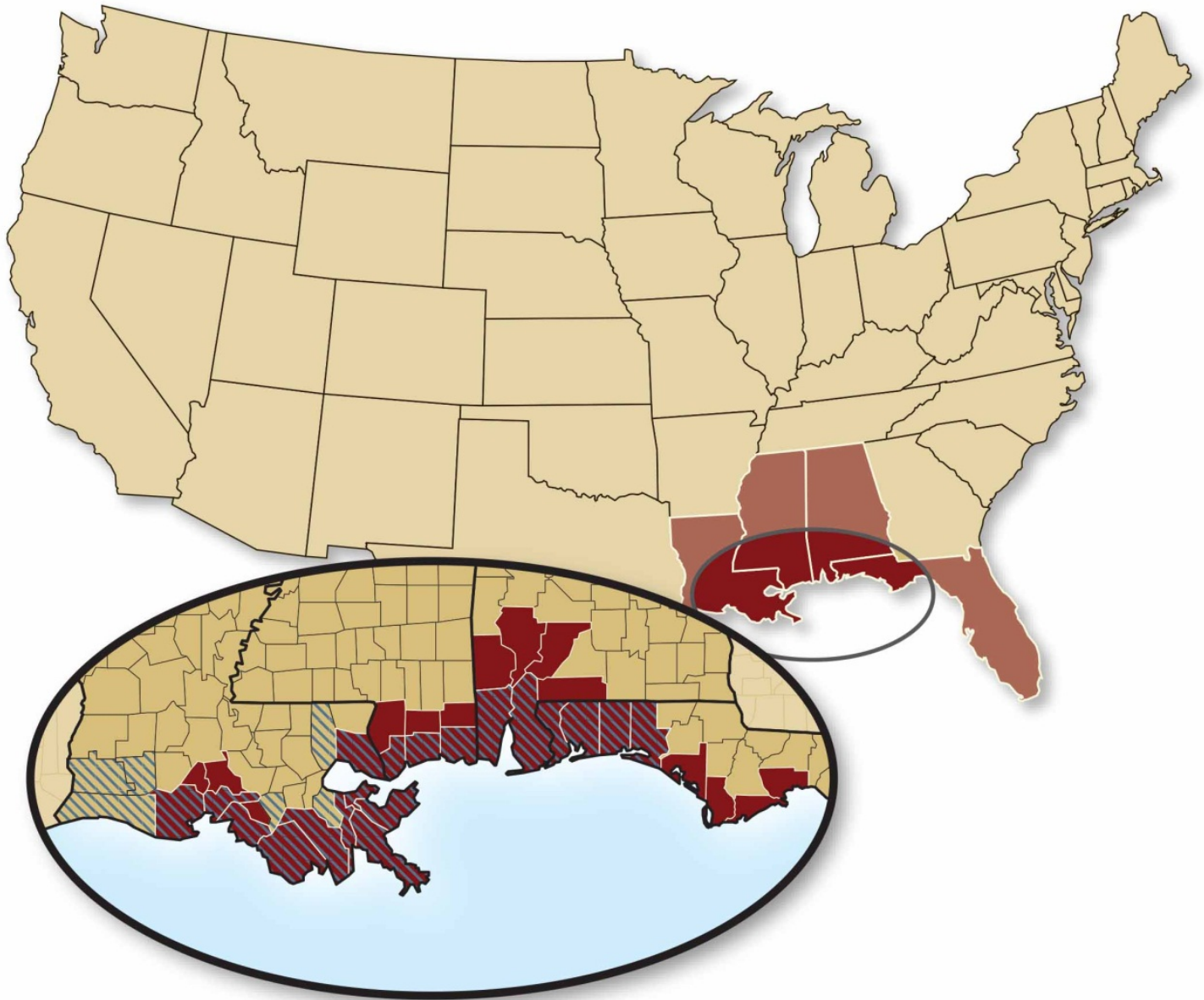


# Behavioral Health in the Gulf Coast Region Following the *Deepwater Horizon* Oil Spill



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### **Revised Adult Mental Illness Estimates for 2008 to 2011**

