

Overview of Baseline Survey Results: Hurricane Katrina Community Advisory Group

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EXECUTIVE SUMMARY

Overview

Hurricane Katrina was the deadliest US hurricane in seven decades and the most expensive natural disaster in US history. Over 500,000 people were evacuated. Nearly 90,000 square miles were declared a disaster area (roughly equal to the land mass of the United Kingdom) (U. S. House of Representatives 2006). More than 1,600 confirmed deaths occurred and over 1,000 others remain missing (Louisiana Department of Health and Hospitals). The destruction caused by Katrina has lingered to this day, much longer than in previous hurricanes (Claritas 2006).

Extensive literature documents adverse mental health effects of natural disasters (Smith et al. 1990; Galea et al. 2002). Although these effects vary greatly, the effects of catastrophic disasters are consistently large (Gleser et al. 1981; Goenjian et al. 2001). For example, studies after Hurricane Andrew found that 25-50% of respondents reported disaster-related mental disorders (David et al. 1996; Norris et al. 1999). Based on these results, and given the extraordinary array of stressors that occurred in conjunction with Hurricane Katrina (e.g., bereavement, exposure to the dead and dying, personal threat to life, massive destruction) (Nandi et al. 2004; Norris et al. 2004), we would expect the mental health effects of Katrina to be at the upper end of the range of occurrence found after previous disasters.

Due to the wide geographic dispersion of the displaced population, comprehensive mental health assessment of Katrina survivors is nonexistent. The Louisiana Department of Public Health documented substantial psychopathology among the 50,000 Katrina survivors treated in evacuation centers (ECs) shortly after the hurricane (Centers for Disease Control and Prevention 2006b), but these individuals represented fewer than 1% of survivors. Seven weeks after the hurricane, the Centers for Disease Control and Prevention (CDC) carried out a

household needs assessment survey that found that half of adults still living in New Orleans had clinically significant psychological distress (Centers for Disease Control and Prevention 2006a). Unfortunately, the CDC did not assess the much larger number of pre-hurricane residents who no longer lived in New Orleans. Two public opinion polls, one conducted jointly by Gallup, CNN, and USA Today in a sample of people who sought American Red Cross (ARC) assistance (Page 2005), and the other conducted by the New York Times in a sample from the ARC  list (Dewan et al. 2006), asked several questions about mental health, but did not attempt to assess the clinical significance of reported symptoms. A probability survey of families with children still residing in FEMA-sponsored trailers or hotel rooms in Louisiana as of mid-February, 2006 found that 44% of adult caregivers had clinically significant psychological distress (Abramson and Garfield 2006). As with the earlier CDC EC survey, however, the sampling frame represented less than 1% of pre-hurricane residents of the affected areas.

The above surveys were not designed to be comprehensive. More comprehensive data are needed, though, as a foundation for public health decision-making. The National Institute of Mental Health launched an ongoing tracking study for this purpose designed to assess the mental health consequences of the hurricane in the entire population of people affected by Hurricane Katrina. The first phase of the study aimed to enroll and carry out a baseline mental health needs assessment with a representative sample of 1000 adult (ages 18+) pre-hurricane residents of the FEMA-defined Hurricane Katrina impact areas in Alabama, Louisiana, and Mississippi (U. S. Department of Homeland Security 2005a; U. S. Department of Homeland Security 2005c; U. S. Department of Homeland Security 2005b). Subsequent phases of the study will track this sample over time to monitor the pace and success of recovery efforts. The current report presents results of that baseline survey. It should be noted that the focus of the baseline survey was on adults.

Subsequent phases of the study will monitor evolving needs in follow-up surveys as well as carry out assessments of the children living in CAG households.

Sample design

We decided to assemble the equivalent of what market researchers refer to as a “consumer panel” for purposes of monitoring the tracking. A consumer panel is a representative sample of people selected from the population of interest, in this case survivors of Hurricane Katrina, who agreed to participate in a series of ongoing tracking surveys for purposes of monitoring trends in the needs of the population and the success of recovery efforts. A total of 1043 people agreed to join this consumer panel and to participate in periodic surveys over a period of several years to help us monitor the pace of the hurricane recovery efforts. The panel was named the Hurricane Katrina Community Advisory Group (CAG) to emphasize the fact that we considered the respondents advisors to us about the needs of the population and the success of recovery efforts. Details on the sample design are presented in Appendix I. It is important to point out here, though, that our intent was to make the sample as representative as possible of all people who resided in the areas affected by the hurricane prior to the time of the hurricane. The survey data were weighted on a broad range of Census social and demographic variables in an effort to approximate this goal as much as possible.

The areas of pre-hurricane residence eligible for the survey included the counties in Alabama, Louisiana, and Mississippi that were in the direct path of the hurricane and were defined by FEMA as eligible for direct hurricane assistance as well as the New Orleans Metropolitan Area. The New Orleans Metropolitan Area includes seven parishes. Only one of these seven (Orleans parish) is coextensive with the city of New Orleans. When we refer to the term “New Orleans Metropolitan Area” in this report, we typically mean all seven of these

parishes, although in some cases we explicitly distinguish the City of New Orleans from the remainder of the New Orleans Metropolitan Area.

