Understanding Changes in Families and Households Pre- and Post-Katrina

Diana B. Elliott
U.S. Census Bureau

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Introduction

Following Hurricane Katrina's landfall on August 29, 2005, Americans were bombarded with media images of the physical damage inflicted upon New Orleans and the Gulf Coast region. Consequently, we have an acute awareness of the storm's damage to property and homes, but considerably fewer insights as to how the storm changed the social conditions in those homes and neighborhoods. Anecdotally, there have been stories about families choosing to live in the areas where they resettled and a reluctance of some to return to an area still rebuilding its basic infrastructure. However, other stories have emerged about the commitment of others to return and to make these areas their home again. This paper will explore these competing ideas by examining with data from the American Community Survey (ACS) how families and households in the Gulf Coast region, and especially New Orleans, looked prior to Katrina and how they have changed as a consequence of this natural disaster. This paper will also explore the determinants of being back in New Orleans one year later for both adults and children.

Background

Three years following Katrina, we still know very little about how the demographic landscape looks in New Orleans and the affected Gulf Coast region, particularly concerning the resettlement of families and households. Overall, the early quantitative evidence suggests that the populations and households of this region, particularly New Orleans, did not quickly return to

their former levels (Frey and Singer, 2006; Koerber, 2006) and may reflect the diminishment of population that has been happening since the 1960s (Colten et al, 2008). But a mass exodus out of a major metropolitan area is something we have never experienced before as a nation (Elliott and Pais, 2006), and the effects of this natural disaster on the population of this region in the short and long term is still unclear.

Early evidence suggests that *who* has returned to repopulate the affected counties in the Gulf Coast, particularly New Orleans, reflects a sharp demographic shift from pre-Katrina days (Logan, 2006; Fussell, 2007). Some have argued that there has been a considerable loss of families with young children because of problems related to reopening schools (Alexander, 2007; Fussell, 2007; Picou and Marshall, 2007; Colten et al, 2008). Others have suggested that the elderly may be less likely to resettle to those areas most damaged by the storm, with such an uncertain future and shaky infrastructure remaining in the wake of the storm (Logan, 2006). Furthermore, life following Katrina may be particularly fraught with hardship for elders given higher rates of disabilities, health issues, financial instability, transportation problems, and insecure housing situations (Jenkins et al, 2007).

Many suggest that the population of the region, and particularly New Orleans, is becoming more white and affluent (Rathke, 2005; Logan, 2006; Fussell, 2007), while also attracting Latinos, often foreign-born and undocumented, to the construction and demolition work (Fussell, 2007). Some speculate that those populations who were most vulnerable prior to Katrina (particularly lower income black residents, renters, and the disabled in New Orleans) may find it difficult to return because of a lack of financial resources, employment, transportation, or suitable housing options (Cutter et al, 2006; Fussell, 2007; Logan, 2006). Researchers have begun to wonder what the city will look like over time and "whose city will be

rebuilt," (Logan, 2006, p. 16). However, the population is constantly shifting in this region, and again raises the question as to which households and families are resettling New Orleans and the affected Gulf Coast counties in the wake of Katrina.

With so many questions and so much speculation about who has returned to resettle New Orleans quickly, there have been a few large-scale, representative studies that have documented some of the resulting demographic change, beyond anecdotal tales. Such studies have shown that in the wake of Katrina, New Orleans became a city that was more white, less poor, older, more educated, and with more renters, never married individuals, and fewer families with children than was the case before the hurricane (Frey and Singer, 2006; Frey, Singer, and Park, 2007; Koerber, 2006; Groen and Polivka, 2008). Predictive models using the Current Population Survey (CPS) data also show that demographic characteristics mattered for the probability of evacuees returning to the Gulf Coast within the first year, namely that the likelihood of returning increased with age, decreased with the severity of damage in the county of origin, and increased with pre-Katrina homeownership (Groen and Polivka, 2008).

However, there is a need for studies that examine the probability of return to New Orleans post-Katrina, not only among adults, but also among the children of New Orleans. One paper argues that the rebuilding process in New Orleans is anticipated to last 600 weeks, suggesting fertile ground for demographers and social scientists to study questions of interest and to help inform the rebuilding process (Cutter et al, 2006). Consequently, basic inquiries such as the probability of return to New Orleans among adults and children emerge as important topics of study. This paper will explore these topics by trying to understand how the composition of families and households in New Orleans and other Katrina-affected counties have changed as a consequence of the storm. Building upon the work of researchers who have used large-scale and

representative Census data sources to understand these demographic changes (Frey and Singer, 2006; Frey, Singer, and Park, 2007; Koerber, 2006; Groen and Polivka, 2008), this paper provides a descriptive and predictive look at who returned to New Orleans using ACS data, with particular interest in understanding if families with very young children returned quickly or stayed away from the most affected areas. Consequently, models will be run not only for the pre-storm adult population of New Orleans, but also for the pre-storm population of children of New Orleans.

Data and methods

Data

The analyses in this paper use data from the 2004, 2006, and 2007 American Community Survey (ACS) and for the most part, are restricted to people and households in Mississippi and Louisiana. The exception to this is the sample for the logistic regression model, which draws upon respondents nationwide who stated on the 2006 ACS survey that they had lived in New Orleans in 2005.

The ACS was started in the late 1990's to replace the collection of data from the long form decennial census questionnaire that was previously distributed to 1 in 6 households in 2000. In contrast, data from the ACS are collected on an annual basis: the Census Bureau mails out a quarter-million ACS questionnaires every month to a nationwide sample, and follows up through phone and in-person interviews, ultimately collecting data from a sample of 2.2 million households annually. This sample is then weighted to be representative of the nation's population as a whole. The ACS is notable for its ability to examine annual data for small geographies (such as the county level) and consequently is well suited for analyzing New Orleans and the Katrina-affected counties in the years prior to and following the storm.

Additional information about the ACS, its methodology, and data products can be found at http://www.census.gov/acs/www.

