Testimony of
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Madam Chair and Members of the Subcommittee, I am Ronald Kessler, Professor of Healthcare Policy at Harvard Medical School and Principal Investigator of "The Hurricane Katrina Community Advisory Group (CAG) study." The CAG study consists of a series of community surveys carried out with a representative sample of people who were pre-hurricane residents of the areas affected by Hurricane Katrina. The purpose of the surveys is to track the mental health and well-being of the people who lived in the parts of Alabama, Louisiana, and Mississippi that were directly affected by Hurricane Katrina.

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I am pleased to have an opportunity to provide an overview of our findings today. The surveys we have completed and analyzed to date include an initial survey administered 5-8 months after Katrina to a representative sample of 1043 people who were pre-hurricane residents of the areas affected by Katrina and a follow-up survey of these same people approximately one year later.

Before turning to the results, I want to acknowledge the critical assistance of the American Red Cross (ARC), which allowed us to sample from their master list of over 1.4 million families that applied for ARC assistance after Katrina, and of FEMA, which similarly allowed us to sample from their master list of over 2 million families that applied to them for post-Katrina assistance. In the absence of these lists, it would have been impossible to carry out our surveys.

In addition to the ARC and FEMA lists, we used random digit dialing to find and interview people who did not apply for ARC or FEMA assistance, so as not to bias the sample by focusing only on the people who were most adversely affected by the hurricane. Bell South was of great assistance to us in this effort, as they made it possible for evacuees who were no longer living at their pre-Katrina addresses to forward their pre-hurricane land line phone numbers to new residences throughout the country. This service was critical to us in tracing evacuees.

We also made use of Census Bureau data on the demographic composition of the affected area in the 2000 Census of the population in order to weight our survey data to be representative of the pre-hurricane population on major socio-demographic variables. Importantly, as our sample included both pre-hurricane residents who continued to live in the affected area after the storm as well as those who relocated elsewhere in the country, we also needed to adjust for differential geographic relocation. The Claritas market research company was critical in this effort, as they generated and provided at no cost estimates of differential geographic mobility across the affected area that we used in calibrating our data.

Our baseline survey estimated that 13.8% of respondents met criteria for the SAMHSA definition of a Serious Mental Illness (SMI) and that an additional 21.3% met criteria for a less severe mental disorder according to the definitions and criteria of the American Psychiatric

Association's DSM-IV diagnostic system (American Psychiatric Association 1994). These estimates were roughly twice as high as estimates obtained using the same measures in a sample of the same Census Region several years before the hurricane (Kessler et al. 2005). Post-hurricane prevalence estimates varied by area, with nearly half the pre-hurricane residents of the New Orleans Metropolitan Area screening positive for a DSM-IV anxiety-mood disorder compared to one-fourth of the pre-hurricane residents of the other areas affected by Katrina. Some 30% of the survey respondents from New Orleans Metro and 12% of those from the remainder of the hurricane area were estimated to have post-traumatic stress disorder (PTSD) at the time of the baseline survey (Kessler et al. 2006).

The socio-demographic correlates of these disorders were largely the same in the post-Katrina survey as in the survey carried out several years earlier. This suggests that the adverse mental health effects of Hurricane Katrina were equally distributed across broad segments of the population.

At the same time, our baseline survey found that suicidal ideation and plans among people with mental illness were significantly *lower* in the post-Katrina survey than in the survey carried out several years before the hurricane (0.6% vs. 8.4%, for ideation; 0.2% vs. 3.6% for plans). These lower rates of suicidality were strongly related to an increased sense of meaning and purpose in life and to reports of discovering new inner strength that people reported not knowing they had prior to the hurricane. These sorts of positive responses have been found after previous disasters. Our results suggest that they were protective against suicidality. In other words, in the midst of the understandable sadness about the losses that so many people experienced and the anxieties about the uncertainties of the future, there was a core of

psychological strength that was sustaining people during the time we carried out our baseline survey.

