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THE Children's
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**THE LEGACY OF KATRINA'S
CHILDREN:
Estimating the Numbers of
Hurricane-Related At-Risk
Children in the
Gulf Coast States of
Louisiana & Mississippi**

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Introduction

The 2005 hurricane season, which included hurricanes Katrina, Rita and Wilma, exacted a monumental toll on the people and infrastructure of the Gulf Coast region in the southern United States. Disaster-related losses were estimated to have exceeded \$110 billion. Much has been written about the short-term effects on the local housing stock, economy, and populations. Less understood, however, are the long-term consequences on the children of the Gulf Coast who experienced first the storm, and then the displacement which uprooted so many from their homes and communities. The displacement, which for many children and families continues through the present, has resulted in households living in unfamiliar environments, far from friends and family or locally-supportive community-based organizations, faith-based institutions, and schools.

More tangibly, the displacement has also led to hazardous and crowded housing conditions as families were forced to double-up, move in to small travel trailers for extended periods of time, or live in areas adjacent to environmental or construction hazards. The loss of civic infrastructure – particularly among education, health care, and criminal justice systems – has compounded the problems facing families and children as they return to their recovering communities or as they continue to live in temporary or transitional settings.

The objective of this research brief is to enumerate the population of children who have been “exposed” to this post-hurricane displacement and infrastructure loss, and to consider how many of them are at elevated risk of a poor future outcome. However much the housing, roadways, and levees are rebuilt and the local economies reconstituted, the legacy of these hurricanes may endure in the lives of these “at-risk” children.

This research brief sought to answer four questions:

1. *How many children were displaced as a result of Hurricanes Katrina and Rita?*
2. *Among those who were displaced, how many children have since returned to their home state or home communities?*
3. *Among those who were displaced, how many children are still living in temporary or transient FEMA-subsidized group housing?*
4. *Regardless as to whether they have returned or are still living in temporary housing, how many of these displaced children are at-risk for poor outcomes?*

It should be evident to most readers that the answers to these questions are not simple, and that by the nature of the available data (or lack thereof) they are built upon various assumptions. Wherever possible, the authors have followed certain principles in attempting these estimations: (a) we have sought to use publicly-available data, particularly those data with the greatest reliability, to establish population parameters; (b) we have sought confirmatory data from multiple,

distinct sources to corroborate projected numbers or trends; (c) we have used conservative scoring rules, so as to err on the side of underestimating rather than overestimating the numbers; and (d) the estimates of at-risk children are presented as a range, to reflect the inherent imprecision in such numbers.

Also, the process of recovery in the Gulf – and the ongoing pain and problems associated with displacement and the persistent sense of uncertainty among so many affected populations – is very much of a dynamic process. As this research brief was going to press, reports in the press chronicled the imminent closing of a number of trailer parks and the growing homeless population in New Orleans¹. For the purposes of this estimation, though, **it does not matter whether the children are still residing in trailer parks or they have moved back to the community. We have chosen to regard them as a single population, at-risk regardless of their current housing circumstances.**

Population Shifts – Estimating the Number of Displaced Children

The numbers of people who evacuated in anticipation or in the wake of the storm ranges widely, from 600,000 to 1.2 million. In a report to Congress released in November 2005, the Congressional Research Service used FEMA damage assessment maps and census data to estimate the population exposed to Hurricane Katrina². The authors estimated that 5.8 million people in three states may have experienced hurricane-force winds. Among that population, fewer than half, 2.5 million people, lived in counties or parishes that experienced considerable damage or destruction. Within that sub-population, approximately 700,000 people were estimated to have been living in households that experienced flooding or extensive or catastrophic structural damage. The authors acknowledged that since these estimates were based on aerial surveillance data, and that later household surveys conducted in person revealed a larger number of structurally-damaged homes, the number of people whose homes were damaged was undoubtedly higher. At the two-year anniversary, the Federal Emergency Management Agency (FEMA) reported that it had disbursed over \$5 billion in housing assistance to over 1.4 million households and had provided temporary housing (i.e., travel trailers or mobile homes) to over 143,000 households³.

