

# Mental Health Following the Deepwater Horizon Oil Spill

Appendix to Literature Summary and  
Review of Disaster Mental Health



NIEHS/WETP

A summary of literature regarding disaster mental health issues found following the Deepwater Horizon Oil Spill in the Gulf of Mexico.

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## **Mental Health Effects of the 2010 Gulf Oil Spill**

One of the hallmarks of the 2010 Deepwater Horizon Oil Spill is the mental health issues that communities have continued to struggle with, long after the oil disappeared.

Studies examining the impact of the Deepwater Horizon Oil Spill on mental health in the Gulf Coast (Alabama, Mississippi and Louisiana) have been important in verifying previous oil spill research and have led to new insights on the longer term effects that manmade and long duration events can have on mental health.

## **Mental and Behavioral Health Issues**

Following disasters a number of mental and behavioral health symptoms are often seen at elevated rates. Stress, anxiety, depression, PTSD, suicide, domestic violence, heavy alcohol use and increased drug abuse rates have been found following many disasters, including oil spills (CDC/SAMHSA 2013, Gill, Picou & Ritchie 2011, Osofsky, Palinkas & Galloway 2010). The health impacts seen following the Deepwater Horizon Oil Spill were not tremendously different from those expected and experienced in previous disasters (Palinkas 2012). The Mental health impacts of the Gulf Oil Spill were apparent even before the oil stopped flowing (Yun, Lurie, Hyde 2010) and continue to be seen years after the disaster.

Negative Mental Health outcomes from the oil spill included depression, anxiety, and stress. Additional measures studied that are indicative of negative mental health status include perceived 'mentally unhealthy days' and the Impact Event Scale.

### *Depression/PTSD*

A study by Buttke et al. (2012) found that between 15- 24% of participants surveyed reported depressive symptoms and rates were higher in surveyed communities than in previously reported by the (BRFSS for each state. Surveys conducted by SAMHSA found depression rates of 15% in most areas (SAMHSA/CDC 2013). Osofsky, Osofsky & Hansel (2011) found that 12% of surveyed participants met the cutoff for symptoms of post-traumatic stress and 15% for serious<sup>1</sup> mental illness'.

Gill, Picou and Ritchie (2011) used the Impact Event Scale; a proxy test for PTSD used for event-specific stress measurement and found that IES scores in the Gulf were elevated at rates similar to those seen after the Exxon Valdez spill.

### *Anxiety*

Anxiety was commonly studied and Grattan et al. (2011) found 'indicators of clinically significant anxiety and depression across all study groups'. Buttke et al. (2012) found rates of

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<sup>1</sup> Using the K6 scale for well-being, anxiety and depression symptoms. 'Serious mental illness' was reported for those who had a score of 13 or more.

anxiety between 21-32% (with no comparison available). Anxiety rates were approximately 15% for Gulf states in SAMHSA studies (SAMHSA/CDC 2013).

### *Additional Indicators*

A variety of additional indicators of mental illness or distress were studied in Gulf states, one such indicator, self-reports of mentally unhealthy days are often included in surveys. Nearly 1 in 4 respondents surveyed by Buttke et al. (2012) reported having more than 14 mentally unhealthy days in the past month and SAMHSA/CDC (2013) found that 15% of respondents reported more than 14 mentally unhealthy days in the last month. Five percent of respondents reported 14 or more days being 'unable to do regular activities due to poor mental health' in the past 30 days (SAMHSA/CDC 2013). Additional measures in mental health, such as calls to mental health and domestic violence hotlines were also known to have increased in the Gulf following the spill (Yun, Lurie and Hyde 2010).

### **Exposures and Risk Factors**

A number of risk factors and exposures were studied for their potential relationship to the many mental health issues seen following the oil spill. Many studies found mental health risk factors that were similar to those seen following other 'technological' disasters and the Exxon Valdez Oil Spill (Palinkas 2012).