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# **Behavioral Health in the Gulf Coast Region Following the *Deepwater Horizon* Oil Spill**

Substance Abuse and Mental Health Services Administration  
Center for Behavioral Health Statistics and Quality  
Division of Surveillance and Data Collection

Centers for Disease Control and Prevention  
Office of Surveillance, Epidemiology, and Laboratory Services  
Public Health Surveillance and Informatics Program Office  
Division of Behavioral Surveillance

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## **Originating Offices**

Substance Abuse and Mental Health Services Administration  
Center for Behavioral Health Statistics and Quality  
1 Choke Cherry Road, Room 2-1042  
Rockville, MD 20857

Centers for Disease Control and Prevention  
Office of Surveillance, Epidemiology, and Laboratory Services  
Public Health Surveillance and Informatics Program Office  
Division of Behavioral Surveillance

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# Executive Summary

## Purpose of Report

This report describes the results of data collection efforts conducted by the Substance Abuse and Mental Health Services Administration (SAMHSA) and the Centers for Disease Control and Prevention (CDC) related to the behavioral health (mental health and substance use) of residents of the Gulf Coast affected by the *Deepwater Horizon* oil spill. The oil spill began with the explosion of the *Deepwater Horizon* oil rig on April 20, 2010, which resulted in the spilling of an estimated 210 million gallons of crude oil before the well was capped on July 15, 2010. Behavioral health problems documented after previous disasters such as the 1989 *Exxon Valdez* oil spill in Alaska and Hurricanes Katrina and Rita in 2005 led to predictions of similar behavioral health problems following the Gulf Coast oil spill.

The data collection efforts described in this report, which were funded by BP, focused on residents of the counties or parishes in Alabama, Florida, Louisiana, and Mississippi that were most directly affected by the spill. The SAMHSA data collection consisted of adding a supplemental sample of approximately 2,000 interviews in the four affected States to the 2011 National Survey on Drug Use and Health (NSDUH), an annual survey of drug use and mental health problems among the civilian, household population aged 12 or older. A majority of these additional interviews were conducted on residents of the Gulf Coast Disaster Area (GCDA), consisting of 32 counties or parishes on or near the Gulf of Mexico. The CDC data collection consisted of the Gulf States Population Survey (GSPS), a telephone survey of approximately 38,000 residents in those same four States from December 2010 to December 2011, with the majority of the interviews conducted in 25 coastal counties.

## Summary of Key Findings

### National Survey on Drug Use and Health

The NSDUH is an in-person survey of the civilian noninstitutional population aged 12 or older residing in the 50 States and the District of Columbia. Analyses of NSDUH data compared measures of substance use and mental health in the past month and past year for a time period prior to the oil spill (2007 to 2009) to a time period after the oil spill (2011) for four areas: the 32 counties of the GCDA, the remainder of the Gulf Coast oil spill States (the remaining counties in the four impacted States), the remainder of the United States (the 47 States including the District of Columbia other than the four affected States), and the total United States. The following age groups were compared for the pre- and post-periods, although not all measures are available for all age groups: 12 or older, 18 or older, 12 to 17, 18 to 25, and 26 or older.

### *Substance Use Findings*

- The prevalence of any illicit drug use in the past month and the prevalence of marijuana use in the past month increased from the pre-spill period to the post-spill period for persons aged 12 or older in the GCDA. These differences were greater than the increase in past month

illicit drug use and marijuana use in the remainder of the United States or in the total United States.

- The prevalence of past month marijuana use in the GCDA increased from pre-spill to post-spill for adults aged 26 or older, but was similar in those time periods for those aged 12 to 17 or 18 to 25.
- For persons aged 18 to 25, the rate of past month nonmedical use of prescription-type pain relievers decreased from the pre- to post-spill period in the GCDA. This decrease was greater than the decrease found in the remainder of the United States.
- The prevalence of any past month alcohol use increased from the pre-spill period to the post-spill period for persons aged 12 or older, aged 18 or older, and aged 26 or older, in the GCDA. The rates of past month alcohol use in these age groups were similar in those time periods in the remainder of the United States and in the total United States.
- In the GCDA, rates in the pre-spill and post-spill periods were similar for past month nonmedical use of prescription-type psychotherapeutics, cigarettes, binge alcohol use, and heavy alcohol use, as well as for past year substance use disorder (defined as illicit drug or alcohol abuse or dependence).