Measures

The focus of this initial report is on the baseline CAG survey, administered between January 19 and March 31, 2006 to all 1043 members of the CAG. A complete copy of the baseline survey questions is included in Appendix II. We focus on seven sections of the survey in the current report. First, we present data on the evacuation itself. Many citizens in the area affected by the hurricane did not heed official warnings about evacuation. To investigate this issue, we asked respondents to think back to the time when they first heard that the hurricane was coming and to recall their decision-making processes concerning evacuation.

The second section of the report concerns stressful experiences after the evacuation. We asked questions about the experiences of CAG members in an effort to paint a representative portrait of the kinds of stressors to which the typical hurricane survivor was exposed. The mass media have focused attention on extreme cases, such as people who lived in shelters, but these represent only a small fraction of the more than four million adults who were affected by the hurricane. Much less is known about the more typical experiences of people in the entire population.

The third section of the report moves beyond traumatic stressors in the hurricane and its aftermath to focus on more conventional practical problems that survivors continue to experience as they try to rebuild their lives. In addition to acute traumatic life-threatening stressors, natural disasters produce chronic adverse circumstances that may have significant mental health consequences. We also asked about proposed solutions that the people of the region would like the government and relief agencies to implement. In the fourth section,

information is reported on respondent ratings of the help they have received so far from a wide variety of helper agencies and organizations. Perceptions of helpfulness vary greatly across these different kinds of organizations.

In the fifth section we focus on residential mobility plans of hurricane survivors. As the data demonstrate, the great majority of displaced people who are living far from their pre-hurricane homes see their current living situation as temporary but express considerable uncertainty regarding where and when they will resettle permanently. More surprisingly, we find that a relatively high proportion of people who are living in their pre-hurricane homes are seriously considering the possibility of relocating to another area. In the last two sections of the report, we focus on negative emotional reactions to the hurricane (the sixth section) and on common positive reactions (the seventh section). We discovered both that many people developed clinically significant mental illness in the wake of the hurricane and that there is an extraordinary amount of internal strength – even among people with mental illness – that fosters optimism about the future and a common resolve to rebuild and get on with life.

We also present data on basic social and demographic characteristics of the sample, primarily to document that the sample is representative of the population based on comparisons with Census data. This information has been relegated to Appendix I, as it is likely to be of most interest to specialists in survey methodology. The data presented there document the representativeness of the sample relative to data from the US Bureau of the Census. Appendix II includes the text of the baseline survey. Appendix III contains all the tables on which the report is based, which are referred to in the body of the text.

In addition to the quantitative data from the baseline survey described in this report, a significant amount of qualitative data about individuals' experiences was collected in the form of

digitally recorded oral histories that are posted on our website at:

www.HurricaneKatrina.med.harvard.edu/oralhistories.php. These rich first-person narratives put flesh onto the bones of the numbers reported here. We encourage readers to visit the web site and listen to featured oral histories. As an aid in selecting from among the hundreds of oral histories that are posted, we have flagged several as especially relevant to themes central to our quantitative analysis. More oral histories will continue to be posted as we follow up on the sample in future waves of survey tracking. Additional oral history information will be sought from respondents in follow-up surveys and will be posted, so that individuals' stories can be followed over time.

Evacuation preparations

Responses to warnings and public health preparedness behaviors are important areas of study for preventive interventions to decrease health risk, injury, distress and psychiatric illness. Nearly 90% of respondents heard about the hurricane more than one day before it hit and the majority at least three days before it hit. (Table A1) The vast majority of respondents also heard the mass media messages about the four key aspects of evacuation preparation: to pack three days of food and water; to get a flashlight, battery-powered radio, and batteries; to ensure that all needed medicines of family members were available; and to develop an evacuation plan. (Table A2) These messages were least likely to be heard by younger people and the non-married. Residents of the New Orleans Metropolitan Area were also much less likely to have heard the messages than were residents of other areas in the path of the hurricane, as the messages were targeted to people in the latter areas. A majority of respondents reported that they heeded these messages and took the precautionary steps advised by officials. (Table A3) The highest percentages of following recommendations were found for making sure all medications needed

by family members were available (88.8%) and the lowest for developing an evacuation plan (67.8%). These preparations were least likely to be made by residents of New Orleans City than respondents in other areas.

Evacuation is one type of disaster behavior. Disaster behaviors are important individual and community protective actions and warrant study to identify facilitators and barriers to such health protective behaviors. Three-fourths of those in the New Orleans Metropolitan Area and nearly one-third of those in Alabama, Louisiana (exclusive of the New Orleans Metropolitan Area), and Mississippi evacuated prior to the time Katrina hit. (Table A4) Evacuation was unrelated to gender, age, race-ethnicity, education, and marital status. Roughly equal numbers of New Orleans Metropolitan Area residents who did not evacuate reported that they did not do so because they did not want to go (35.9-42.2%) and because they were unable to go (38.7-45.5%). (Table A5) By comparison, residents of the other hurricane areas who did not evacuate in advance were more than twice as likely to say they did not want to go (67.3%) as that they were unable to go (24.5%). As one might expect, low-income people were considerably more likely to report being unable to leave (40.2%) than were people with high incomes (6.4%).