Overall, this study analyzes data from 8,105,832 households (weighted) and 21,160,962 people (weighted) in households from Mississippi and Louisiana in 2004, 2006, and 2007 (Table 1). The 2004 sample consists of 2,788,183 households in Mississippi and Louisiana with a total of 7,185,914 people living in households.[1] The 2006 sample consists of 2,640,499 households and 6,981,594 people living in households. Finally, the 2007 sample consists of 2,677,150 households with a total of 6,993,454 people living in households. Most of the analyses look in-depth at New Orleans (Orleans Parish) and the hardest hit coastal counties in Louisiana and Mississippi, or those defined as having at least 5 percent of the county's population in damaged areas (see Logan, 2006), including: Jefferson Parish, LA; St. Bernard Parish, LA; Plaquemines Parish, LA; Jackson County, MS; Harrison County, MS; and Hancock County, MS. Table 1 presents the population and household estimates for New Orleans, Katrina-affected counties, and the remaining counties in Mississippi and Louisiana that experienced little or no storm-related damage in 2004, 2006, and 2007.

[1] The 2004 ACS sample was a notably smaller unweighted sample than in following years because the full implementation of the ACS began in 2005. The unweighted national sample in 2004 was approximately 800,000 housing units.

Table 1: Population in Households in New Orleans, Katrina Affected Counties, and other Counties in Mississippi and Louisiana

	Total in Mississippi and Louisiana				New Orleans				Other Katrina Affected Counties				Remaining Counties in Mississippi and Louisiana			
	Population		Households		Population		Households		Population		Households		Population		Households	
	Estimate	MOE/1	Estimate	MOE	Estimate	MOE	Estimate	MOE	Estimate	MOE	Estimate	MOE	Estimate	MOE	Estimate	MOE
2004	7,185,914	--	2,788,183	17,724	444,515	--	180,382	4,948	912,135	14,803	362,687	8,377	5,829,264	14,803	2,245,114	17,691
2006	6,981,594	--	2,640,499	11,556	212,245	1,476	73,516	1,838	788,065	3,452	293,075	4,685	5,981,284	3,819	2,273,908	9,884
2007	6,993,454	--	2,677,150	12,008	230,620	944	80,039	3,114	794,800	3,404	303,828	4,395	5,968,034	3,529	2,293,283	11,854

1/MOE is the margin of error for the number presented in the table.

Source: U.S. Census Bureau, American Community Survey, 2004, 2006, 2007.

One notable limitation of this study is the omission of data from 2005, the year that Katrina occurred. For obvious reasons, sampling and data collection was less than ideal in the aftermath of Katrina from September through December of 2005 in affected regions. Consequently, these data will not be included in this study. The Census Bureau did conduct a special tabulation of the affected areas in 2005, or the "2005 ACS Special Product for the Gulf Coast Area," to better understand the immediate impact of the storm. Additional information can be found at http://www.census.gov/acs/www/Products/Profiles/gulf_coast/index.htm.

In this study, the primary dependent variable is drawn from the 2006 data and is based upon respondents' reported migration patterns between 2005 and 2006. In the 2006 ACS, 286,880 adults and 90,879 children nationwide said they were living in New Orleans in 2005. Of these 286,880 adults and 90,879 children, only 51 percent of the adults and 48 percent of the children were in New Orleans in 2006.[2] The dependent variable examines who among the residents of New Orleans in 2005 were also in New Orleans in 2006, compared to those who left. The logistic regression models examine the likelihood that adults and children were living in New Orleans one year later given selected individual-level, family, and household characteristics.

Table 2 provides descriptions of the coding of the independent variables used in the logistic regression model in this paper for those respondents on the 2006 ACS who reported living in New Orleans the year prior. The following independent variables listed in Table 2 are anticipated to relate to whether residents of New Orleans in 2005 were living in New Orleans following Katrina.

[2] These numbers are presented as the totals in Tables 4 and 6.

Table 2: Coding of variables included in the multivariate models of New Orleans adults and children

Variable	Coding
Family characteristics	
Married/A	1=Yes, married; 0=No, not married
Presence of school aged child/A	1=Yes, own child age 5-17 present; 0=No, no child age 5-17 present
Female headed household/C	1=Yes, female headed household; 0=Not a female headed household
Demographic characteristics	
Male	1=Yes, man; 0=No, woman
Age under 5/C	1=Yes; 0=No (Under age 5 is excluded age group in children's model)
Age 5 to 13/C	1=Yes; 0=No
Age 14 to 17/C	1=Yes; 0=No
Age 30 to 44/A	1=Yes; 0=No (Under age 30 is the excluded age group in adult model)
Age 45 to 64/A	1=Yes; 0=No
Age 65 and older/A	1=Yes; 0=No
Black	1=Black alone; 0=Does not identify as Black alone
Hispanic/A	1=Hispanic; 0=Not Hispanic
Born in Louisiana/A	1=Yes; 0=Not born in Louisiana
Foreign-born/A	1=Yes, foreign born and in country less than 5 years; 0=Not foreign born or in country 5 years or more
Disabled/A	1=Yes, disabled; 0=No disability
Household income	Range from 0 to $2,524,158
Employed	1=Employed; 0=Not employed (Householder status in children's model) (Excluded employment category in model)
Not in labor force	1=Not in labor force; 0=In labor force (Householder status in children's model)
Unemployed	1=Unemployed; 0=Not unemployed (Householder status in children's model)
Poverty	1 = In poverty; 0 = Not in poverty
Housing characteristics	
Home is rented	1=Rented home; 0=Owned home
Lacks complete plumbing or kitchen/A	1=Lacks either plumbing or kitchen; 0=House has both complete plumbing and complete kitchen
Crowding/A	1=More than one person per room; 0=At least one room per person

A/Variable in Adult Model ONLY
C/Variable in Children's Model ONLY

Family characteristics. Based on prior studies, it is anticipated that never married adults and families with children will be *more* likely to be living in New Orleans in 2006 (Frey and Singer, 2006; Frey, Singer, and Park, 2007; Koerber, 2006; Groen and Polivka, 2008). For these reasons, it is also anticipated that children who live in female-headed households will be *less* likely to live in New Orleans in 2006.