People who were displaced by Hurricane Katrina, as distinct from those who evacuated and were able to return to their homes within a few days, found refuge and temporary housing in many different settings: in private housing that they

¹ “New Orleans Hurt by Acute Rental Shortage,” New York Times, 3 Dec 2007, Section A Page 1.

² “Hurricane Katrina: Social-Demographic Characteristics of Impacted Areas,” CRS Report for Congress (4 Nov 2005). T Gabe, G Falk, M McCarty, VW Mason. Congressional Research Service, The Library of Congress

³ “Families Recovering – Communities Rebuilding,” FEMA Gulf Coast Recovery Office. http://www.fema.gov/txt/hazard/hurricane/2005katrina/gcro_media_pack_2_year_anniversary.txt. Document retrieved 30 Nov 2007.

purchased or rented, or in which they doubled-up with others; or in publicly-subsidized housing that included trailers and mobile homes in group settings (such as trailer parks), in hotels and motels, in rentals operated by Public Housing Authorities, and in apartment units paid with rental-assistance vouchers. People were displaced within their home state and across state lines. There is no single data source or registry accounting for this displaced population. Furthermore, many people who were displaced moved a number of times, and many moved across a number of the public and private housing options described above.

Table 1. Estimates of Population Displacement & Return to Community

		Louisiana	Mississippi	TOTAL
Pre-Katrina, Aug 2005^a				
A	# children 0-4 years old	213,195	129,931	343,126
B	# children 5-19 years old	682,841	393,305	1,076,146
C	TOTAL # CHILDREN	896,036	523,236	1,419,272
D	Total # Adults, >19 yo	2,193,743	1,232,590	3,426,333
Post-Katrina, Dec 2005^a				
E	# children 0-4 years old	164,606	118,952	283,558
F	# children 5-19 years old	593,662	378,947	972,609
G	TOTAL # CHILDREN	758,268	497,899	1,256,167
H	Total # Adults, >19 yo	1,940,197	1,201,414	3,141,611
Displaced Population				
I	# children 0-4 years old [A – E]	48,589	10,979	59,568
J	# children 5-19 years old [B – F]	89,179	14,358	103,537
K	TOTAL # CHILDREN [C – G]	137,768	25,337	163,105
	Total # Adults, >19 yo [D – H]	253,546	31,176	284,722
School Enrollment^{b,c}				
L	2004	731,351	494,590	1,225,941
M	Oct 2005	612,468	488,352 ^d	1,100,820
N	2007	676,731	493,302	1,170,033
O	Displaced students [L – M]	118,883	6,238	125,121
P	Returned students [N – M]	64,263	4,950	69,213
Q	Rate of return over 2-year period [P/O]	54.1%	79.4%	55.3%
FEMA Subsidized Housing^e				
R	Cumulative, all units (group, comm., priv, ind)	89,894	37,832	127,726
S	Current, all units (group, comm., priv, ind)	46,622	14,938	61,560
T	Rate of return over 2-year period [(R – S) / R]	48.1%	60.5%	51.8%
Estimated # displaced children who returned				
U	Based on trailer depopulation data [K * T]	66,266	15,329	81,595 ^f
V	Based on school enrollment data [K * Q]	74,532	20,118	94,650 ^f

^a US Census Bureau, American Community Survey (ACS) count of FEMA-impacted counties, www.census.gov/acs/www/Products/Profiles/gulf_coast/index.htm.

^b Louisiana Department of Education, Multiple Statistics for Total Reported Public School Students, October 2004, October 2005, and February 2007, www.doe.state.la.us/lde/pair/1489.html.

^c Mississippi Assessment and Accountability Reporting System, www.mde.k12.ms.us/account/ORS/DAADF.htm. Council of Chief State School Officers, September 29, 2007, www.ccsso.org/Whats_New/6907.cfm.

^d According to Mississippi state education data there were 494,038 students enrolled in October 2005. According to Council of Chief State School Officers, 5,686 of those students were displaced from Louisiana.

