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Extended Abstract

Assessing the Serious Mental Illness of Katrina Affected Parishes in Louisiana: Results from the K6 scale  
as applied in the 2006 Louisiana Health and Population Survey

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### **Introduction**

The Hurricanes of 2005 in the Gulf Coast of the United States caused significant and extensive damage to property, displaced thousand of residents and altered the demographics of the region. Traumatic events such as these result in elevated levels of mental illness<sup>1,2</sup>. In Louisiana alone, estimates suggest that some 645,000 people were permanently or temporarily displaced by hurricane-related flooding<sup>3</sup>. Mass migration due to the storms dramatically changed the demographics of southern Louisiana and invalidated traditional data sources such as the decennial census upon which planners and policy-makers routinely rely. To fill this data gap, the Louisiana Recovery Authority (LRA) and the Louisiana Department of Health and Hospitals (DHH) convened a group of federal, state and local partners to develop and implement a household population survey with the intent to produce fast, reliable estimates on household demographics, health, economic, education, and migration indicators for 18 hurricane affected parishes. The CDC and Census Bureau provided technical assistance and oversight to the Louisiana Public Health Institute (LPHI) which managed the survey on behalf of the LRA and DHH.

One of the health characteristics measured during the 2006 Louisiana Health and Population Survey was the K6 scale of non-specific psychological distress<sup>4</sup>. This scale was used on the survey because Louisiana officials (DHH, LRA) requested that estimates gathered from the survey could be compared to readily available state, regional, or national norms. Upon review of the serious mental illness (psychological stress) literature, study designers found that the methodology and validation of the K6 scale was extensively reported and most appropriate to fill the data needs for post-Katrina Louisiana recovery<sup>5</sup>. Reports with descriptive statistics including results of the K6 scale were released in October 2006, however closer analysis was required, since the K6 scale was administered to only the head of household for each housing unit.

### **Methods**

The 2006 Louisiana Health and Population Survey used a cluster sampling design developed by the US Census Bureau and a survey instrument and interviewing techniques developed by the US Centers for Disease Control and Prevention. Surveys were conducted between June and December of 2006 and parish results were released between October 2006 and August 2007.

For the six hurricane-affected parishes included in this analysis (Orleans, Jefferson, St Bernard, Plaquemines, Cameron and Calcasieu), a total of 1,633 successful K6 scale responses were collected from the head of household (HH) only. Scores in the range of 13-24 are classified as probable serious mental illness (SMI)<sup>1</sup>, those in the range 8-12 as probable mild-moderate mental illness and those in the range 0-7 as probable non-cases. Previous validation of this method however has only been conducted on scores in the 13-24 range to determine SMI prevalence at a population level<sup>6</sup>.

In order to generalize the results of the K6 scale from the HH interviews to the rest of the population over the age of eighteen, differences between the HHs and the remainder of the people in the household were

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<sup>i</sup> The definition of SMI according to Kessler et al (2002) requires a 12-month DSM-IV disorder with a GAF score <60 for the worst month in that 12 month period.

accounted for using post-stratification weighting. Since age and gender data were collected for the entire household, frequencies for these two variables were calculated for three different weighting class levels: the first person (HH), the first five people and the entire household (roster), all of which produced similar results.

After weighting the HH data to represent the first five household members, analyses on the outcome of interest, serious mental illness (SMI) vs. no SMI, were conducted and extrapolated or generalized to the first five household members. Bivariate analyses were evaluated for significance at the  $\alpha=.05$  level, but variables with a p-value of .10 or less were later considered for multivariable models predicting SMI. SMI is indicated by a K6 scale score of greater than or equal to thirteen.

## Results

Table 1. Estimated prevalence of mental condition by Geographic Area.