Much of this psychological strength was rooted in a sense of optimism about the future: the sense that we're all in this together, that we're going to tackle the problems of recovery together, and that we're going to bounce back and rebuild our lives. As it happened, this optimism was unrealistic in light of the enormity of the infrastructure damage caused by Katrina. My colleagues and I were concerned when we originally discovered this pattern in the data that a mental health crisis might be looming behind these short-term positive feelings because of the unrealistic nature of the optimism. The short-term psychological adrenaline created by the optimism, we felt, would not be sufficient to sustain people emotionally if practical problems persisted for a long period of time.

The general wisdom in the mental health field is that this sort of initial optimism wears down within a year or so. Practical recovery efforts after most disasters are either complete or well on the way to completion within a year. As a result, the typical finding in most surveys of PTSD and other post-disaster mental illness is that many cases recover within a period of months, that the majority recover within a year, and that the vast majority recover within two years. People who do not recover within two years typically have a chronic course that often lasts for many years. Our hope was that we would find evidence of widespread recovery from hurricane-related mental disorders in the second survey, which we carried out a year after the baseline survey, but we were concerned that this would not be the case and that, in fact, prevalence of mental illness might increase rather than decrease

About half (48.3%) of the people with pre-hurricane mental disorders and one-sixth (18.5%) of those with new mental disorders reported in our baseline survey that they received

some kind of treatment for emotional problems since the hurricane (Wang et al. 2006). Most were treated in the general medical sector and received medication but not psychotherapy. While psychiatrists saw a small proportion of patients overall (17.5%), they provided treatment to nearly half (48.1%) of the patients with pre-hurricane mental disorders who experienced disruption of treatment due to the hurricane. Self-reported reasons for failing to seek treatment among new-onset cases largely involved low perceived need, while reasons for failing to continue treatment among pre-existing cases largely involved objective barriers to treatment, such as financial difficulties, lack of availability of treatment providers, and lack of transportation.

As it turned out, the estimated prevalence of any anxiety-mood disorder did not change significantly between the baseline survey and the follow-up survey, although the trend was positive (from 30.7% to 33.9%). The estimated prevalence of SMI, in comparison, was significantly higher in the follow-up survey than baseline survey in the total sample (14.0% vs. 10.9%) as well as in the sub-sample of respondents who are not from the New Orleans Metropolitan Area (13.2% vs. 9.4%). This trend was not significant, in comparison, in the New Orleans Metro sub-sample (16.9% vs. 16.5%). The estimated prevalence of PTSD roughly doubled in the follow-up survey compared to the baseline survey in the sub-sample exclusive of New Orleans Metro (20.0% vs. 11.8%), but did not change in the New Orleans Metro sub-sample (24.1% vs. 25.9%). The prevalence of suicidality, finally, was significantly higher in the follow-up than baseline survey both with regard to suicidal ideation (6.4% vs. 2.8%) and suicide plans (0.8% vs. 0.2%). These trends, unlike those for SMI and PTSD, were statistically significant and relatively comparable in magnitude in both the New Orleans Metro sub-sample and in the remainder of the sample.

We cross-classified baseline and follow-up diagnoses in order to study the composition of the diagnoses with significant trends. The majority of respondents classified as having SMI at follow-up either already had SMI at baseline (39.9%) or progressed from baseline less severe mental illness (31.6%) to SMI, while the remaining 28.5% represent delayed onsets (i.e., no mental illness at baseline). A similar pattern was found for PTSD, where the majority of follow-up cases either already had PTSD at baseline (41.7%) or progressed from other baseline mental disorders to PTSD (27.1%), while the remaining 31.2% were delayed onsets (i.e., no mental illness at baseline). The proportions of delayed onsets were comparable for suicidal ideation (24.1%) and somewhat higher for suicide plans (46.6%), while the proportions with persistence (16.6% and 26.0% for ideation and plans, respectively) were lower than for PTSD. The proportions that represent progressions (i.e., from baseline mental illness without suicidality to the subsequent onset of suicidality) were higher for suicidal ideation (59.3%) than for PTSD and comparable for suicide plans (27.4%) to PTSD.