Demographic characteristics. Some research has suggested that women are more likely to evacuate during hurricanes than men (Bateman and Edwards, 2002), so men may be more likely to be in New Orleans in 2006 because they never left. Studies have also found age to be important, as post-Katrina New Orleans in 2006 was populated in greater proportions by older adults (Frey and Singer, 2006; Frey, Singer, and Park, 2007; Koerber, 2006; Groen and Polivka, 2008). Because of well-documented problems with the schools (Picou and Marshall, 2007; Fussell, 2007; Colten, Kates, and Laska, 2008; Alexander, 2007), the age of the children of New Orleans may also matter, as school age children may not have been as likely to be back in 2006.

Because New Orleans has an extensive history regarding race and segregation (Fussell, 2007; De Sousa Briggs, 2006), and post-Katrina reports suggested that the city had a higher proportion of white residents following the storm (Frey and Singer, 2006; Frey, Singer, and Park, 2007; Koerber, 2006), it is anticipated that being black corresponds to a greater likelihood of *not* having returned to New Orleans following Katrina in 2006 for adults and children. Hispanic ethnicity may be predictive as well, as reports of post-Katrina New Orleans suggested that Latinos represented a greater proportion of the population, in part because of the boom in construction work (Fussell, 2007), but could also be related to return migration by Hispanic residents of pre-Katrina New Orleans. Futhermore, a high proportion of New Orleanians were born in Louisiana (Frey, Singer, and Park, 2007), which may confer a sense of place upon such former residents (Groen and Polivka, 2008), so this may also encourage the return of such residents soon after the storm. Similarly, the foreign-born who have resided in the U.S. for fewer than five years may have few incentives to return to New Orleans. It is less clear what influence physical disabilities might have upon the return to New Orleans – the disabled may have been

unable to evacuate New Orleans easily during the storm or unable to return to New Orleans easily after the storm.

Important socioeconomic characteristics are also likely linked to whether or not individuals returned by 2006 to New Orleans. It is anticipated that the models in this study will replicate the findings of others, that those with more income, more education, better employment, and those not in poverty will be more likely to be back in New Orleans by 2006 (Frey and Singer, 2006; Frey, Singer, and Park, 2007; Koerber, 2006).

Housing characteristics. Demographic studies have found homeowners to be more likely to return to New Orleans soon after the storm (Frey and Singer, 2006; Frey, Singer, and Park, 2007; Koerber, 2006). Not only are more homeowners anticipated to be in this study, but it is also anticipated that housing conditions in New Orleans will be of lower quality than those still displaced in 2006, with returning residents experiencing plumbing and/or kitchen inadequacies, or crowding in the few homes that were habitable during the immediate recovery period.

Methods

To better understand how Katrina affected New Orleans and other counties of the Gulf Coast, analyses were performed on the data to understand changes in the population composition over time (2004 compared to 2006 and 2007) and relative comparisons within the region (Katrina affected areas compared to the remaining counties in Mississippi and Louisiana). Descriptive analyses show changes in families and households before and after Katrina. These initial descriptive analyses show what the distribution of families and households in New Orleans, other Katrina affected counties, and the remaining counties in Mississippi and Louisiana looked like before (2004) and after Katrina (2006 and 2007).

Bivariate comparison tables and logistic regression models were run to understand which adults and children who resided in New Orleans in 2005 were likeliest to be living in New Orleans at the time they responded to the ACS in 2006 (n=286,880 weighted adults; n=90,879 weighted children). Elliott and Pais (2006) examined the likelihood of return one month after the storm among a representative sample of 1200 Katrina survivors and found that lower-income homeowners were more likely to report wanting to return to their pre-Katrina communities than higher-income homeowners (p. 315). However, intentions expressed by survivors so soon after the storm may vary considerably from their actions and follow through one year later, given the many logistical hurdles citizens have faced in the rebuilding process (de Sousa Briggs, 2006). Groen and Polivka (2008) also examine the determinants of returning so soon after the storm, but their primary focus is on economic determinants. This paper adds to the literature by examining who among former residents of New Orleans were likeliest to live in the city one year later, with a particular focus on families and children. Predictors include household and individual level characteristics including the presence and age of children, household complexity, age, employment status, disability status, race, ethnicity, foreign-born status, income, employment, and various housing condition measures and include models run separately for the adult and child populations.

Findings

Descriptive Analyses. Table 1 shows the estimates of individuals and households in New Orleans, the other counties directly affected by Katrina, and all other counties in Mississippi and Louisiana. Looking at New Orleans, the population in households decreased from 444,515 in 2004 to 212,245 in 2006 and went up slightly to 230,620 in 2007. The population in New Orleans in 2007 represents a 48 percent decrease of the population in 2004. Similarly, the

population in the households of the other counties directly affected by Katrina also declined from 912,135 in 2004 to 794,800 in 2007, or a 13 percent decrease (Table 1).

Looking specifically at households, New Orleans had 100,343 fewer households in 2007 compared to 2004, a 56 percent decline in the number of households. The other counties directly affected by Katrina had 58,859 fewer households in 2007 compared to 2004, or a 16 percent decline in the number of households (Table 1).

While it should come as no surprise that there has been a decline in the number of households in Katrina affected areas, what has the effect of Katrina been upon the number of families in these areas? Table 3 shows the proportions and types of families that were in these areas before and after Katrina, compared to 2004. Perhaps the most striking findings are those that show the relative proportions of households with children under the age of 12 living in them. We see that in New Orleans, 15.9 percent of households in 2004 had own children[3] under the age of 12, in contrast with only 11.9 percent of such households in New Orleans in 2007. These data provide additional evidence that families with young children are not as prevalent in New Orleans as they were before Katrina. In looking at other Katrina-affected counties, we see little change: Households with own children under 12 went from 22.6 percent in 2004 to 19.8 percent in 2007; however, the percentages of households with own children under 6 and under 3 in other Katrina-affected counties were not significantly different between 2004 and 2007 (Table 3). New Orleans, Katrina-affected counties, and the remaining counties in Mississippi and Louisiana generally saw an increase in the percentage of households with members over 65 in 2006 and 2007 when compared to 2004 (Table 3).