We also asked people who did not evacuate why they did not do so. By far the most common reason, reported by the majority who did not evacuate voluntarily (62.0%), is that they did not think the storm would be that bad. (Table A6) The next most common reason was that the respondent wanted to stay with family or friends (18.5%). We did not probe this response in enough detail to determine whether the family or friends decided not to evacuate because they felt that the storm was not going to be that bad or if they were unable to evacuate. Both the perception that the danger was not great enough to warrant evacuation and the report that respondents did not evacuate because they wanted to stay with family or friends were unrelated

to sex, age, race-ethnicity, education, marital status, or pre-hurricane income. The only other commonly reported reasons for choosing not to evacuate before the storm were that the respondents wanted to stay to protect their home and that their job required them to stay, each reported by approximately 10% of respondents who voluntarily decided not to evacuate. Respondents who told us that they were unable to evacuate were asked what prevented them from leaving. (Table A7) Over half (57.8%) of those with lower income who did not evacuate reported it was due to their lack of money, compared to only 1.8-5.1% of those with above average income. Lack of money was the most commonly reported reason (34.0%). By far the most common reason for not leaving among high-income respondents who said they were unable to evacuate was that their job required them to stay (52.1%). This was seldom reported as a reason by low-income respondents (6.7%). Only a small proportion of respondents overall (2.4%), but higher proportions in New Orleans City (5.2%) and the rest of the New Orleans Metropolitan Area (17.9%) said that one reason for not evacuating was that they did not want to leave their pets.

Post-evacuation stressful experiences

More than one-third (43.6%) of the people who evacuated stayed at least one night in more than one place and one-fourth (25.3%) in more than two places. (Table A8) Movement across a number of different locations was especially common among high-income people and residents of the New Orleans Metropolitan Area. Nearly all respondents reported experiencing at least one significant stressor during that time, such as the death of a loved one, a major financial loss, extreme physical adversity, and extreme psychological adversity. (Table A9) Although only about 7% of respondents reported experiencing a stressor that would be considered “traumatic” in the technical sense of that term used by mental health professionals (e.g., had to be rescued,

any life-threatening experience, being physically or sexually assaulted), nearly one out of five (18.7%) reported that a traumatic event of this sort (including death) occurred to someone close to them. The vast majority (84.6%) of respondents experienced a significant financial, income, or housing loss. More than one-third of respondents (36.3%) experienced extreme physical adversity and nearly one-fourth (22.8%) experienced extreme psychological adversity. Over one-third of respondents (40.6%) reported that they experienced five or more significant stressors. All of these stressors were more commonly reported by socially disadvantaged people (e.g., poor, minorities, low education). However they were also common among the most advantaged. For example, exposure to five or more stressors was reported by 23.9% of people in the highest quartile of pre-hurricane income compared to 47.6% of those in the lowest quartile of pre-hurricane income.

Current practical problems and proposed solutions

We asked respondents whether their current living situation was better, worse, or about the same as before the hurricane. (Table A10) About one-third (36.4%) said *worse*, half (52.6%) *about the same*, and the remainder (11.1%) said *better*. Pre-hurricane residents of New Orleans City were most likely to report the worst living situations, followed by pre-hurricane residents of the rest of the New Orleans Metropolitan Area, compared to pre-hurricane residents of other areas. We asked the same question about current health – whether it was better, worse, or about the same as before the hurricane. (Table A11) Close to two-thirds (62.1%) of respondents said their health was *about the same* as before the hurricane, while much smaller percentages said *worse* (30.4% of the total sample) or *better* (6.9%). The proportion reporting worse health was higher among those with low (12.7%) than high (3.9%) incomes. Overall, health appears to have

been adversely affected in a major way for fewer than 10% of respondents overall and for somewhat more than 15% in New Orleans City.

We next asked respondents whether their life as a whole was currently better, worse, or about the same as before the hurricane. Overall, about one-fourth (25.5%) said *worse*, while the majority (60.4%) said *about the same* and 13.5% said *better*. (Table A12) Fewer than 10% reported that their life was *a lot* worse than before the hurricane. Importantly for planning and resource distribution, the proportion reporting that their life was a lot worse was highest among pre-hurricane residents of New Orleans City (16.6%), followed by pre-hurricane residents of the remainder of the New Orleans Metropolitan Area (13.4%), and lowest among pre-hurricane residents of other areas (8.5%). Interestingly, respondents with high education and high pre-hurricane incomes were more likely than those with low education and income to report that their life was worse. This might reflect the fact that people who had more resources before the event experienced the greater relative financial losses. Another plausible interpretation is a methodological one: that the most disadvantages low-income people were under-represented in the sample, leading to bias in our estimates of extent of adversity among low-income people. We have no way to adjudicate between the substance and methodological interpretations with the data available to us.

We asked respondents to tell us how satisfied or dissatisfied they were with their life in the year before the hurricane. (Table A13) The majority were either very satisfied (70.8%) or somewhat satisfied (18.7%), although these high percentages might represent optimistically biased recollection in the wake of the hurricane. Low income is the only variable associated with a substantially lower recollected level of high life satisfaction. Respondents were then asked to rate their current life satisfaction using the same scale. The number of respondents who reported

currently being very satisfied was much lower (40.3%) than before the hurricane, while the number reporting being somewhat satisfied was higher (29.1%) than before the hurricane. (Table A14) In order to simplify comparison, we subtracted scores on the pre-hurricane and current satisfaction scales and found that 47.7% reported the same level of current life satisfaction as in the year before the hurricane, 43.1% reported decreased satisfaction, and 9.1% reported increased satisfaction. (Table A15) Decreased satisfaction was more common among pre-hurricane residents of New Orleans City (78.3%) than the rest of the New Orleans Metropolitan Area (61.0%) or the other hurricane areas (36.7%). We asked respondents to tell us their three most serious current practical problems caused by the hurricane. (Financial problems led the list 61.3%). (Table A16) Nearly half of respondents (49.5%) also mentioned housing problems and problems with services (e.g., plumbing, electrical, sewage), whereas only slightly smaller percentages mentioned employment (37.3%) and insurance (34.1%) problems. Employment problems were most common among the young, financial problems most common among people with low pre-hurricane incomes, and most of the problems of all sorts were more commonly mentioned by pre-hurricane residences of the New Orleans Metropolitan Area than residents of other areas affected by the hurricane.