^e FEMA Gulf Coast Recovery Office, FEMA Gulf Coast Direct Housing Site and Unit Overview, October 3, 2007, No. 10.0.

^f Numbers are summed across states and do not equal to the direct product due to rounding

In order to arrive at an estimate of the total displaced population we have analyzed data from the US Census Bureau, as illustrated in Table 1. In 2006, the Census Bureau released selected data from the American Community Survey for the 117 counties and parishes in the Gulf Coast that had received FEMA Individual or Public Assistance. Under normal conditions, the Census Bureau accumulates data for the American Community Survey throughout a calendar year. As part of their special tabulation for the Gulf Coast, the Census Bureau produced data that distinguished the period January – August 2005 (“pre-Katrina”) from the period September – December 2005 (“post-Katrina”). These population data are collected door-to-door as part of a randomized household survey. The post-Katrina estimates do **not** include households that could not be accessed (because of flooded or damaged roads, for example), that have been destroyed, or that include institutionalized populations or those living in trailer parks. This works to our advantage in the enumeration, since we have considered all who could not be counted to have been displaced. As such, the displaced population may be estimated as the difference between the pre-Katrina and post-Katrina population estimates.

The total number of displaced individuals in both Louisiana and Mississippi is estimated at 447,827, among which are an estimated 163,105 children. This represents the approximate number of children between the ages of 0 – 19 who were not at their pre-Katrina address as of December 2005.

One way of corroborating these numbers is to examine school enrollment data both pre- and post-Katrina. Using data from the state education departments, as illustrated in Table 1, there were 1,225,941 students enrolled in 2004 but only 1,100,820 students enrolled in October 2005⁴. The difference of 125,121 students represents, in part, the number of students displaced from their home state. Given that the student population of 5 -19 year olds represents approximately 76% of the entire 0-19 year old population according to the pre-Katrina census data, one can estimate that there were a total of approximately 164,633 displaced children, using these enrollment data. This number is reasonably close to the estimate of 163,105 children arrived at using the census data above.

⁴ The total number of students reported by the Mississippi department of education for October 2005 was 494,038. This number likely reflects an additional influx of students who had been displaced from Louisiana. The Council of Chief State School Officers reported that 5,686 out-of-state Katrina evacuees were included in the Mississippi enrollment numbers, so we have subtracted them from the total enrollees to arrive at the number of pre-Katrina Mississippi students enrolled in October 2005. Louisiana did not report any out-of-state Katrina evacuees.

Estimating the Number of Children Who Have Returned

Using the state school enrollment data illustrated in Table 1, it is possible to estimate a “rate of return” among displaced children. As of 2007, there were 1,170,033 enrolled students in the two states, an increase of 69,213 students over the October 2005 enrollment data. The rate of return may be calculated as the number who returned divided by the number who were displaced. As shown in Table 1, this ranges from 54.1% in Louisiana to 79.4% in Mississippi. Across both states, the rate of return among school enrollees was 55.3%.

This return rate may overestimate the total number of children who have returned to their home states, since it does not account for the natural growth of the student population. In order to corroborate the school enrollment rate of return, we used trailer depopulation data from FEMA in order to estimate the numbers who have left the trailers and returned to the community (although it is unknown what the destination is for those households who have left the trailers). According to FEMA, there were a total of 127,726 travel trailers and mobile homes provided to households in both Louisiana and Mississippi. This included trailers that were in FEMA-built trailer parks, in commercial trailer parks, in industrial settings, and trailers that were sited on private property, such as a householder's front yard or driveway. As of September 29, 2007, there were 61,560 active trailers and mobile homes. This suggests that 66,166 trailers have been vacated, which when divided by the total of 127,726 units represents a 51.8% rate of return. Given that there is a lag between a trailer being vacated and FEMA accounting for it, this rate of return is likely an underestimate of the returned population. Furthermore, the trailer population represents only a segment of all those displaced, and does not include households that were living in private or publicly-subsidized apartments or homes, or who were doubled-up with others.