### *Oil Exposure*

A person's exposure to oil (or to oil on the shoreline of the town) was analyzed in most research articles; however the impact of exposure to oil was mixed. Gill, Picou & Ritchie (2011) found that exposure to the oil was one of the strongest predictors of stress, and in preliminary results from the GuLF Study (NIEHS 2013) high exposure to oil in workers was correlated with poor mental health outcomes, even when history of mental illnesses was considered. On the other hand, Morris et al. (2013) found that economic impact was a stronger predictor than was exposure to oil. Of those who reported exposure to oil to Grattan et al., (2011) levels of anxiety and depression were similar between those who lived in communities where oil reached the shore (directly affected) and those where it did not (Indirectly affected).

Studies of the relationship between oil exposure and mental ill-health vary due to a number of methodological discrepancies. Gill, Picou & Ritchie 2011 classified exposure using interviewees reporting of having worked shoreline cleanup, worked on a Vessel of Opportunity, owned oil damaged property or had an 'other exposure'. Grattan et al. 2011 classified exposure as 'persons living or working in a community where oil reached the shoreline'. Exposure and residence may not be independent however, as many workers from communities without oil may have participated in clean-up activities and had contact with oil. The GuLF study (NIEHS 2013) classified 'high, medium and low' exposures based on where an individual worked and

the likelihood of oil contact in that position. These discrepancies in classification of 'exposure' may contribute to the mixed findings related to oil exposure.

### *Income Loss*

As seen following the Exxon Valdez spill (Osofsky, Osofsky & Hansel 2011) in addition to being observed in studies of the Gulf Oil Spill, (Grattan et al., 2011 and SAMHSA/CDC 2013) those who lost income due to the spill were more likely to develop a mental health issue or present symptoms. Income loss or worry was most strongly related to anxiety and depression both immediately following the spill, and one year later (Morris et al 2013). Morris and team (2013) found that rates of anxiety and depression were high while oil still flowed at 65% and 62% respectively, but that anxiety and depression rates were actually higher a year later for those who had income related loss at 85% and 83% respectively (Morris et al 2013). Gill, Picou and Ritchie (2011) also found that economic loss due to the spill and concern about economic future were two of the strongest predictors of self-reported stress (using the IES scale). Grattan et al. (2011) found that those who suffered income loss had the lowest mean resiliency scores. Multiple studies found that Income loss was found to be a stronger predictor of/cause of mental illness than location or distance to oil on the shore (Grattan et al. 2011 and Morris et al. 2013)

The economic impacts on jobs and industries with ties to the Gulf waters, namely tourism, fishing and oil were particularly noticeable. A study by Cope, Slack, Blanchard and Lee (2012) found that those in the fishing industry suffered greater effects (worse mental health status) than those in gas and oil or tourism. This result may be due to the short term impacts on the oil industry (short moratorium on drilling) compared to the longer term impacts on fishing (facing prolonged oil exposure, environmental damage the fish habitats, and lack of consumer confidence).

Grattan et al. (2011) noted that those who had income loss were more likely to use behavioral disengagement as a coping strategy than those without income loss. They also had 'significantly more tension/anxiety, depression, anger, fatigue, confusion and mood disturbance....they also had a higher rate of clinically elevated depression than any other group in the study.'

As with studies of exposures, income loss was not consistently defined between studies and varying levels of detail were used by studies to classify income loss. The most common measure of income loss was a simple classification of lost income compared to stable income (both self-reported); Morris et. al 2013, Grattan et al. 2011, Gill, Picou & Ritchie 2011. Gill, Picou and Ritchie (2011) also asked residents 'how much they used coastal areas along the Gulf for commercial activities before the spill' and created a 0-4 impact scale. Cope, Slack, Blanchard and Lee 2012 analyzed occupations in the household (fishing industry, oil industry etc.) and controlled for employment status, therefor giving a more detailed analysis of

economic impacts. The multiple definitions of income loss and varying levels of detail used to study the impact of income loss may contribute to the variation in results. While most found income to be related to mental health symptoms, specific relationships (business owner vs. worker etc.) and the level of impact (lost one week's wages vs. lost job) are rarely explored.