We asked respondents what three practical actions they think the government should take to be most helpful to people like themselves. (Table A17) Four broad classes of actions were mentioned repeatedly: improvements in the processes with which the government agencies interact with the public (43.5%), individual financial assistance (43.5%), preparations for future recurrences (29.0%), and more rapid reconstruction of community infrastructure (26.2%). Concerns about preparation to prevent future recurrences were mentioned significantly more often by pre-hurricane residents of New Orleans City than by other respondents.

Rating the helper agencies and organizations

We asked all respondents to rate each of a number of helper agencies and organizations on how the organizations responded to the hurricane and (in New Orleans) flood using an excellent-to-poor scale. (Table A18-25) The agencies and organization that the highest proportion of respondents rated excellent were the National Guard/Armed forces (32.0%) and the American Red Cross (31.9%). The agencies and organizations that the lowest proportion of respondents rated excellent were the insurance industry (rated excellent by 3.6% of respondents and poor or very poor by 54.8% of respondents), FEMA (rated excellent by 6.4% of respondents and poor or very poor by 47.0% of respondents), and the rest of the federal government (rated excellent by 7.1% of respondents and poor or very poor by 37.1% of respondents). All ratings were lower among pre-hurricane residents of New Orleans City than other areas. High positive ratings of the National Guard and the Red Cross were found in all major social and demographic segments of the sample. The same was true for the negative ratings of FEMA and other parts of the federal government.

Residential mobility plans

Some 71.2% of respondents said they planned to continue to live permanently in the town where they lived at the time of interview. (Table A26) This response was reported most often by people who were living in their pre-hurricane homes (76.3%), less often by those who were living in another home in the same county or parish as their pre-hurricane home (63.9%), and least often by respondents who were living in a different county or parish from the one in which they resided before the hurricane (22.3%). It is striking that nearly one in every four people who are living in their pre-hurricane homes planned not to remain in the town permanently.

Pre-hurricane residents of the New Orleans Metropolitan Area who lived elsewhere at the time of the interview were asked whether they planned to return to New Orleans. (Table A27) Some 15.7% said that they definitely would return, 19.3% said they definitely would not return, and the remainder said that they probably would return (26.6%), were unsure (21.9%), or probably would not return (16.5%). (Table A28) Reconstruction of infrastructure was by far the most frequent issue mentioned in these responses (35.2%). (Table A29) About half the people who envisioned returning felt that they would return within one year and about one-fourth envisioned that they would return in between one and two years.

Post-traumatic stress reactions

As one might imagine, a substantial proportion of respondents reported having emotional problems related to their experiences in the hurricane. Our paper published the same day as this report was posted, which appears in the Bulletin of the World Health Organization, showed that the proportion of CAG respondents who screened positive for a clinically significant anxiety or mood disorder at the time of the survey (5-8 months after the hurricane) was double the number in a comparable survey carried out two years before the hurricane in the same Census Divisions as the areas affected by the hurricane (The Hurricane Katrina Community Advisory Group in press).

We also asked about anxiety reactions associated with traumatic stress reactions and found that many survey respondents reported experiencing such reactions within the month of the interview even though the interviews were carried out between four and seven months after the hurricane. A full one-fourth (25.3%) of survey respondents, for example, reported having nightmares in the past month about their experiences in the hurricane. (Table A30) Upsetting thoughts or memories about the hurricane, flood, or aftermath were reported by 50.5% of all

respondents. (Table A31) More than one-third (37.6%) of all respondents reported being more jumpy or easily startled than usual (Table A32), while more than half (51.8%) reported being more irritable or angry than usual (Table A33).

Importantly, distress symptoms were higher in those who lived in New Orleans, the most affected area. Nightmares were reported by 49.6% of the respondents who were pre-hurricane residents of New Orleans City, 8.0% of them reporting that these nightmares occurred most every night and another 7.1% two to four nights a week. A full one out of every four respondents from New Orleans City reported having these thoughts just about every day. More than half (52.8%) of those living in New Orleans reported being more jumpy or easily startled than usual and 79.4% reported being more irritable or angry than usual.

A question can be raised whether these emotional reactions are indicative of clinically significant mental disorders or are merely normal reactions that one might expect of anyone exposed to experiences as stressful as those associated with Hurricane Katrina. We are still in the midst of carrying out clinical follow-up evaluations of respondents by mental health professionals to address this question. Preliminary results suggest that, as one would expect, a minority of the CAG members who reported these emotional reactions are judged by our clinical interviewers to have significant mental disorders, while the majority is judged to have normal emotional reactions. Specific estimates of the prevalence and correlates of clinically significant post-traumatic stress disorder, though, are not yet available.