Given the imprecision in these rates of return, we have elected to use them as the low and high estimates of a range. As shown in Table 1, using the census data ***we have estimated a range of 81,595 to 94,650 children who have returned to their home community or home state.***

Children Living in FEMA-subsidized Trailer Parks

As noted earlier, another significant population is represented by those households still residing in FEMA-subsidized trailer parks. According to data from the FEMA Gulf Coast Recovery Office, the rate of depopulation of these trailer parks has been accelerating since the summer of 2007. In the early months of the summer an average of 70 trailers per week were being vacated. By the beginning of the fall the number had increased to an average of 182 trailers per week. FEMA has also indicated its interest in closing all FEMA-built trailer park sites by the end of May 2008 and ending all commercial leases by

December 2008. As of September 29, 2007, FEMA was reporting that 13,039 trailers were still populated in group settings in the two states.

Table 2. Estimates of Children Living in Group Trailers

		Louisiana		Mississippi		TOTAL
		FEMA sites	Commercial	FEMA sites	Commercial	
A	Number of current trailers ^a	4,376	5,336	1,393	1,934	13,039
B	Proportion of households with children ^b	.287	.513	.487	.436	
C	Average number of children per household ^b	1.69	2.07	1.97	2.49	
D	Total number of children [A * B * C]	2,122	5,666	1,336	2,100	
		7,788		3,436		11,224

^a FEMA Gulf Coast Recovery Office, FEMA Gulf Coast Direct Housing Site and Unit Overview, data as of 29 Sep 2007, report date October 3, 2007, No. 10.0.

^b Child and Family Health Study, Operation Assist, baseline data collected February 2006 (LA), August 2006 (MS), and follow-up in April-July 2007. Multi-stage, random cluster sample of households displaced by Hurricane Katrina.

Using data collected by the authors as part of the longitudinal Gulf Coast Child & Family Health Study, a random sample of 1,247 displaced and heavily impacted households in Louisiana and Mississippi, we have estimated the number of children still residing in trailers based upon the proportion of trailers with children, and the average numbers of children per household, as illustrated in Table 2. Because household composition and other socio-demographic family characteristics may differ by type of trailer park and by state, we have stratified these estimates by FEMA-built versus commercial trailer sites within each state. Based on these estimates, **there are approximately 11,224 children still residing in trailer park settings**. This is likely an overestimate given the rate of depopulation, and should be regarded as an upper bound.

Estimating Risk

The short-term impact of major disasters or traumas on children has been well documented in the academic literature. Norris and her colleagues, in their comprehensive review of over 160 studies of disaster survivors, describe a variety of poor outcomes experienced by children and teens: younger children tend to exhibit increased clinginess, dependence, sleeping problems, aggressive behavior and other symptoms of mental health distress, whereas adolescents tend toward minor deviancy and delinquency⁵. A number of studies have sought to identify those social and familial factors that put children particularly at risk after a disaster. These factors include displacement and homelessness, persistent uncertainty, parental depression and psychopathology, and living in

⁵ Norris FH, Friedman MJ, Watson PJ, Byrne CM, Diaz E, Kaniasty K. 60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981-2001. *Psychiatry*. Fall 2002;65(3):207-239

families with “inadequate cohesion,” among others⁶. Of course, not every child who has been exposed to a major disaster suffers dire consequences. Child development specialists have long asserted that a child's well-being and social development are dependent upon the interaction of many positive forces, such as a safe and nurturing environment, positive role models, a strong functioning family, and the child's own physical health status and psychological predisposition. These factors in a child's life can buffer the child from a variety of stressful life events and help them adapt to the most disruptive shocks⁷.

