel N. Social Marginalisation, Federal Assistance and Repopulation Patterns in the New Orleans Metropolitan Area following Hurricane Katrina. *Urban Studies*. 2012; 49(14):3211–3231.
- Lein, L.; Angel, R.; Beausoleil, J.; Bell, H. The Basement of Extreme Poverty: Katrina Survivors and Poverty Programs. In: Weber, Lynn; Peek, Lori, editors. *Displaced: Life in the Katrina Diaspora*. Austin, Texas: University of Texas Press; 2012. p. 47-62.
- Linneman P. An Economic Analysis of the Homeownership Decision. *Journal of Urban Economics*. 1985; 17:230–246.
- Litt, J. 'We Need to Get Together with Each Other.': Women’s Narratives of Help in Katrina’s Displacement. In: Weber, Lynn; Peek, Lori, editors. *Displaced: Life in the Katrina Diaspora*. Austin, Texas: University of Texas Press; 2012. p. 167-182.
- Myers CA, Slack T, Singelmann J. Social Vulnerability and Migration in the Wake of Disaster: the Case of Hurricane Katrina and Rita. *Population and Environment*. 2008; 29:271–291.
- Morrow-Jones HA, Morrow-Jones CR. Mobility Due to Natural Disasters: Theoretical Considerations and Preliminary Analyses. *Disasters*. 1991; 15(2):126–132. [PubMed: 20958718]
- Norris FH. Disaster Research Methods: Past Progress and Future Directions. *Journal of Traumatic Stress*. 2006; 19(2):173–184. [PubMed: 16612819]
- Pais JF, Elliott JR. Places as Recovery Machines: Vulnerability and Neighborhood Change After Major Hurricanes. *Social Forces*. 2008; 86:1415–1453.
- Pardee, JW. Living through Displacement: Housing Insecurity among Low-Income Evacuees. In: Weber, Lynn; Peek, Lori, editors. *Displaced: Life in the Katrina Diaspora*. Austin, Texas: University of Texas Press; 2012. p. 63-78.
- Peacock, WG.; Girard, C. Ethnic and Racial Inequalities in Hurricane Damage and Insurance Settlements. In: Peacock, WG.; Hearn-Morrow, B.; Galdwin, H., editors. *Hurricane Andrew: Ethnicity, Race, Gender, and the Sociology of Disasters*. New York: Routledge; 1997. p. 171-190.
- Peek L, Richardson K. In Their Own Words: Displaced Children’s Educational Recovery Needs after Hurricane Katrina. *Disaster Medicine and Public Health Preparedness*. 2010; 4(2):S63–S70. [PubMed: 23105037]
- Rossi PH. The Social Benefits of Homeownership: Empirical Evidence from National Surveys. *Housing Policy Debate*. 1996; 7(1):1–35.
- StataCorp. *Stata Multiple-Imputation Reference Manual*, Release 13. Statistical Software. College Station, TX: StataCorp; 2013.
- U.S. Census Bureau. *Census Bureau Releases First Detailed Data on Katrina Damage to New Orleans Area Housing*. 2011. Press release, Monday, February 14, 2011. Accessed January 28, 2013: <http://www.census.gov/newsroom/releases/archives/housing/cb11-28.html>.

- U.S. Government Accountability Office. Disaster assistance for permanent housing primarily benefited homeowners; opportunities exist to better target rental housing needs. January 2010, GAO-10-17, Report to Congressional Requesters. 2010. Retrieved from [www.gao.gov](http://www.gao.gov)
- Wisner B. Disaster Vulnerability: Scale, Power, and Daily Life. *GeoJournal*. 1993; 30.2:127–140.
- Zhang Y, Peacock WG. Planning for Housing Recovery? Lessons Learned from Hurricane Andrew. *Journal of the American Planning Association*. 2010; 76:5–24.
- Zottarelli LK. Post-Hurricane Katrina Employment Recovery: The Interaction of Race and Place. *Social Science Quarterly*. 2008; 89(3):592–607.

**Table 1**

Variables used in the analysis, total sample and by pre-Katrina housing tenure

	Total	
	Mean	S.E.
<b>Current housing</b>		
In pre-Katrina home	0.19	0.02
In a new home	0.64	0.03
In a temporary home	0.06	0.01
Living with family or friends	0.11	0.02
<b>Pre-Katrina housing tenure</b>		
Homeowner	0.10	0.02
Renter	0.59	0.03
Lived with family or friends	0.14	0.02
Public housing resident	0.17	0.02
Days since Hurricane Katrina	363.6	4.2
<b>Individual characteristics and pre-Katrina resources</b>		
Age	25.5	0.3
Married or cohabiting	0.33	0.03
Number of dependent children	1.9	0.1
Lived with parents	0.24	0.02
Employed	0.61	0.03
Owned or had access to car	0.69	0.03
Received public assistance	0.90	0.04
Frequency of church attendance	2.4	0.1
Psychological distress	5.5	0.2
<b>Hurricane Katrina impacts</b>		
Minimal housing damage	0.16	0.02
Substantial housing damage	0.36	0.03
Enormous housing damage	0.48	0.03
Evacuated before Hurricane Katrina	0.84	0.02
Number of hurricane-related traumas	3.3	0.1
Possessed insurance policy	0.25	0.03
Received FEMA assistance	0.87	0.02
Received other assistance	0.82	0.02
N	302	

**Table 2**

Effects of pre-Katrina housing tenure on odds of post-Katrina housing type

	In pre-Katrina home		In a new home		In a temporary home		Living with family or friends	
	Odds	p <  t	Odds	p <  t	Odds	p <  t	Odds	p <  t
Model 1 (includes control for days since Katrina, not shown)								
Homeowner	<b>2.8</b>	0.03	1.0		<b>4.5</b>	0.02	0.8	0.82
Renter	1.0		1.0		1.0		1.0	
Public housing resident	<b>0.4</b>	0.05	1.0		0.3	0.24	0.2	0.07
Lived with family or friends	1.7	0.24	1.0		1.5	0.54	1.8	0.26
Model 2 (adds demographics & resources, not shown)								
Homeowner	<b>2.9</b>	0.03	1.0		2.3	0.24	0.8	0.83
Renter	1.0		1.0		1.0		1.0	
Public housing resident	<b>0.4</b>	0.07	1.0		0.3	0.34	0.3	0.10
Lived with family or friends	1.9	0.17	1.0		1.7	0.47	1.9	0.23
Model 3 (adds disaster impacts, not shown)								
Homeowner	<b>3.3</b>	0.04	1.0		1.8	0.47	0.9	0.85
Renter	1.0		1.0		1.0		1.0	
Public housing resident	<b>0.3</b>	0.05	1.0		0.4	0.43	0.3	0.11
Lived with family or friends	1.2	0.70	1.0		1.5	0.61	1.7	0.34
Model 4 (adds disaster assistance, shown)								
Homeowner	2.0	0.31	1.0		1.9	0.53	0.7	0.74
Renter	1.0		1.0		1.0		1.0	
Public housing resident	<b>0.3</b>	0.05	1.0		0.4	0.40	0.3	0.09
Lived with family or friends	1.0	0.95	1.0		1.6	0.55	1.9	0.24
Possessed insurance	2.1	0.13	1.0		0.8	0.83	1.4	0.58
FEMA payment	0.9	0.90	1.0		5.5	0.16	3.2	0.11
Other payment	1.5	0.42	1.0		0.3	0.13	2.8	0.12

Note: Odds ratios in bold font are statistically significant at the p&lt;.05 level.