Mental condition	Orleans <i>n=461</i>	Jefferson <i>n=255</i>	Plaquemines <i>n=237</i>	St. Bernard <i>n=136</i>	Region 1* <i>n=1089</i>	Cameron <i>n=290</i>	Calcasieu <i>n=254</i>	Pre-Storm Gulf Coast <sup>7</sup>	United States <sup>8</sup>
SMI (13+)	18.76	6.34	9.51	19.11	10.39	16.71	7.22	6.1	6.2
Mild to moderate (8-12)	10.76	18.57	14.61	27.21	16.84	18.73	18.84	9.7	Not available
None (0-7)	70.47	75.10	75.88	53.68	72.78	64.59	73.94	Not available	Not available

\*Parishes that comprise Louisiana Department of Health and Hospital Region 1 include Orleans, Jefferson, Plaquemines and Saint Bernard

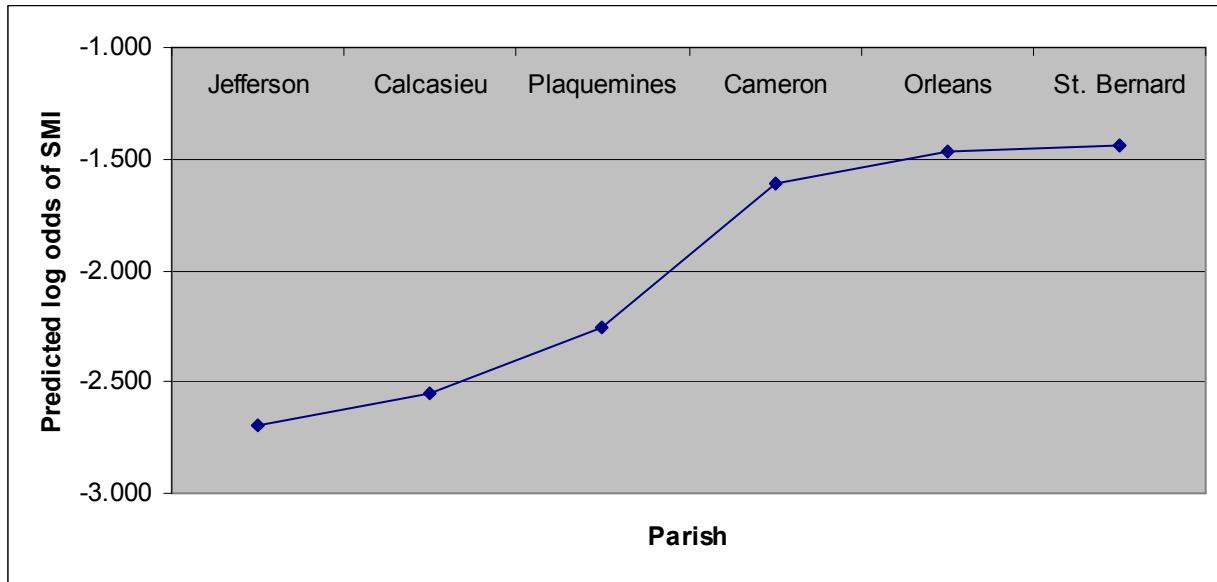
Table 2. Estimated distribution of SMI by Parish.

<i>n=1633</i>	SMI K6 scale $\geq 13$
<b>Parish</b>	
Jefferson	33.08
Calcasieu	15.54
Plaquemines	2.17
Cameron	1.57
Orleans	39.70
St. Bernard	7.94

When looking at the prevalence of SMI across hurricane-affected parishes, St. Bernard and Orleans parish have the highest prevalence SMI (Table 1) and all parishes have higher levels of SMI than pre-storm Gulf Coast region estimates. Jefferson and Orleans parishes, however, have the greatest burden of SMI across the affected geographic area (Table 2) due to larger population size (Jefferson) and prevalence (Orleans).

There is a significant difference in the likelihood of SMI between the parishes. The log odds were computed with the lowest prevalence parish (Jefferson) as the reference category. People from Cameron, Orleans and Saint Bernard parishes were about 3 times more likely to have SMI than those from Jefferson parish. Figure 1 shows the likelihood or predicted log odds of SMI increasing from left to right, with Jefferson being the lowest and St. Bernard the highest.

Figure 1. Predicted log odds of SMI by parish.