The focus on short-term outcomes, even those that may arise within a year or two after a major disaster, may obscure much longer-lasting effects. The systems and structures that provide stability to children – such as family, school, and primary medical and mental health care -- often serve as gateways for a child's future development. Poor academic performance is associated with limited economic opportunities and predicts many high-risk behaviors such as drug use, criminal activity, and unsafe sexual behaviors. Comprehensive pediatric medical care has long-term benefits associated with adequate childhood immunization, better nutritional habits, and a lower burden of long-term chronic disease. Mental health distress and disability among children, particularly if untreated or incompletely treated, may lead to increased risk of suicide and various forms of social maladjustment as adults.

The children and families of Louisiana and Mississippi were exposed – and many continue to be exposed – to a number of the factors thought to predict poor outcomes. In order to estimate how many among the children who were “exposed” to Katrina's massive displacement may be at risk for long-term poor outcomes, we have used data from the Child & Family Health Study to estimate the prevalence of three risk factors in particular among children who were displaced by Katrina⁸. The three risk factors are illustrated in Table 3. The first is an education risk, in which parents are asked to rate their child's academic performance on a 10-point scale (0 being the lowest and 10 the highest), contrasting their child's performance before and after the hurricane. We have nominally selected a 3-point drop in a parent's rating, a 30% decline, as representative of a significant educational risk.

The second factor examines whether a child has either lost a “medical home,” that is comprehensive primary medical care, or has lost medical insurance since the hurricane. This is considered to signify a health access risk.

⁶ See, for example, Bronfenbrenner U, Ceci SJ. Nature-nurture reconceptualized in developmental perspective: a bioecological model. *Psychol Rev.* Oct 1994;101(4):568-586; and Dubow EF, Tisak J. The relation between stressful life events and adjustment in elementary school children: the role of social support and social problem-solving skills. *Child Dev.* Dec 1989;60(6):1412-1423

⁷ Masten AS. Ordinary magic. Resilience processes in development. *Am Psychol.* Mar 2001;56(3):227-238.

⁸ Baseline data reports available at www.ncdp.mailman.edu/research.htm

The last factor represents a mental health risk. In this, parents and caregivers reported that their child has experienced clinically-diagnosed depression, anxiety, or a behavior disorder since the hurricane.

Table 3. Estimates of Childhood Risk

	Louisiana	Mississippi	TOTAL
Children “at-risk”^a			
Educational risk: <i>Proportion with 3-point or greater drop in parent-reported academic achievement (0-10 scale)</i>	25.4%	6.7%	17.9%
Health access risk: <i>Proportion who either lost a medical home or who lost insurance since the hurricane</i>	25.3%	31.8%	28.4%
Mental health risk: <i>Proportion with clinically-diagnosed depression, anxiety, or behavior disorder since hurricane</i>	37.1%	25.4%	31.5%
Proportion with ANY of above three risks	55.4%	47.1%	51.4%
<i>Among households with <\$10,000 annual income</i>	52.1%	46.7%	49.8%
<i>Among households with >\$35,000 annual income</i>	34.6%	44.1%	39.9%

^a Data represent interviews conducted between April – June 2007 with a weighted sample of 1,247 displaced and heavily impacted households in Louisiana and Mississippi. Child and Family Health Study, Operation Assist

In each of these risk factors, we have sought to identify a characteristic that has emerged *since* the hurricane. Many of the children who were displaced by Katrina exhibited one or more of these risk factors prior to the hurricane – diminished educational achievement, no access to health care, or a pre-existing mental health condition. Even in the absence of the disaster they were at great risk for poor long-term outcomes. While all these children deserve our attention, we were particularly interested in enumerating those children placed at greater risk because of the disaster.

The prevalence of these three risk factors differs by state. In Louisiana, the number one risk factor reported by parents and caregivers is the mental health risk, at 37.1%, whereas in Mississippi the most prevalent risk is loss of medical home or insurance, 31.8%. Louisiana parents were far more likely to report a drop in educational achievement, 25.4%, than were their Mississippi counterparts, 6.7%. Nevertheless, ***the overall proportion of children with at least one of the three risk factors is not altogether different between the two states – 55.4% among Louisiana children and 47.1% among Mississippi children.*** Furthermore, in Louisiana the presence of these risk factors varies greatly by income. Those with less than annual household incomes of \$10,000 were far more likely to report a risk than were households with incomes above \$35,000. In Mississippi, the rates were quite similar for the different household income levels.