Post-traumatic personal growth

At the same time, we found evidence of an enormous amount of inner strength and personal resilience among hurricane survivors in the form of what the literature calls “post-traumatic personal growth”. Post-traumatic personal growth in such areas as increased self-

efficacy (Benight et al. 1999), optimism (Dougall et al. 2001), hope (Cheung et al. 2006), and perceived social support (Norris and Kaniasty 1996) has been found in previous research to occur among a number of people who have been exposed to diverse kinds of trauma. These changes have been found to facilitate psychological adjustment by making sense of trauma or finding some positive aspect of the trauma (Davis et al. 1998; Dougall et al. 2001).

The baseline CAG survey assessed a number of dimensions of post-traumatic growth based on existing inventories (Park et al. 1996; Tedeschi and Calhoun 1996). Strikingly, the vast majority of hurricane survivors reported some type of post-traumatic growth. For example, 88.5% of respondents said that their experiences with the hurricane helped them develop a deeper sense of meaning or purpose in life. (Table A34) Close to half of respondents (46.9% of the total sample and 47.6% of those from New Orleans City) rated this experience as having occurred *a lot*. Three-fourths of all respondents (77.3% and 71.8% of those from New Orleans City) said that their experiences with the hurricane made them more spiritual or religious (40.7% *a lot so*), (Table A35) while 83.8% of all respondents and 85.9% of those from New Orleans City said that the hurricane led them to realize that they had inner strengths that they did not previously know they had. (Table A36) Close to half of respondents (45.0% of all respondents and 41.5% of those from New Orleans City) rated this discovery of inner strength as having happened *a lot*. Discovering *a lot* of inner strength was especially common among Non-Hispanic Blacks (62.4%) and people with low pre-hurricane incomes (57.8%).

Further evidence of this strength in the face of adversity is indicated by the fact that the vast majority of respondents (83.4% of the total sample and 73.8% of those from New Orleans City) reported that they had *a lot* of faith in their own abilities to rebuild their life. (Table A37) This high level of faith in personal strength cut across the full range of social and demographic

variables we studied in our basic analyses. For example, faith in personal abilities was reported by 82.3% of Non-Hispanic Whites and 85.2% of Non-Hispanic Blacks, by 79.5% of people with the lowest pre-hurricane incomes, and by 84.6% of people with the lowest levels of education. It is important to recognize that this perception of strength is not something that was perceived by respondents to be there all along, even before the hurricane, but as something that respondents *discovered* in themselves as part of the process of struggling with the adversities caused by the hurricane. This can be seen clearly in responses to a question we asked respondents about whether they currently feel better able to cope with adversity based on their experiences with the hurricane or if they feel less able to cope than before the hurricane. The vast majority of respondents (89.3% of all respondents and 81.0% of those from New Orleans City) reported that they would be better able to cope with future stresses. (Table A38) More than half of respondents (56.9% of all respondents and 51.3% of those from New Orleans City) said that they would be *a lot* better able to cope. The perception of being a lot better able to cope was found consistently across the full range of the social and demographic variables considered in our analysis, including among people with low education (57.8%) and low pre-hurricane income (59.4%), and was especially pronounced among Non-Hispanic Blacks (65.4%) and Hispanics (73.3%).

Suicidal ideation, plans, and attempts As readers of our recent paper in the Bulletin of the World Health Organization will know (The Hurricane Katrina Community Advisory Group in press), our analyses of the baseline CAG data in comparison to data from an earlier survey suggest that the post-traumatic growth documented in the last section might be protective against suicidal ideation, suicide plans, and suicide attempts among Katrina survivors with clinically significant anxiety and depression. It is noteworthy that the indicators of post-traumatic growth were not strongly related to serious mental illness (SMI) or mild-moderate mental illness (MMI),

which means that a great many Katrina survivors are, understandably, depressed by their losses and anxious about their uncertain future. However, the suicidality often associated with these syndromes in the general population was much lower at the time of the baseline interview among people in the CAG who were able to develop a sense of new purpose and meaning and inner strength in the wake of the hurricane. The causal processes underlying this pattern presumably involve the creation of positive future orientations that provide psychological scaffolding protecting against the suicidality often associated with extreme distress. Although processes of this sort have long been discussed in the psychoanalytic literature (Frankl 1959; Heisel and Flett 2004), the current study is, to our knowledge, the first to provide quantitative evidence regarding such a pattern in an epidemiological sample of a disaster population.

This is an extremely encouraging finding. However, an implicit caution in the results also has to be pointed out: that the low suicidality might be temporary, if the feelings of purpose, meaning, and inner strength reported by so many respondents are linked to an expectation that the practical problems of living created by the hurricane will soon be solved, and if these expectations are not met as time goes on. One could easily imagine that this type of situation could lead the positive cognitions we documented to erode and to be replaced with a sense of hopelessness that, in the presence of the high levels of estimated mental illness found here, could lead to a substantial increase in suicidality. The finding of low suicidality, then, should be considered evidence of a short-term postponement – a window of opportunity for the officials who are leading the recovery efforts -- rather than as a permanent absence of suicidality in this population.