### *Prior Experiences*

The impact of a past exposure to financial loss, or trauma earns repeated mention in studies following the Gulf Oil Spill. Osofsky, Osofsky & Hansel (2011 ) note that populations impacted by the Gulf Oil Spill were still recovering, and struggling, from the impacts (physical, mental and financial) of Hurricanes Katrina and Rita, and therefore were already at a higher risk of mental health issues, or already presenting an elevated level of mental ill-health (compared to the US) prior to the 2010 spill.

Neria, Nandi & Galea 2008 found that prior trauma is a significant risk factor for developing behavioral health after a later trauma and multiple researchers have suggested the impacts of Katrina, only 5 years removed, play a role in the health status of residents of the Gulf Coast following the oil spill. Osofsky, Osofsky & Hansel (2011) found a significant relationship between Katrina impact and symptoms of Anxiety and Depression in a multiple regression of survey participants.

Osofsky, Osofsky & Hansel (2011 also found 'rebound resilience' or the feeling that one could 'bounce back' was related to better mental health outcomes. They theorize that having rebounded from past events (Hurricane Katrina etc.) allowed individuals to feel that they learned from the past and to better adapt to the adversity. Osofsky, Osofsky & Hansel (2011) postulated that recovery 'may serve as a protective factor in cumulative disasters'.

### *Community and Attachment*

The long held belief that community attachment led to more positive mental health status was challenged by a study in 2012 released by Lee and Blanchard that found those with higher levels of community attachment<sup>2</sup> had higher rates of anxiety and mental ill health than those who did not. This conflict with a commonly held belief was in fact, only momentary, as a later study by Cope, Slack, Blanchard and Lee (2012)found that after one year those with higher levels of community attachment had better mental health outcomes. Additional studies by Osofsky, Osofsky & Hansel (2011) found that 'place satisfaction' was correlated with better mental health outcomes. The apparent increase in ill-affect seen immediately following the spill in those with high community attachment, Lee and Blanchard (2012) hypothesize were related to the disruptive impact that oil had on communities, many of which faced new and sudden uncertainty regarding the state of the natural resources they depended on. Cope, Slack,

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<sup>2</sup> Community Attachment measured using a 5-item index of Likert-Scale questions about community and satisfaction (Cope, Slack, Blanchard and Lee 2012 and Lee and Blanchard 2012).

Blanchard & Lee (2012) also note that the early negative impacts related to attachment were most likely due to the still spilling oil in the gulf at the time of survey, as compared to the more static situation present a year later upon follow up.

### *Underlying Uncertainty*

While income loss was the most strongly related to the presentation of ill mental health, one of the underlying themes that appear in many of studies is the role of uncertainty in a disaster that is manmade and/or prolonged, such as the oil spill. In a natural disaster the event is (usually) quickly over and familiarity about what to do next is present, particularly in areas like the Gulf where natural disasters are common. With the continual leak of oil for weeks, as well as the environmental damage caused which can impact ecosystems and coastlines (And therefore food and tourism industries) for longer time periods, there was greater uncertainty about how to recover and when that would happen. Morris et al. (2013) noted that in such situations people often continue to seek out information, which in turn can lead to further confusion as information comes from conflicting or unreliable sources. Multiple reports found mistrust of many information sources including BP and the Federal government, despite these resources providing the information sought, this mistrust again contributed to more uncertainty. (Morris et al. 2013, and Cope, Slack, Blanchard & Lee 2012). The theme of mistrust and the relationship to behavioral health after a man-made disaster is one that has been repeatedly observed in literature (SAMHSA/CDC 2013)

The negative mental health status of those in the fishing industry was both due to income loss in the immediate aftermath, but also due to uncertainty about future income levels due to the prolonged environmental exposure and the impact of national perceptions on the gulf's health (Morris et al. 2013).

Gill, Picou & Ritchie (2011) and Morris et al. (2013) both noted that the long process of litigation, repayments and arbitration can also contribute to further uncertainty. The money available can help rebuild businesses and health, but the duration of the process and uncertainty of an outcome often prevent individuals from finding relief.