**Predictors of SMI**

Associations between several SES variables and SMI were conducted. Although gender, race, educational attainment and single person household status in Table 3 were not significant at the alpha=.05 level, it is noted that race has a p-value of about .08, which warrants further investigation. In addition, age was significantly associated with SMI. Both Rao-Scott and Wald chi-square statistics were significant, with respective p-values of .0002 and .0003.

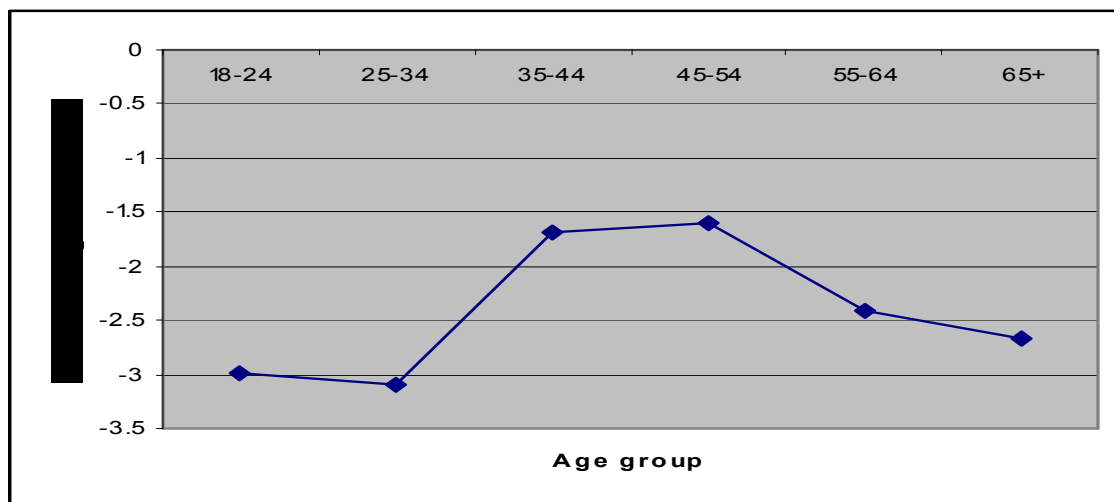
Table 3. Weighted estimated percentage of SMI by sex, age, race, educational attainment and single person household.

	SMI	No SMI	Rao-Scott chi-square	d.f.	p-value	Decision
<b>Gender</b>	n=1614		2.12	1	.1458	Not significant
Males	41.59	52.25				
Females	58.41	47.75				
<b>Race</b>	n=1592		6.79	3	.0789	Not significant
White	56.92	68.05				
Black	41.04	28.88				
Asian	.90	1.72				
Other	1.13	1.35				
<b>Age</b>	n=1631		24.21	5	.0002	Significant
18-24	5.31	11.50				
25-34	10.90	26.68				
35-44	39.62	23.36				
45-54	26.61	14.50				
55-64	8.84	10.66				
65+	8.73	13.70				
			Wald chi-square=23.64, 5 d.f., p-value=.0003			
			<u>Odds ratios</u>			
			45-54 vs. 25-34, 4.42			
			45-54 vs. 18-24, 3.98			
			45-54 vs. 55-64, 2.21			
			45-54 vs. 65+, 2.88			
<b>Educational level</b>	n=1633		4.38	5	.4958	Not significant
No school	1.18	4.17				
<High school	30.70	29.08				
HS or GED	30.94	23.36				

Some college or Associates degree	16.43	18.14				
Bachelor's degree	14.50	14.21				
Some or completed graduate school	6.25	11.03				
<b>Single-person household</b>	<i>n=1633</i>		.38	1	.5379	Not significant
Yes	76.86	80.37				
No	23.14	19.63				
<b>Employment status</b>	<i>n=1595</i>		9.47	2	.0088	Significant
Employed	42.18	61.90				
Unemployed	25.58	12.18				
Not in labor force	32.24	25.93				

In terms of age, the lowest predicted log odds or likelihood of SMI were found in people from age 18 to 34 (age groups '18-24' and '25-34'), with the highest odds of SMI in people from 35-54 (age groups '35-44' and '45-54') years of age. People 55 and over (age groups '55-64' and '65+') had odds of SMI in between the above-mentioned age groups. Figure 2 shows the relative predicted log odds of SMI for the six age groups.