Summary

The results reported here document the enormous adversity experienced by people who lived in the path of Hurricane Katrina as well as by people who lived in New Orleans at the time of the flood caused by Katrina. A substantial minority of respondents continue to have serious practical problems of living, although life satisfaction is surprisingly high in light of this ongoing adversity. As one might expect in light of the many stresses they have experienced, emotional distress was reported by many respondents, with close to one in three estimated to have a clinically significant mental disorder. Yet we also found a great deal of post-traumatic personal growth and psychological resilience, with the vast majority of respondents reporting that they felt better able to cope with adversity as a result of their experience and that they had faith in their abilities to overcome their adversities and to reconstruct their lives. Preparedness behaviors and disaster behaviors were also examined. The preliminary results reported here regarding these and the more in-depth analyses of these behaviors currently underway should be of value to planners in preparing for future disaster response initiatives. Future reports will present the results of the more in-depth analyses of these baseline data that are currently underway as well as the results of future tracking surveys in the sample.

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Appendix I. CAG Sample Design

As noted in the introduction, we decided to assemble a panel sample for repeated survey administration (i.e., each person in the baseline sample is re-interviewed at multiple points in time) rather than to use a trend sample design (in which a new sample is selected for each successive survey and separate people are interviewed at each point in time) because of concerns about the costs of repeatedly recruiting new samples of this highly dispersed population for trend surveys and to improve the efficiency of trend estimates. The panel design is desirable from a scientific perspective because it allows the researcher to follow changes in the lives of individual respondents over time. The panel design is inferior to the trend design, though, in that high respondent burden in the panel design typically leads to increasing non-response bias over time. The ideal design is consequently one that combines elements of the panel and trend designs, sometimes referred to as a “rolling panel design” (Kish 2004). We hope to implement this type of design in future waves of the study, if pending funds are made available, so as to add first interviews with new respondents to introduce a trend component into the design.

The target population for the CAG was English-speaking adults (ages 18+) with pre-hurricane residences in the areas defined by FEMA as affected by Katrina (4,137,000 adult residents in the 2000 Census) in either of two sampling frames: a random-digit dial (RDD) frame that included telephone banks working in the eligible counties-parishes prior to the hurricane; and a frame that included telephone numbers of the roughly 1.4 million families that applied for ARC assistance after Katrina. Pre-hurricane residents of the New Orleans Metropolitan Area were over-sampled in both frames. Many dislocated people were traced in the RDD sample because phone calls were forwarded to new addresses. The ARC sample also included cell phones. The small proportion of evacuees still living in hotels at the time of the survey was represented through a supplemental sample of hotels that housed FEMA-supported evacuees.

Overlap of the two sampling frames was handled in two ways: by confining numbers from the ARC sample to those not in the RDD frame (i.e., cell phones and exchanges outside the hurricane area); and by down-weighting RDD respondents who reported ARC assistance and had additional phone numbers outside the RDD frame. Respondents from the two frames were combined by weighting the participating ARC households to their estimated population proportion based on estimates of the proportion of ARC numbers outside the RDD frame and the proportion of RDD respondents that asked for ARC assistance. Hotel sample respondents were included without a household weight, as they were selected proportionally.

The CAG was recruited in a baseline telephone survey administered between January 19 and March 31, 2006. The survey began with a brief series of screening questions followed by a request for eligible respondents to participate in the CAG, which potential respondents were told would require participation in a series of tracking surveys over a period of several years. Potential members were informed that CAG participation would require completing quarterly tracking interviews over a period of up to two years to monitor the ongoing needs of hurricane survivors. The 1043 respondents who agreed to join the CAG were then administered the baseline CAG telephone interview.

The survey screening response rate was 64.9%. This is lower than in typical household surveys due to problems tracing and contacting eligible respondents in the dispersed population that was displaced by Katrina. The CAG participation rate among screening survey respondents was 41.9%. This is a relatively low participation rate in comparison to the rates found in one-shot surveys, but is actually considerably higher than the rate of participation in typical consumer

panel surveys. It is noteworthy that the amount of subjectively rated stress reported by respondents and the amount of psychological distress reported by respondents in the month before interview (both of which were assessed in the screening interview) were significantly higher among screening survey respondents who declined to join the CAG than those who joined. Furthermore, a number of those who declined to join told interviewers that their experiences during and after Katrina were so painful to recall that they felt psychologically unable to relive those experiences by participating in the CAG interviews.

The sample of 1043 CAG members was weighted to adjust for significant differences between screening survey respondents who declined to participate in the CAG and those who participated in measures of perceived stress, psychological distress, and a range of social and demographic variables. A weight for within-household probability of selection was also used to adjust for the fact that only one random respondent was invited to join the CAG in each sample household. A post-stratification weight was also used to adjust for residual discrepancies between the sample and data from the 2000 Census for the affected areas on a range of social, demographic, and pre-hurricane housing variables. The consolidated weight, finally, was trimmed to increase design efficiency based on evidence that trimming did not significantly affect outcome variable prevalence estimates.

Table 1 presents the distribution of 2000 Population Census data for the pre-hurricane residents of the affected areas in comparison to both unweighted and weighted data for the CAG respondents. The unweighted data under-represent pre-hurricane New Orleans Metropolitan Area residents who are young, unmarried, low-income, not working, and residents of Orleans Parish. The unweighted CAG sample in the remainder of the hurricane area under-represents the young and those who were pre-hurricane residents of Alabama. Even with these different sorts of under-representation, though, we have substantial numbers of respondents in each of the under-represented groups. For example, 26.8% of the New Orleans Metropolitan Area sample is young, while 20.2% live in low-income families. This means that we have enough cases to weight the data to balance for the under-representation of these population segments. As shown in the table, weighting the CAG data substantially reduced the discrepancies between the Census and the sample on these variables. This was, of course, by design, as we weighted the sample to approximate the Census on all the demographic and housing variables included in the 2000 Census Long-Form.