[3] "Own children" are the biological, step, and adopted children of the householder.

Table 3: Families and Households and their Characteristics in New Orleans, Katrina Affected Counties, and Other Counties in Mississippi and Louisiana

	Total			New Orleans			Other Katrina Affected Counties			Remaining Counties in Mississippi and Louisiana		
	2004	2006	2007	2004	2006	2007	2004	2006	2007	2004	2006	2007
	%	%	%	%	%	%	%	%	%	%	%	%
TOTAL HOUSEHOLDS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Family households (total families)	69.1	68.7	68.5	57.0	54.6	55.2	69.1	69.6	68.3	70.1	69.1	69.0
With own children under 18	32.7	31.5	30.7	21.8	17.7	20.4	33.0	29.9	28.1	33.5	32.2	31.4
Married-couple family	47.1	47.2	47.0	31.8	33.5	31.3	49.0	49.6	47.7	48.0	47.4	47.5
With own children under 18	19.7	19.4	18.8	9.5	10.0	9.3	20.7	19.8	17.9	20.4	19.7	19.3
Male householder family	4.8	4.7	4.7	3.1	4.0	4.8	5.1	5.3	5.5	4.9	4.6	4.6
With own children under 18	2.3	2.2	2.1	1.0	0.8	1.2	2.9	2.6	2.2	2.3	2.2	2.2
Female householder family	17.2	16.8	16.8	22.1	17.0	19.1	15.0	14.6	15.1	17.2	17.1	16.9
With own children under 18	10.7	9.9	9.7	11.4	6.9	9.9	9.5	7.5	8.0	10.8	10.3	10.0
Nonfamily households	30.9	31.3	31.5	43.0	45.4	44.8	30.9	30.4	31.7	29.9	30.9	31.0
Householder living alone	26.2	26.9	26.9	35.9	37.8	37.9	26.5	25.1	26.7	25.4	26.8	26.5
65 years and over	8.7	9.2	9.2	9.3	10.9	8.5	7.4	9.0	8.1	8.9	9.2	9.3
Households												
With own children under 12	23.5	22.3	21.8	15.9	10.7	11.9	22.6	20.6	19.8	24.3	22.9	22.4
With own children under 6	14.0	12.9	13.0	10.0	5.8	7.3	11.9	10.9	11.9	14.7	13.4	13.3
With own children under 3	7.9	7.6	7.1	5.5	3.5	3.5	7.2	6.3	6.2	8.2	7.9	7.4
With own children under 1	2.8	2.8	2.5	1.3	1.6	0.9	3.1	2.5	1.6	2.8	2.9	2.6
With members age 65+	22.2	23.8	23.5	22.1	28.1	23.1	21.6	25.7	23.9	22.3	23.4	23.4
Average household size (mean)	2.53	2.64	2.61	2.42	2.89	2.88	2.50	2.69	2.62	2.54	2.63	2.60

Source: U.S. Census Bureau, American Community Survey, 2004, 2006, 2007.

Comparing those remaining in New Orleans to those who left. Tables 4 and 5 show who among the 286,880 adult respondents on the 2006 ACS reported living in New Orleans in 2005 and were either present or left New Orleans after Katrina by the time of survey in 2006. Table 4 shows bivariate comparisons of those adults who lived in New Orleans in 2005 (n=286,880) and were 1) either living in New Orleans following Katrina in 2006 or 2) were not living there, and their distributions across key demographic characteristics.[4] In these bivariate comparisons, it is notable that a greater proportion of New Orleanians who did not return by 2006 were never married (41.4 percent). Also, those with school-aged children (age 5 to 17) were less likely to have returned to New Orleans by 2006 (26.6 percent had not returned by 2006 compared to 15.9 percent who had returned), especially those with children age 12 and younger (22.1 percent had not returned compared to 10.4 percent who had returned by 2006) (Table 4).

Looking at the age distribution of the population, younger adults were less likely to return by 2006, while older adults were more likely to have stayed in New Orleans in 2006. Although 21.2 percent of the adults who lived in New Orleans in 2005 were under 30, only 15.6 percent of those living in New Orleans in 2006 were under 30. In contrast, 16.4 percent of all adults living in New Orleans in 2005 were over age 65, but 19.7 percent of those still living in New Orleans in 2006 were over age 65 (Table 4). Those who had not returned to New Orleans were more likely to be black (constituting 67.1 percent of the population who had not returned compared to 56.4 percent of the population that returned) and were more likely to be disabled (23.9 percent of the population who had not returned compared to 18.5 percent of the population who had returned).

[4] In this paper, those who were living in New Orleans in 2005 and were living in New Orleans in 2006 are referred to as "stayers." In contrast, those who were living in New Orleans in 2005 and were not living in New Orleans in 2006 are referred to as "leavers." However, it should be noted that we do not have a full reporting of their residence patterns during the prior year. It is possible that "leavers" *left* New Orleans just prior to being surveyed, while "stayers" could have *returned* to New Orleans just prior to being surveyed.

Table 4: Residents and Non-Residents of New Orleans in 2006 by Selected Characteristics (N = 286,880 U.S. adults, age 18 and older, who reported living in New Orleans in 2005; WEIGHTED)