It is noteworthy that the majority of respondents with baseline SMI (51.1%) continued to have SMI at follow-up, while 30.8% improved (i.e., were classified as having less severe mental illness at follow-up) and only a relatively small minority (18.1%) recovered (i.e., no longer met criteria for an anxiety-mood disorders). In the case of PTSD, 70.4% of baseline cases continued to have PTSD at follow-up, while an additional 10.3% were classified as having some other anxiety-mood disorder but not PTSD at follow-up, and only 19.3% recovered. Persistence was somewhat lower for suicidal ideation (37.9%), but much higher for plans (69.8%). Improvement, in comparison, was comparatively high for suicidal ideation (49.9%), but not for suicide plans (16.0%). Recovery (i.e., no mental illness and no suicidality at follow-up), finally, was relatively uncommon for either suicidal ideation (12.2%) or plans (18.0%).

As noted above, we would normally expect to find lower proportions of the population to have mental illness and suicidality this long after a disaster. That we not only failed to find decreases of this sort, and actually found a number of *increases*, is an indication of the more severe adverse emotional effects of Hurricane Katrina than more typical disasters. Socio-demographic variables were generally not significant predictors of trends in anxiety-mood disorders or suicidality in the two surveys, indicating that these adverse effects were widespread in the population.

One possible explanation for the significant increases in the prevalence estimates of anxiety-mood disorders and suicidality is that hurricane-related stresses might have increased over time due to the slow pace of recovery efforts. As it turns out, though, this is not the case. A significantly lower proportion of respondents reported current exposure to hurricane-related stress in the follow-up survey (57.5%) than in the baseline survey (91.7%). This significant decrease was found both in the New Orleans Metro sub-sample (97.9% vs. 78.3%) and in the remainder of the sample (90.0% vs. 51.7%). It is noteworthy, in light of the fact that the increases in SMI and PTSD were found only in the sub-sample exclusive of the New Orleans Metro Area, that the decrease in hurricane-related stress was less pronounced in New Orleans Metro than the remainder of the sample. Indeed, the prevalence of stress in the follow-up survey was significantly higher in the New Orleans Metro sub-sample than in the remainder of the sample (78.3% vs. 51.7%). This means that higher levels of residual hurricane-related stress cannot explain the fact that SMI and PTSD increased over time only among respondents not from the New Orleans Metro Area.

Another possibility is that the psychological effects of hurricane-related stresses increased over time even though the magnitude of the stresses themselves decreased. A

comparison of the cross-sectional associations between hurricane-related stresses and the outcomes finds some superficial support for this possibility with regard to SMI, as the odds-ratios linking stress with SMI in the follow-up survey are consistently larger than the parallel odds-ratios in the baseline survey. However, these differences are not statistically significant (χ^2_4 = 8.1, p = .09). Furthermore, the pattern is not less pronounced in the New Orleans Metro sub-sample than in the remainder of the sample (χ^2_4=5.1, p = .28; detailed results available on request). This means that heightened reactivity to hurricane-related stress cannot explain the fact that the significant increase in SMI is confined to respondents in the sub-sample exclusive of the New Orleans Metro Area. Furthermore, the pattern of higher odds-ratios at follow-up than baseline does not hold either for PTSD or for suicidal ideation. In the case of suicidal ideation, the rarity of the outcome required the stress measures to be dichotomized (severe stress vs. all others) to stabilize parameter estimates.

The model was expanded to study the effects of hurricane-related stress on trends in SMI, PTSD, and suicidal ideation. This was done by adding a control for the baseline value of the outcome to the prediction equation along with measures of stress assessed in both surveys. Baseline stress was not a significant predictor of trends in either SMI (χ^2_4 = 4.3, p = .37) or PTSD (χ^2_4 = 8.0, p = .09), while stress at follow-up was significant in both equations (χ^2_4 = 31.5, p< .001; χ^2_4 = 13.0, p = .011). No significant interactions were found between baseline stress and follow-up stress or between sub-sample (i.e., New Orleans Metro vs. the remainder of the sample) and either measure of stress. (Detailed results available on request.) Based on these results, the final model for trends in SMI and PTSD included stress in the follow-up sample as the only key predictor. (Table 6) Stress exposure in this model is associated with substantial variation in both SMI and PTSD at follow-up, with odds-ratios for serious-severe stress in the

range 35.8-42.2 for SMI and 12.8-20.3 for PTSD after controlling for baseline SMI and socio-demographics.