Table 1. Comparison of socio-demographic characteristics of the affected area in the 2000 US Census of the Population with the comparable characteristics of CAG members both before and after weighting

	New Orleans Metropolitan Area			Remainder of area affected by the hurricane		
	Census %	Weighted CAG %	Unweighted CAG %	Census %	Weighted CAG %	Unweighted CAG %
Age						
18-39	41.2	33.7	26.8	42.8	33.3	34.7
40-59	36.7	46.3	48.2	34.5	45.6	43.9
60+	22.1	20.1	25.1	22.7	21.2	21.4
Sex						
Male	46.3	43.7	45.6	46.8	47.6	46.3
Female	53.8	56.4	54.4	53.2	52.4	53.7
Marital status						
Married/cohabitating	50.7	55.9	55.7	55.4	60.7	55.0
Never married	26.2	20.7	18.2	22.6	19.5	18.7
Separated/widowed/divorced	23.1	23.4	26.1	22.0	19.8	26.3
Family income ¹						
Low	28.2	28.2	20.2	33.3	38.5	37.4
Low-average	29.0	25.7	26.8	30.8	26.6	27.6
High-average	30.4	29.2	33.2	27.4	24.6	23.8
High	12.3	16.9	19.9	8.5	10.4	11.1
Pre-hurricane housing						
Mobile home	5.2	4.0	5.1	16.7	16.3	17.2
Detached home	67.5	67.8	71.0	72.6	73.3	71.3
Attached home	27.3	28.2	23.9	10.7	10.5	11.6
Pre-hurricane employment						
Working	57.6	67.2	68.0	55.0	61.3	61.3
Race-ethnicity						
White	60.7	62.1	69.2	67.0	62.5	65.9
Black	32.7	31.1	24.2	30.3	29.6	28.1
Other	6.6	6.8	6.6	2.7	7.9	6.0
Pre-hurricane residence						
N.O. City	33.7	34.1	28.1	35.4		27.0
Rest of N.O. metro	66.3	65.9	71.9	43.5		32.7
Rest of LA				21.2	40.2	40.3
AL*					31.7	
MS*					28.1	

¹Income was defined using the official federal government definition of poverty (<http://www.census.gov/hhes/poverty/povdef.html>). This definition takes into consideration family income, number of adults residing in the household, and number of children residing in the household. Our definition of Low-income households included families with incomes less than or equal to 1.5 times the poverty line. Low-average income was defined as greater than 1.5 to 3.0 times the poverty line, while High-average was defined as greater than 3.0 to 6.0 times the poverty line and High income as greater than 6.0 times the poverty line.

It is useful to review these distributions in some more detail in order to appreciate the composition of the pre-hurricane population in the affected areas. The weighted sample closely approximates the Census population in having 7.3% of respondents with pre-hurricane residences in New Orleans City (Orleans Parish), 13.9% in the remainder of the New Orleans Metropolitan Area, 31.7% in the remainder of Louisiana that was affected by the hurricane, 25.7% in the parts of Alabama affected by the hurricane, and 31.4% in the parts of Mississippi affected by the hurricane. (Table A39) Approximately one-third of the weighted sample is in the age range 18-39, somewhat less than half in the age range 40-59, and about one-fifth in the age range 60+. (Table A40) This age distribution did not differ significantly by gender, race-ethnicity, education, or by area of pre-hurricane residence (New Orleans City, the remainder of the New Orleans Metropolitan Area, and other areas affected by the hurricane). Respondents who were still residing in their pre-hurricane homes at the time of interview, though, were significantly older than respondents who were displaced from their homes. Somewhat more than half the weighted sample (53.2%) is female. (Table A41) The majority of respondents are Non-Hispanic Whites (62.4%), with lower proportions of Non-Hispanic Blacks (29.9%), Hispanics (3.0%), or other race-ethnic groups (4.7%). (Table A42) Non-Hispanic Whites are significantly more likely than other respondents to have high education, high pre-hurricane income, and to be married. The racial-ethnic composition of the sample also varies dramatically by pre-hurricane area of residence, with the majority of pre-hurricane residents of New Orleans City Non-Hispanic Black (64.4%), compared to only 13.6% Non-Hispanic Blacks in the remainder of the pre-hurricane New Orleans Metropolitan Area and 29.6% of the remainder of the sample area.

Two-thirds (67.8%) of respondents were married or cohabiting at the time of the hurricane, 15.3% never married, and 16.9% previously married. (Table A43) This distribution varies significantly with age, race-ethnicity, pre-hurricane income, and pre-hurricane area of residence in ways consistent with the Census, with marriage lower among the elderly, Non-Hispanic Blacks, those with low pre-hurricane incomes, and those who resided in New Orleans City prior to the hurricane. The majority (62.6%) were employed prior to the hurricane. (Table A44) This was most true, though, of those less than 60 years of age, Hispanics, the married and previously married, and those with high pre-hurricane incomes. Smaller proportions of the sample were retired (13.5%), homemakers (5.6%), students (2.2%), and *other* (16.0%), where *other* includes the unemployed and disabled and those looking for work.