Among children who exhibit these risks, most have only one. Table 4 reveals that very few children have all three risks (1.1% in Louisiana and fewer than 1%

in Mississippi). A small number have two risks, and again this differs by state, with Louisiana parents twice as likely as Mississippi parents to report two or more risk factors affecting their children.

Table 4. Magnitude of Risk

	Louisiana	Mississippi	TOTAL
Number of risk factors ^a			
0	44.6%	53.0%	48.6%
1	34.8%	37.9%	36.3%
2	19.5%	8.9%	14.4%
3	1.1%	.1%	0.7%

^a Child and Family Health Study, Operation Assist

Applying the Risk Calculation to Estimate the Number of At-Risk Children

To estimate the number of children at risk for poor long-term outcomes due to the hurricane, we have applied the risk estimates observed in the Child & Family Health Study to the population estimates of the numbers of children who were displaced. In order to refine the estimates, we have separated the population and risk factors by state and by whether the children are likely to have returned or are still living in trailer parks. Table 5 illustrates our calculations. The lower bound of the range is calculated as the low end of the risk estimate multiplied by the low end of the population estimate; the higher bound is done likewise with the two high end estimates. The state and combined totals are the sum of the lower-end and higher-end estimates. In Louisiana, we estimate that there are between 39,650 and 53,325 children at risk for poor outcomes because of their exposure to the consequences of Katrina, and in Mississippi we estimate between 6,931 and 11,609 children. ***The combined range of children estimated at risk is 46,582 to 64,934.***

Table 5. Estimates of Children at Risk among those Initially Displaced

	Louisiana		Mississippi		TOTAL
	Living in Community	Living in Trailer	Living in Community	Living in Trailer	
A Mean % at high risk (95% CI) ^a	54.9 – 65.8	42.0 – 55.0	34.9 – 47.8	46.0 – 58.0	
B Population ^b	66,266 – 74,532	7,788	15,329 – 20,118	3,436	
C Estimated range of # at risk [A * B]	36,380 – 49,042	3,270 – 4,283	5,350 – 9,616	1,581 – 1,993	
D Total (range)	39,651 – 53,325		6,931 – 11,609		46,582 to 64,934

^a Child and Family Health Study, Operation Assist.

^b Estimated # displaced children who returned calculated in Table 1

These numbers are not absolute counts of children. Rather, they represent an educated estimate as to the numbers of children who presently have at least one

risk factor that may predispose them to a poor outcome in the future. There are likely many more children in the two states at risk for poor outcomes, particularly since Louisiana and Mississippi rank 49th and 50th in the US for the proportion of children living below the federal poverty line. According to 2006 census data, there are 467,923 children 18 or under living in poverty in the two states. Fundamentally, all of these children may be regarded as “at-risk” as well.

Risk is a fluid concept. A child at risk one day may, because of changed circumstances, not be at risk another day. Similarly, the numbers of children estimated to be at risk will vary based on the measures used to predict risk. Nevertheless, the estimates presented in this report represent a magnitude of risk among the children whose lives were so disrupted by Hurricane Katrina, particularly for those risks that have emerged **as a consequence** of the hurricane and the subsequent displacement.

In summary

1. *How many children were displaced as a result of Hurricanes Katrina and Rita?*

Approximately 163,105 children were displaced.

2. *Among those who were displaced, how many children have since returned to their home state or home communities?*

Between 81,595 – 94,650 children have returned.

3. *Among those who were displaced, how many children are still living in temporary or transient FEMA-subsidized group housing?*

Approximately 11,224 children were living in FEMA group housing as of September 28, 2007.

4. *How many of these displaced children, whether they have returned or are living in temporary housing, are at-risk for poor outcomes?*

Between 46,582 and 64,934 children are estimated to have been displaced by Hurricane Katrina and are presently experiencing a risk factor that puts them at risk for long-term poor outcomes.