	Population in 2005		Stayers: In New Orleans in both 2005 and 2006		Leavers: In New Orleans in 2005; Gone in 2006	
TOTAL	**286,880**		**146,097**		**140,783**	
	Percent	**SE/1**	**Percent**	**SE/1**	**Percent**	**SE/1**
TOTAL	**100.0**	**--**	**50.9**	**1.1**	**49.1**	**1.1**
Family characteristics						
Marital status						
Married, spouse present	31.3	1.0	32.7	1.3	29.9	1.4
Married, spouse absent	5.2	0.5	5.0	0.8	5.4	0.7
Widowed	9.3	0.7	11.0	1.0	7.6	0.8
Divorced	13.0	0.8	14.1	1.2	11.8	1.0
Separated	3.1	0.4	2.3	0.5	3.9	0.6
Never married	38.0	1.1	34.8	1.5	41.4	1.5
Presence of own children						
Has own school aged child (5 to 17)	21.2	0.9	15.9	1.1	26.6	1.4
Has own child age 12 and younger	16.2	0.8	10.4	0.9	22.1	1.3
Has own child age 6 and younger	8.7	0.6	5.5	0.7	12.1	1.0
Has own child age 3 and younger	4.8	0.5	3.4	0.6	6.2	0.8
Has own child age 1 and younger	2.2	0.3	1.4	0.3	3.1	0.6
Demographic characteristics						
Male	45.8	1.1	45.3	1.6	46.4	1.5
Age						
Under 30	21.2	0.9	15.6	1.1	27.1	1.4
30-44	26.2	1.0	23.2	1.4	29.4	1.4
45-64	36.2	1.1	41.4	1.6	30.7	1.4
65 and older	16.4	0.8	19.7	1.2	12.9	1.0
Black alone	61.7	1.0	56.4	1.5	67.1	1.4
Hispanic	3.8	0.4	3.4	0.6	4.2	0.6
Foreign-born and in country <5 years	0.9	0.2	0.4	0.2	1.5	0.4
Some college or more	51.8	1.1	53.3	1.6	50.2	1.5
Born in Louisiana	72.2	0.9	73.0	1.3	71.3	1.4
Disabled	21.1	0.9	18.5	1.2	23.9	1.3
Household income (mean)	65,202	1,935	79,544	3,373	50,319	1,747
Poverty	22.4	0.9	13.8	1.1	31.3	1.4
Employment status						
Unemployed	13.3	0.8	7.5	0.9	19.3	1.3
Not in labor force	37.7	1.1	36.5	1.5	38.9	1.5
Housing characteristics						
Home is rented	59.0	1.1	42.3	1.6	76.3	1.2
Lacks complete plumbing or kitchen	1.9	0.3	2.3	0.4	1.5	0.4
Crowding (>1 person per room)	8.3	0.7	7.7	1.0	8.9	0.9

1/Standard Errors were computed using the Taylor Expansion method.

Source: U.S. Census Bureau, American Community Survey, 2006.

Furthermore, the economic and housing indicators suggest that adults who had not returned to New Orleans by 2006 had fewer means. Those who had not returned to New Orleans by 2006 had lower household incomes (mean of $50,319 compared to $79,544 among those who returned) and were more likely to be in poverty (31.3 percent compared to 13.8 percent who returned). Those who had not yet returned by 2006 were also more likely to be renting at the time of survey (76.3 percent compared to 42.3 percent who had returned) (Table 4).

Table 5 presents a logistic regression model that predicts who among residents of New Orleans in 2005 were likely to be living in New Orleans in 2006. The universe for this model is limited to those adults nationwide who reported on the 2006 ACS survey that they had lived in New Orleans in 2005, or the year that Katrina happened (n=286,880). The goal of the analysis presented in Table 5 is to understand which residents of New Orleans at the time of Katrina were likeliest to also be in New Orleans during the rebuilding process. Because these models use cross-sectional data, we cannot tell if the respondents stayed through the storm or returned. However, these models can provide a sense of who was in New Orleans one year after the storm and which characteristics were predictors of such residence post-Katrina.

As the model in Table 5 shows, a number of factors were significantly associated with the likelihood of still being in New Orleans one year after Katrina. Those who were not married were more likely to be in New Orleans in 2006 ($p<.001$), as were adults who did not have school aged children ($p<.001$). As shown in the bivariate statistics in Table 4, younger adults were less likely to have stayed in New Orleans in 2006 than older adults, particularly those age 45-64 ($p<.001$; 2.4 times greater odds compared to those under 30) and those age 65 and older ($p<.001$;

Table 5: Logistic Regression model: Adults who lived in New Orleans in 2005 and the likelihood that they lived in New Orleans in 2006 (N = 286,880 U.S. adults, age 18 and older, who reported living in New Orleans in 2005; WEIGHTED)

	Likelihood of living in New Orleans in 2006	Sig.	SE/1	Odds Ratio
Family characteristics				
Married	-0.4423	***	0.11	0.6
Has own school aged child	-0.5718	***	0.13	0.6
Demographic characteristics				
Male	-0.1276		0.10	0.9
Age *(excluded category is under 30)*				
30-44	0.2903	^	0.15	1.3
45-64	0.8714	***	0.15	2.4
65 and older	0.9657	***	0.18	2.6
Black alone	-0.1225		0.12	0.9
Hispanic	0.0227		0.27	1.0
Born in Louisiana	0.1852		0.11	1.2
Foreign-born and in country <5 years	-0.9637	^	0.56	0.4
Disabled	-0.5438	***	0.13	0.6
Household Income	4.04E-07		0.00	1.0
Education	-0.0398	*	0.02	1.0
Poverty	-0.4007	**	0.13	0.7
Employment status *(excluded category is employed)*				
Unemployed	-0.9632	***	0.16	0.4
Not in labor force	-0.4197	**	0.13	0.7
Housing characteristics				
Home is rented	-1.3466	***	0.11	0.3
Lacks complete plumbing or kitchen	0.4904		0.35	1.6
Crowding (>1 person per room)	0.2355		0.20	1.3
Intercept	1.4103	***	0.29	
Somers' D	0.486			
Gamma	0.487			
Tau-a	0.241			

Significance is noted as follows: ^(<0.10), *(<0.05), **(<0.01), ***(<0.001).

1/Standard Errors were computed using the Taylor Expansion method.

Source: U.S. Census Bureau, American Community Survey, 2006.

2.6 times greater odds compared to those under 30). Despite race differences in the bivariate distributions of Table 4, race was not a significant predictor of staying in New Orleans in 2006, after controlling for the other predictors included in the logistic regression model (Table 5). Also of note, the foreign born who were in the country for less than 5 years were significantly less

likely to be in New Orleans by 2006 ($p<0.1$), as were the disabled ($p<.001$). Those with less education ($p<.05$), those in poverty ($p<.01$), those who were unemployed ($p<.001$) and not in the labor force ($p<.01$), and renters ($p<.001$) were all less likely to be living in New Orleans by 2006 given the other predictors in the model (Table 5).