Figure 2. Predicted log odds of SMI by age.



In addition, there was an important association between employment status and SMI as shown in Table 4. People "Not in the labor force" are categorized, according the U.S. Census Bureau definition, which includes individuals who stated that they were retired, students or unable to work. People that were unemployed were about 3 times more likely to have SMI than those that were employed.

Table 4. Odds ratios predicting SMI for employment status.

Employment Status	Predicted log odds	Odds ratios (reference=employed)	Wald chi-square	
Employed	-2.61			
Not in labor force	-2.00	1.83	3.24	Sig p=.0718

Unemployed	-1.48	3.08	8.52	Sig p<.0035
Global test: Wald chi-square=9.41, 2 d.f., .0091				

The results shown above indicate that SMI is a common occurrence exacerbated by post-disaster conditions and may not discriminate by race, education and other demographic variables, except age and employment status.

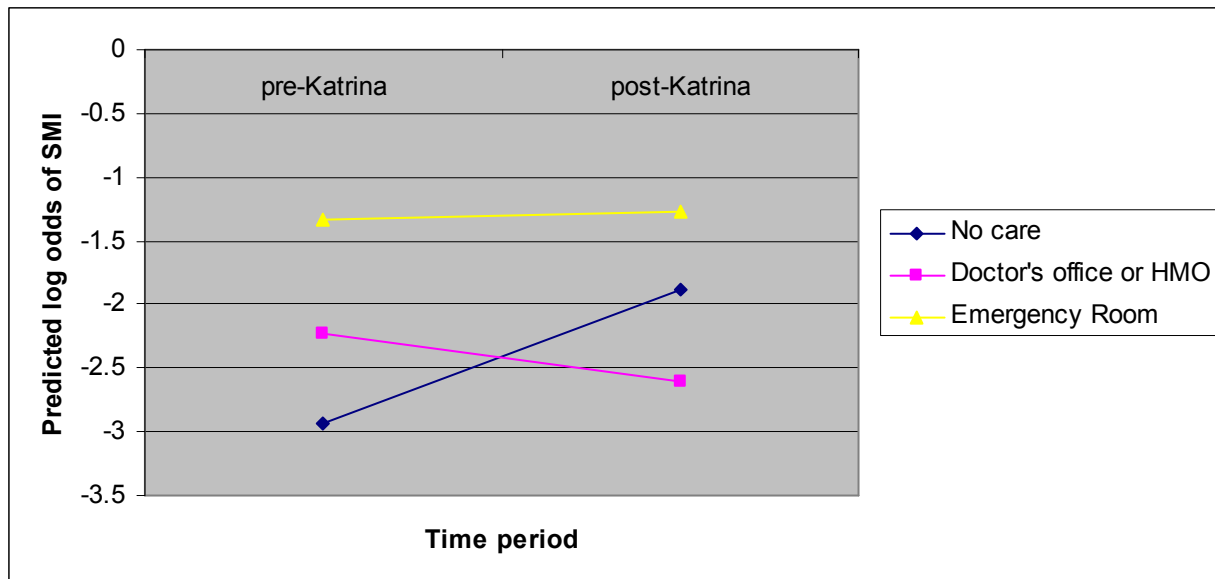
Within the population of those with SMI there are general access to care issues post hurricane. A logistic regression model was run to determine if there was a statistically significant change in the place that a person received healthcare services from the time period before the hurricanes to the post-hurricane time period for subjects with SMI.

People with SMI were less likely to go to a doctor’s office or HMO after the storm as compared to before the storm, but had no significant increase in likelihood of going to the emergency room (Table 5 and figure 3). In fact as shown in table 5, people with SMI were nearly 3 times more likely to not get care after the storm

Table 5. Odds ratios comparing pre and post Hurricane time periods for people with SMI, by place of care category. *n*=364

Place of care	Odds ratio post-Katrina vs. pre-Katrina
No care	2.88
Doctor’s office or HMO	.69
Emergency room	1.06

Figure 3. Predicted log odds of SMI.