Close to one-fourth of respondents (23.3%) have less than a high school education, while a similar number completed high school without any additional education (22.7%), and slightly higher proportions completed some post high school education short of a bachelor's degree (28.6%), and the remainder completed a bachelor's degree (25.3%). (Table A45) More than one-third (36.3%) of respondents were classified as having low pre-hurricane household income, compared to 26.4% low-average, 25.6% high-average, and 11.8% high. (Table A46) Low pre-hurricane income, as one would expect, was highest among young, Non-Hispanic Black, poorly educated, never married respondents.

Similar to the 2000 Census population, close to half of respondents (49.4%) owned their home with a mortgage before the hurricane, while 27.5% owned without a mortgage, and 17.4% rented. (Table A47) As one would expect, ownership was lower and rental higher among the young, people with low pre-hurricane incomes, and residents of New Orleans City. Most pre-hurricane homes were one-family detached houses (69.1%), with smaller numbers attached houses (6.0%), apartments (7.9%), or mobile homes (12.8%). (Table A48) A much higher proportion of respondents lived in an apartment (18.7%) or an attached home (25.8%) in New Orleans City than in other areas. The vast majority of the sample (86.8%) lived in their pre-hurricane home at the time of the interview, but this was dramatically less true of pre-hurricane residents of New Orleans City (24.2%) than the rest of the New Orleans Metropolitan Area (70.5%) or the other areas affected by the hurricane (95.5%). (Table A49) It is noteworthy that the sample contains no pre-hurricane residents of Alabama or Mississippi who were displaced by the hurricane and lived in another county or state at the time of interview. We know that such people exist because some of them were part of the ARC list of people who applied for disaster relief. However, such individuals were few in number in the ARC list and the contact information for those who were randomly selected for CAG recruitment was inadequate to trace them. More than half of respondents described their religious preference as Protestant (58.5%), compared to 28.2% Catholic, and 9% no religion. (Table A50) Catholics have a particularly high presence among respondents who lived in the New Orleans Metropolitan Area outside of New Orleans City prior to the hurricane (45.3%). More than half of respondents described themselves as very religious (55.5%). (Table A51) Religiosity is significantly higher among older than younger respondents and among those who have been married than the never-married. When asked how often they seek comfort in a religious or spiritual way when they have problems in their day-to-day lives, 59.6% of respondents said *often* and an additional 18.9% *sometimes*. (Table A52) Use of religion to seek emotional comfort is higher among non-Hispanic Blacks (71.9%) than other respondents.

Appendix Table 3. Selected tables of results from the baseline CAG survey

Notes to the Appendix Tables

Each appendix table presents the response distribution of a single survey question both in the total sample and is a consistently-defined set of sub-samples that break out results by respondent gender, age, race-ethnicity, education, marital status, pre-hurricane income, pre-hurricane residence, and post-hurricane residential mobility.

All the percentages presented in the tables are *column* percentages. This means that the percentages sum to 100% within each column. These percentages are *weighted*, which means that they were calculated from the dataset after the cases had been weighted to adjust for differential probabilities of selection and differential non-response. Reports of the number of respondents used to make the calculations, in comparison, are based on unweighted data, allowing the reader to see the actual number of survey respondents in the denominator of each column. Note that sub tables are based on calculations in sub-samples. For example, Table A8 is based only on responses of people who reported that they evacuated after the hurricane. In situations of this sort, the table will include a footnote describing the sub-sample.

The separation of respondents on the basis of race-ethnicity is labeled in the tables *Hispanic*, *White*, *Black*, and *Other*. Respondents labeled *Hispanic* are those who reported Hispanic ethnic ancestry on either side of their family whether or not they also reported other ancestries. Respondents labeled *White*, in comparison, are actually Non-Hispanic Whites, which means that they reported White race, no other race (i.e., not Asian or Black, or Native American or Pacific Islander), and did not report Hispanic ethnicity. Respondents labeled *Black*, in comparison, are actually Non-Hispanic Blacks, while respondents labeled *Other* are defined residually.

In the case of marital status, respondents who are both previously married and cohabiting are classified here in the category *married or cohabiting*.

Pre-hurricane income was defined using the official federal government definition of poverty (<http://www.census.gov/hhes/poverty/povdef.html>). This definition takes into consideration family income, number of adults residing in the household, and number of children residing in the household. We used a four-category distinction. Our definition of *Low-income* households included families with incomes less than or equal to 1.5 times the poverty line. *Low-average* income was defined as greater than 1.5 to 3.0 times the poverty line, while *High-average* was defined as greater than 3.0 to 6.0 times the poverty line and *High* income as greater than 6.0 times the poverty line.

Pre-hurricane residence was divided into three categories: *New Orleans City* includes pre-hurricane residents of Orleans parish. *New Orleans Metropolitan Area* includes pre-hurricane residents of the remaining six parishes in the official US Bureau of the Census definition of the New Orleans Metropolitan Area, not including those in Orleans parish (the seventh of the seven parishes in the Metropolitan Area). *Other location* includes all other respondents, who were residents the counties in Alabama, Louisiana (exclusive of the New Orleans Metropolitan Area),

and Mississippi that were defined by FEMA as eligible for individual assistance after the hurricane. Residence at the time of interview is irrelevant to these definitions, as they focus on pre-hurricane residence.

Post-hurricane location, finally, was defined in three categories: respondents who resided in their pre-hurricane residence at the time of the interview; those who resided at the time of interview in a different home but in the same county (or, in Louisiana, parish) as their pre-hurricane home; and those who resided at the time of interview in a different county or state as their pre-hurricane home.

Appendix Tables will be posted by noon on Thursday, August 24.