While Tables 4 and 5 present data on the family, demographic, and household characteristics of adults who returned to New Orleans a year after Katrina, Tables 6 and 7 present data about the children who returned to New Orleans by 2006. Looking at the bivariate statistics presented in Table 6, we see that the children who had not yet returned to New Orleans in 2006 were more likely to live in a female-headed household (58.5 percent compared to 48.6 percent of those who returned). The children who had not yet returned by 2006 had lower household income means ($40,830 compared to $65,245 of those who returned) and were more likely to be in poverty (51.1 percent compared to 39.2 percent of those who returned). They were also less likely to have an employed head of household (42.1 percent compared to 72.0 percent of those who returned) and were more likely to be in rented housing (82.4 percent compared to 53.2 percent of those who returned).

Table 6: Residents and Non-Residents of New Orleans in 2006 by Selected Characteristics (N = 90,879 U.S. children, under age 18, who reported living in New Orleans in 2005; WEIGHTED)

	Population in 2005		Stayers: In New Orleans in both 2005 and 2006		Leavers: In New Orleans in 2005; Gone in 2006	
TOTAL	**90,879**		**43,147**		**47,732**	
	Percent	**SE/1**	**Percent**	**SE/1**	**Percent**	**SE/1**
TOTAL	**100.0**	**--**	**47.5**	**2.1**	**52.5**	**2.1**
Family characteristics						
Female headed household	53.8	2.1	48.6	3.4	58.5	2.6
Demographic characteristics						
Male	50.9	2.1	50.4	3.4	51.3	2.6
Age						
Under 5	22.8	1.8	24.3	3.0	21.5	2.2
5 to 13 years	50.7	2.1	50.3	3.4	51.1	2.6
14 to 17 years	26.5	1.8	25.4	2.9	27.4	2.3
Black alone	80.4	1.4	77.5	2.1	82.9	1.9
Household income (mean)	52,422	3,126	65,245	5,744	40,830	3,038
Poverty	45.4	2.1	39.2	3.5	51.1	2.6
Employment status of householder						
Employed	56.3	2.1	72.0	3.0	42.1	2.6
Not in labor force	25.9	1.8	20.9	2.7	30.4	2.3
Unemployed	17.7	1.5	7.1	1.6	27.3	2.4
Housing characteristics						
Home is rented	68.5	1.8	53.2	3.3	82.4	1.8

1/Standard Errors were computed using the Taylor Expansion method.

Source: U.S. Census Bureau, American Community Survey, 2006.

Table 7 shows results from the regression model showing which children were most likely to have returned to New Orleans by 2006. As shown in Model 1, children who lived in female-headed households ($p<0.1$) or who were black ($p<.05$) were more likely to be living in New Orleans in 2006. An interaction term is introduced in Model 2 and shows significantly that black children living in female-headed households were more likely to live in New Orleans one year later ($p<0.1$; 2.2 greater odds than children of other family structure and/or racial identifications). As was the case with the adult sample shown in Table 5, children whose householders were not in the labor force ($p<.001$), were unemployed ($p<.001$), and were renting their residence ($p<.001$) were less likely to have returned to New Orleans by 2006 (Table 7).

Table 7: Logistic Regression model: Children who lived in New Orleans in 2005 and the likelihood that they lived in New Orleans in 2006 (N = 90,879 U.S. children, under age 18, who reported living in New Orleans in 2005; WEIGHTED)

	Likelihood of living in New Orleans in 2006					
	Model 1			Model 2		
	Coefficients	SE/1	Odds Ratio	Coefficients	SE/1	Odds Ratio
Family characteristics						
Female headed household	0.4035^	0.23	1.5	-0.2632	0.41	0.8
Demographic characteristics						
Male	-0.0468	0.19	1.0	-0.0577	0.19	0.9
Age *(excluded category is under 5)*						
5 to 13 years	-0.1328	0.25	0.9	-0.1193	0.25	0.9
14 to 17 years	-0.2882	0.27	0.8	-0.2672	0.27	0.8
Black alone	0.5002*	0.24	1.6	0.2849	0.28	1.3
Household income	1.89E-07	0.00	1.0	1.57E-09	0.00	1.0
Poverty	0.2976	0.25	1.3	0.266	0.25	1.3
Employment status of householder						
Not in labor force	-0.9947***	0.25	0.4	-0.9849***	0.25	0.4
Unemployed	-1.8225***	0.31	0.2	-1.8455***	0.31	0.2
Housing characteristics						
Home is rented	-1.6548***	0.25	0.2	-1.6735***	0.25	0.2
Interaction						
Black child living in female headed household				0.7993^	0.47	2.2
Intercept	0.9894***	0.29		1.1544***	0.31	
Somers' D	0.521			0.524		
Gamma	0.524			0.529		
Tau-a	0.253			0.254		

Significance is noted as follows: ^(<0.10), *(<0.05), **(<0.01), ***(<0.001).

1/Standard Errors were computed using the Taylor Expansion method.

Source: U.S. Census Bureau, American Community Survey, 2006.

Discussion

This study suggests that the story of Katrina one year after the storm is a story of "haves" and "have nots." The more resources individuals and families had, the more likely they were to have returned to New Orleans by 2006. First, employment is an important factor associated with the return of adults and children to New Orleans. Adults and the heads of household among the children in the study who were employed were more likely to be living in New Orleans in 2006 than the unemployed and those not in the labor force. While the causal link is not clear in these data regarding whether they returned because they had employment waiting or whether they were better able to find employment upon their return than those who had not yet returned to New Orleans, these data suggest that employment, or the ability to get employment, is a strong predictor of a speedy return.

Homeowners, both among adults in the sample and among children's heads of households, were also more likely to come back by 2006. This finding suggests that there may have been motivation for homeowners to return to their property, as well as difficulties for renters trying to return to New Orleans without control or a claim to their rented homes. Renting outside of New Orleans, rather than buying, could also be an indicator that individuals intend to return to New Orleans in the near future.