### Limitations

The 2006 Louisiana Health and Population Survey was conducted early in the recovery effort so it is quite possible that population characteristics and consequently the prevalence of SMI have changed as

repopulation and rebuilding of previously flooded and devastated areas continues. In addition, unlike other traumatic disaster events such as 9/11, the 2005 Hurricanes Katrina and Rita did not play out in one single event, but were a series of crisis events some of which are still not resolved two years after the storm. There is a whole segment of the population that has returned to previously devastated areas subsequent to the 2006 Louisiana Health and Population Survey. It would be interesting to conduct an analysis of the K6 scale again two years after the fact to see if high prevalence levels of SMI remain.

### **Programmatic Implications**

The results of the re-weighting and analysis of the 2006 Louisiana Health and Population Survey K6 scale indicate that the prevalence of SMI was higher in all the affected parishes at the time of the survey than it was in the Gulf-coast pre-storm and compared to the national average. Elevated levels are commonly found in populations that have recently been affected by traumatic events such as a large scale natural disasters, affecting all segments of the population regardless of gender, race (though it was borderline) and education. Age, parish and employment status have the most significant associations which might indicate that the geographic area and the level of destruction in that geographic area, as well as the ability to cope economically i.e. employment status play into one's risk of SMI. Increased prevalence of SMI as well as findings that those with SMI are less likely to access care at all post storm speak to access to care issues. One potential solution being piloted in hurricane affected Louisiana is the medical home concept which includes the integration of primary care and behavioral health in a neighborhood level clinic- a one-stop shop. In addition, networks such as the Behavioral Health Action Network started post-storm in 2006 and facilitated by the Louisiana Public Health Institute are important vehicles of coordination for a unified response to the continuing behavioral health crisis in hurricane-affected areas.

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<sup>1</sup> Canino G, Bravo M, Rubio-Stipec M, Woodbury M. The impact of disaster on mental health: Prospective and retrospective analyses. *International Journal of Mental Health*. 1990;19:51-69.

<sup>2</sup> Madakasira S, O'Brien KF. Acute posttraumatic stress disorder in victims of a natural disaster. *Journal of Nervous and Mental Disease*. 1987;175:286-290.

<sup>3</sup> Gabe, T., et al., *Hurricane Katrina: Social-demographic characteristics of Impacted areas*, in *CRS Report for Congress*. 2005, Congressional Research Services: Washington, D.C. p. 1-29.

<sup>4</sup> Kessler, RC, Andrews G, Colpe LJ, Mroczek DK, Mornam S-LT, Walters EE, Zaslavsky A. Short screening scales to monitor population prevalences and trends in nonspecific psychological distress. *Psychological Medicine*. 2002; 32:950-976.

<sup>5</sup> Kessler, R.C., Barker, P.R., Colpe, L.J., Epstein, J.F., Gfroerer, J.C., Hiripi, E., Howes, M.J., Normand, S-L.T., Manderscheid, R.W., Walters, E.E., Zaslavsky, A.M. 2003. Screening for serious mental illness in the general population *Archives of General Psychiatry*. 60(2), 184-189.

<sup>6</sup> 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.

<sup>7</sup> Kessler, R.C., Galea, S, Jones, R.T., & Parker, H.A. (2006). *Mental Illness and Suicidality After Hurricane Katrina*. Bulletin of the World Health Organization (in press).

<sup>8</sup> Kessler, R.C., P.A. Berglund, S. Zhao, P.J. Keaf, A.C. Kouzis, M.L. Bruce, R.M. Friedman, R.C. Grosser, C. Kennedy, T.G. Kuehnel, E.M. Laska. R.W. Manderscheid, W.E. Narrow, R.A. Rosenheck, T.W. Santoni and M. Schneier. 1996. "The 12-month Prevalence and Correlates of Serious Mental Illness (SMI)." In *Mental Health, United States*, edited by R.W. Manderscheid and M.A. Sonnenschein, pp. 59-70. Washington DC: US Government Printing Office.