The situation was different for suicidality, as baseline stress and stress at follow-up both predicted trends. If we think of these associations as causal, the proportion of suicidality ideation associated with high hurricane-related stress is 61.6%.

Considering these results broadly, the prevalence estimates of anxiety-mood disorders both at baseline and in the follow-up survey in the New Orleans Metro sub-sample are considerably higher than those found in previous surveys of mental illness after natural disasters in the US, while the prevalence estimates in the remainder of the sample are comparable to those in previous studies (Norris et al. 2002; Galea, Nandi & Vlahov 2005). Previous reviews have noted that comparisons of prevalence estimates across disasters is challenging due to the wide range of disaster experiences to which people in disasters are exposed. However, broadly speaking, the higher prevalence estimates of anxiety-mood disorders in the New Orleans Metro sub-sample are consistent with the results of studies that considered persons in highly disaster affected areas (Canino et al. 1990; David et al. 1996), while the lower prevalence estimates in the remainder of the sample are consistent with the results of previous studies in areas with lower disaster impact (Caldera et al. 2001; Kohn et al. 2005).

The significant increase in prevalence estimates of SMI, PTSD, and suicidal ideation-plans are different from the patterns found in other longitudinal surveys of mental illness after natural disasters, where, as noted above, prevalence typically decreases (McFarlane 1988; Carr et al. 1997; Norris et al. 1999). Even in cases where no decrease has been found in previous surveys, the typical pattern has been for prevalence to remain stable for some time rather than to increase significantly in the way in did in our survey (Norris et al. 1999).

The fact that the increases in SMI and PTSD are confined to respondents not from the New Orleans Metro Area is difficult to interpret in light of the higher levels of hurricane-related stress both at baseline and at follow-up in the New Orleans Metro sub-sample. It is possible to speculate post hoc that the much greater media attention directed at New Orleans than the other areas affected by Katrina might have led to a greater sense of abandonment among affected people not from the New Orleans Metro Area, but we have no data to evaluate this interpretation. Another possibility is that the increases in SMI, PTSD, and suicidality are partly due to increases in stressors that might only be indirectly linked to the hurricane. This possibility is consistent with evidence from several longitudinal studies that low-intensity ongoing stressors significantly predict long-term PTSD, presumably because these nagging stressors erode the resistance resources that would otherwise promote recovery (Adams & Boscarino 2006; Galea et al. in press). However, it is unclear why such stressors might be more prevalent among people not from the New Orleans Metro Area than from New Orleans Metro. Finally, there is the possibility that psychological vulnerability to such stressors is higher among people not from the New Orleans Metro Area and that this heightened vulnerability explains why the increases in SMI and PTSD documented here were confined to this sub-sample.

We have not yet analyzed the data regarding treatment in the follow-up survey, so we have no information at this time about patterns of change in treatment after the baseline survey.

These results lead to four conclusions. First, continuing hurricane-related stress (such as in finances, employment, and housing) clearly is playing a critical role in the high prevalence of hurricane-related anxiety-mood disorders in this population.

Second, the fact that the associations between these stresses and the mental health outcomes considered here were stronger among affected people from areas other than the New

Orleans Metro Area suggests that undetermined stress and-or vulnerability factors are present among people from other areas New Orleans Metro that should lead policy makers to focus attention on the needs of these people and not to concentrate only on New Orleans.

Third, the observation that these adverse effects are only weakly related to socio-demographic variables means that efforts to address the needs for mental health treatment in this population need to deal with all segments of the population rather than target only specific high-risk population segments.

Fourth, the fact that hurricane-related stressors were still quite common in the population at the time of our follow-up assessment, which occurred nearly two years after the hurricane, and that high proportions of the outcomes at follow-up were attributable to these continuing stresses, suggests that efforts to address the problem of increased mental illness and suicidal ideation-plans among people affected by Hurricane Katrina need to address continuing needs for practical and logistical assistance to deal with the high remaining levels of stress. This may be particularly challenging when it comes to helping pre-hurricane residents of the affected areas who are now living elsewhere in the country, but it is especially important to reach these geographically displaced people because of their comparatively high risk of SMI.

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