Adults who were more educated and were not in poverty were also more likely to return to New Orleans by 2006, further evidence that having more resources helped hasten a return. The disabled were also less likely to be living in New Orleans in 2006 following Katrina. However, this finding may also suggest a lack of resources – the disabled who were evacuated may have had fewer opportunities to return quickly to New Orleans following Katrina because of health limitations.

While older adults were more likely to be back in New Orleans by 2006, the age of children did not matter as a predictor of a child's own residence in New Orleans in 2006. However, as shown in the model for the adult population, having a school aged child ($p<.001$) and being a younger adult was associated with a lower likelihood of living in New Orleans in 2006. This may mean that parents of school-aged children, regardless of the age of the child, may have resisted returning to the area so soon after the storm, given the uncertainties surrounding the ability of the public schools to reopen.

Furthermore, the evidence about which families returned suggests that, given other characteristics, married couples were less likely to return to New Orleans by 2006, and black children in female-headed households were more likely to be back in New Orleans in 2006. This suggests that among adults, those who did not have to consider the employment and concerns of a married partner may have had an easier time returning to New Orleans quickly. For single mothers with children, the considerations of a spouse or partner may not have been a limiting factor, and there may have also been the matter of returning to the reliable support networks that existed prior to the storm rather than forging ahead alone with children in a city where such networks were not yet in place.

There were additional differences found between the predictors of adults who returned to New Orleans by 2006 compared to children who returned to New Orleans by 2006. While being black was a significant predictor of the return of children to New Orleans (Table 7; Model 1), especially if they lived in female-headed households, it was not a significant predictor of which adults returned (Table 5). Such differences suggest that for children especially, post-Katrina residence was linked to race and family structure differences. Finally, while poverty was a significant predictor explaining why adults were not back in New Orleans in 2006, poverty was

not a predictor for children. It is unclear why poverty was not a factor affecting the return of children, yet affected adults, but suggests that additional study should be conducted to explore the differing effects of poverty on the migration of adults and children back to New Orleans.

Appendix 1: Pearson Correlation Coefficients (Adults who reported in 2006 that they resided in New Orleans in 2005)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1 mardum	1.00																		
2 ownschch	0.10	1.00																	
3 sexdum	0.07	-0.08	1.00																
4 age3044	0.06	0.17	0.03	1.00															
5 age4564	0.17	-0.08	0.00	-0.45	1.00														
6 age65	0.02	-0.15	-0.03	-0.26	-0.33	1.00													
7 black	-0.13	0.09	-0.08	-0.03	0.06	-0.11	1.00												
8 his_num	0.03	-0.02	0.06	0.05	-0.06	-0.01	-0.20	1.00											
9 pob_LA	-0.08	0.00	-0.08	-0.02	-0.01	-0.01	0.39	-0.22	1.00										
10 citstat	0.06	-0.02	0.02	0.10	-0.05	-0.04	-0.12	0.19	-0.16	1.00									
11 dis	-0.08	-0.08	-0.02	-0.13	0.04	0.28	0.05	-0.02	0.01	-0.03	1.00								
12 HINC	0.16	0.00	0.04	0.02	0.03	-0.01	-0.20	-0.02	-0.06	0.00	-0.09	1.00							
13 schln	0.19	-0.02	-0.03	0.08	0.08	-0.17	-0.32	-0.07	-0.13	-0.01	-0.25	0.19	1.00						
14 hhpov	-0.21	0.12	-0.05	-0.01	-0.05	-0.10	0.19	0.02	0.02	0.00	0.12	-0.25	-0.22	1.00					
15 unemp_dum	-0.10	0.04	0.02	0.02	-0.02	-0.16	0.17	-0.01	0.06	-0.03	-0.04	-0.09	-0.07	0.16	1.00				
16 NIL_dum	-0.04	-0.06	-0.12	-0.20	-0.07	0.45	0.03	-0.02	0.04	-0.05	0.37	-0.13	-0.26	0.12	-0.30	1.00			
17 hhten	-0.21	0.02	-0.01	0.02	-0.06	-0.10	0.25	0.03	0.03	0.06	0.03	-0.26	-0.18	0.30	0.14	0.02	1.00		
18 incmplhh	-0.02	0.04	0.02	0.03	-0.05	0.01	-0.01	0.07	0.02	-0.01	0.01	0.00	0.00	0.02	-0.03	0.02	-0.03	1.00	
19 pprm	-0.03	0.12	-0.02	0.00	-0.02	-0.08	0.11	0.02	0.08	0.03	-0.02	0.02	-0.10	0.04	0.06	-0.02	0.08	0.02	1.00

Source: U.S. Census Bureau, American Community Survey, 2006.

Appendix 2: Pearson Correlation Coefficients (Children who reported in 2006 that they resided in New Orleans in 2005)

	1	2	3	4	5	6	7	8	9	10	11	12
1 sexdum	1.00											
2 black	0.02	1.00										
3 age0to4	0.03	-0.04	1.00									
4 age5to13	-0.03	0.01	-0.55	1.00								
5 age14to17	0.01	0.03	-0.33	-0.61	1.00							
6 singmomhh	0.06	0.31	0.06	-0.03	-0.02	1.00						
7 HINC	-0.02	-0.33	0.03	-0.05	0.03	-0.31	1.00					
8 hhpov	0.03	0.37	0.02	0.07	-0.10	0.51	-0.34	1.00				
9 hhldr_emp	0.04	-0.18	0.01	0.02	-0.03	-0.30	0.21	-0.35	1.00			
10 hhldr_NIL	-0.05	0.09	0.01	-0.02	0.02	0.13	-0.12	0.20	-0.67	1.00		
11 hhldr_unemp	0.01	0.13	-0.01	0.00	0.02	0.24	-0.13	0.23	-0.53	-0.27	1.00	
12 hhten	0.05	0.41	0.02	0.06	-0.08	0.44	-0.35	0.45	-0.23	0.07	0.22	1.00

Source: U.S. Census Bureau, American Community Survey, 2006.