### *Other Variables*

Additional variables were studied by multiple researchers, however the impact of each was negligible or varied and therefore they do not serve as predictors of mental health issues. The impact of age was unclear as studies found a potential correlation between age (Gill, Picou & Ritchie, 2011 and Grattan 2011) while others, including studies by Morris et al. (2013) and Cope, Slack, Blanchard & Lee 2012 did not. Female gender was associated with increased negative mental health impacts by Cope, Slack, Blanchard & Lee (2012) but was not explanatory in resilience outcomes studied by Morris et al. (2013) or with higher rates of stress by Gill, Picou & Ritchie (2011)

## Discussion and Conclusions

The variability of results and inconsistent conclusions on the relationship between oil exposure and age, gender and other outcomes are due to a variety of factors. The variety of results underscores the need for coordinated, longitudinal research on mental health following disasters and the importance of baseline data collection.

Limited baseline data for specific populations, particularly baseline post-Katrina but pre-oil spill data, makes comparisons difficult. The unique socio-economic and cultural groups in the gulf make general comparisons to national level population data difficult. In recognizing this difference, the study by Cope, Slack, Blanchard & Lee (2012) attempted to gather baseline data immediately following the spill (While oil was still flowing, prior to the well-being capped) to be used as the 'control' and a sample one year later as the 'cases'. While a positive to have the same population, taking a baseline measurement in a population that had already been introduced to the disaster (and thereby the uncertainty brought with it) would most likely create a baseline with higher anxiety and mental health issues than a truly pre-spill sample would. The study does however, have the ability to differentiate between immediate and longer-term impacts of uncertainty and economic impact in the same population. Baseline data that is available, such as the BFRSS was used by Buttke et al. (2012) and SAMHSA/CDC (2013), but as it is generalized to counties, states or regions, does not allow direct comparison. The SAMHSA/CDC (2013) study found few discernible differences between 2008 BFRSS data and study populations, in part because BRFSS questions varied by state and BRFSS surveys were completed over the course of the spill and therefore do not represent a true pre-spill baseline.

In addition to lacking a baseline, sample sizes and selection was a reported shortfall in most studies. The timing of studies, including beginning and follow-up varies, which makes cross study comparisons difficult. Multiple studies and follow-ups have shown that mental health issues are correlated to the time since the oil spill. The best example of this is presented by Cope, Slack, Blanchard & Lee (2012), who note that while rates of affective disorder spiked initially following the spill in those with high community attachment, later studies showed that those with higher rates of community attachment had lower health impacts in the long run. To truly compare studies, similar timeframes in sampling must be compared so as to eliminate the variation seen over time. Timeliness of research and lack of baseline data were compounded in the gulf due to a lack of mental health questions in existing public health surveillance systems (Buttke et al. 2012).

One area of study that was not available in published research is the impact on the oil spill on the mental health challenges faced by minority populations and specifically vulnerable populations in the Gulf. (Do 2011). Some studies surveyed socioeconomic status, income and residence, but none were found that specifically surveyed or analyzed minority populations

such as Vietnamese fishermen, despite the additional barriers they may face following a disasters.

While the short term effects of the oil spill on mental health were noticeable, it is important to also note the long term burden, seen a year or more after the spill, which communities struggle to deal with. Short term shock, anxiety and exacerbation of existing mental health issues are often expected following a disaster (Lee & Blanchard 2012), but a long-duration, 'man-made' or 'technological' disaster brings with it other mental health crisis that are not immediately apparent and are brought on by the uncertainty and duration of such events. While some studies are following populations longitudinally, it is important to continue follow-up research to better understand the long term (more than 1 year) impacts a disaster may have on a population in order to better respond to future events and support the ongoing needs of communities still impacted by the DWH Oil Spill.

It is important to note that the similarities between the mental health impacts (and rates of mental health issues) of the Exxon Valdez spill and the Deepwater Horizon spill allow for extrapolation of what the Gulf region may face in future years. Disregarding the impacts of potential future disasters (as the Gulf is prone to), rates of stress (measured on the Impact Event Scale), community disruption and uncertainty may remain elevated in the Gulf as they have in Alaska (Gill, Picou & Ritchie 2011).



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Appendix to Literature Review of Mental Health Impacts from Disasters

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