Appendix 3: Standard Errors of the Percentages in Table 3

	Total			New Orleans			Other Katrina Affected Counties			Remaining Counties in Mississippi and Louisiana		
	2004	2006	2007	2004	2006	2007	2004	2006	2007	2004	2006	2007
	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
TOTAL HOUSEHOLDS												
Family households (total families)	0.5	0.3	0.3	2.3	1.8	1.6	1.5	0.9	0.9	0.5	0.3	0.3
With own children under 18	0.5	0.3	0.3	2.0	1.4	1.3	1.6	0.9	0.9	0.5	0.3	0.3
Married-couple family	0.5	0.3	0.3	2.1	1.7	1.4	1.6	0.9	0.9	0.5	0.3	0.3
With own children under 18	0.4	0.2	0.2	1.3	1.1	0.9	1.3	0.8	0.7	0.4	0.3	0.3
Male householder family	0.2	0.1	0.1	0.7	0.8	0.7	0.8	0.5	0.4	0.3	0.2	0.2
With own children under 18	0.2	0.1	0.1	0.4	0.3	0.3	0.6	0.3	0.3	0.2	0.1	0.1
Female householder family	0.4	0.2	0.2	2.0	1.5	1.4	1.2	0.7	0.7	0.5	0.3	0.3
With own children under 18	0.4	0.2	0.2	1.6	1.0	1.0	1.0	0.6	0.6	0.4	0.2	0.2
Nonfamily households	0.5	0.3	0.3	2.3	1.8	1.6	1.5	0.9	0.9	0.5	0.3	0.3
Householder living alone	0.5	0.3	0.3	2.2	1.7	1.5	1.4	0.8	0.8	0.5	0.3	0.3
65 years and over	0.3	0.2	0.2	1.2	1.1	0.8	0.7	0.5	0.4	0.3	0.2	0.2
Households												
With own children under 12	0.5	0.3	0.3	1.8	1.2	1.0	1.4	0.8	0.8	0.5	0.3	0.3
With own children under 6	0.4	0.2	0.2	1.5	0.8	0.8	1.1	0.6	0.7	0.4	0.2	0.2
With own children under 3	0.3	0.2	0.2	1.2	0.6	0.5	0.9	0.5	0.5	0.3	0.2	0.2
With own children under 1	0.2	0.1	0.1	0.5	0.4	0.3	0.6	0.3	0.2	0.2	0.1	0.1
With members age 65+	0.4	0.2	0.2	1.7	1.6	1.3	1.2	0.8	0.7	0.4	0.3	0.3
Average household size (mean)	0.02	0.01	0.01	0.09	0.09	0.08	0.05	0.03	0.03	0.02	0.01	0.01

Source: U.S. Census Bureau, American Community Survey, 2004, 2006, 2007.

References

Alexander, Maria. 2007. "Reinventing a Broken Wheel? The Fight to Reclaim Public Education in New Orleans," Social Policy, 37 (3/4): 18-23.

Bateman, Julie M. and Bob Edwards. 2002. "Gender and Evacuation: A Closer Look at Why Women are More Likely to Evacuate for Hurricanes," Natural Hazards Review, 3(3): 107-117.

Colten, Craig E., Kates, Robert W., and Shirley B. Laska. 2008. "Three Years After Katrina: Lessons for Community Resilience," Environment. September/October: 36-47.

Cutter, Susan I., Emrich, Christopher T., Mitchell, Jerry T., Boruff, Bryan J., Gall, Melanie, Schmidtlein, Mathew C., Burton, Christopher G., and Melton, Ginni. 2006. "The Long Road Home: Race, Class, and Recovery from Hurricane Katrina," *Environment*. 48(2): 8-20.

De Sousa Briggs, Xavier. 2006. "After Katrina: Rebuilding Places and Lives," City & Community, 5 (2): 119-128.

Elliott, James R. and Jeremy Pais. 2006. "Race, class, and Hurricane Katrina: Social Differences in Human Responses to Disaster," Social Science Research, 35: 295-321.

Frey, William H. and Audrey Singer. June 2006. "Katrina and Rita Impacts on Gulf Coast Populations: First Census Findings," The Brookings Institution Metropolitan Policy Program, Special Analysis in Metropolitan Policy.

Frey, William H., Audrey Singer, and David Park. September 2007. "Resettling New Orleans: The First Full Picture from the Census," The Brookings Institution, Metropolitan Policy Program, Special Analysis in Metropolitan Policy.

Fussell, Elizabeth. 2007. "Constructing New Orleans, Constructing Race: A population history of New Orleans," *The Journal of American History*. December: 846-855.

Groen, Jeffrey, A. and Anne E. Polivka. 2008. "Going Home after Hurricane Katrina: Determinants of Return Migration and Changes in Affected Areas." The Bureau of Labor Statistics. Presented at the 2008 Population Association of America Meeting in New Orleans, LA.

Jenkins, Pamela, Laska, Shirley, and Gretchen Williamson. 2007. "Connecting Future Evacuation to Current Recovery: Saving the Lives of Older People in the Next Catastrophe," *Generations*. 31(4): 49-52.

Koerber, K. 2006. "Migration Patterns and Mover Characteristics from the 2005 ACS Gulf Coast Area Special Products." The U.S. Census Bureau, Housing and Economic Household Statistics Division. Presented at the Southern Demographic Association Conference.

Logan, John R. 2006. "The Impact of Katrina: Race and Class in Storm-Damaged Neighborhoods," Report by the Initiative in Spatial Structures in the Social Sciences, Brown University (www.s4.brown.edu/katrina/report.pdf), pp. 1-16.

Picou, J. Steven, and Brent K. Marshall. 2007. "Social impacts of Hurricane Katrina on displaced K-12 students and educational institutions in coastal Alabama counties: Some preliminary observations," *Sociological Spectrum*. 27: 767-780.

Rathke, W. 2005. "Do You Know What It Means to Rebuild New Orleans?" *Social Policy*, 36 (2): 4-8.