### ***Mental Health Findings***

- The prevalence of major depressive episode in the past year increased from pre- to post-spill among persons aged 18 to 25 in the GCDA, but the prevalence was similar in these time periods in the other regions.
- The prevalence of serious thoughts of suicide in the past year increased from pre- to post-spill for persons aged 18 to 25 in the GCDA, but the prevalence was similar in these time periods for the other regions.
- The prevalence of suicide plans in the past year increased from pre- to post-spill in the GCDA among persons aged 18 or older and persons aged 18 to 25, but in these age groups, rates were similar across these time periods for the other regions.
- Among adults in the GCDA, rates in the pre-spill and post-spill periods were similar for past month psychological distress, as well as for past year any mental illness, serious mental illness, suicide attempts, and mental health services utilization.

### **Gulf States Population Survey**

The GSPS was a random-digit dial household telephone survey of residents aged 18 or older in 25 coastal counties in Alabama, Florida, Mississippi, and Louisiana most directly affected by the spill and noncoastal comparison counties within those four states. The GSPS included select questions from CDC's Behavioral Risk Factor Surveillance System (BRFSS; <http://www.cdc.gov/brfss/>) and other sources. Analyses compared the physical and mental health, health risk behaviors such as substance use, selected chronic disease indicators, and economic and environmental factors in coastal and noncoastal counties during the period



December 2010 to December 2011, as well as comparing selected measures from the GSPS to results from the BRFSS for those regions from 2004 to 2010. GSPS analyses included in this report are intended to be descriptive in nature. The tables include notations when estimates between coastal and noncoastal areas are found to be significant. Readers should note that these differences do not include controls for other factors such as age, race, or income.

The results generally do not indicate substantial differences in physical or mental health or health behaviors by state. Other than exposures to the oil spill, there were no substantial differences, in any of the factors measured, between coastal and noncoastal counties. As expected, sizeable coastal/noncoastal differences were noted for contact with oil from the spill, participation in clean-up activities, decreased household income, and loss of jobs due to the spill.

- Overall, 16 percent of the coastal population suffered moderate to severe depression in the 2 weeks before the interview, and 15 percent suffered moderate to severe anxiety in the last 2 weeks before the interview.
- Five percent of coastal residents reported suicidal ideation in the past year, 3 percent reported physical abuse by an intimate partner, and 10 percent reported emotional abuse.
- Sixteen percent of coastal residents reported fair/poor general health, 20 percent reported fair/poor physical health, 11 percent reported fair/poor mental health, 6 percent reported dissatisfaction with life, and 9 percent reported rarely/never receiving emotional support.
- When asked about unhealthy days within the preceding 30 days, 15 percent of coastal residents indicated that they had experienced 14 or more physically unhealthy days and 14 percent indicated that they had experienced 14 or more mentally unhealthy days.
- Fair/poor general health was less common in coastal counties/parishes post event than in the time period 2004 to 2010 but physically and mentally unhealthy days were similar to previous BRFSS estimates.
- With respect to risk behaviors among residents of coastal counties, 18 percent reported everyday smoking, 15 percent reported binge drinking, 6 percent reported heavy drinking (defined using BRFSS standard definitions as more than two drinks per day for males and more than one drink per day for females), and 3 percent reported having increased use of prescription medication without their physicians' advice. In addition, 27 percent did not exercise regularly.
- In a comparison to everyday smoking and binge drinking rates taken from the 2004 – 2010 BRFSS and the GSPS, no change in rates is discernible.
- Forty percent of coastal households had at least one child, and 11 percent of these households reported having a child experiencing depression, 17 percent reported a child who was nervous or afraid, 18 reported a child with problems sleeping, and 15 percent reported a child with problems getting along with other children.

## Conclusions

The analyses presented here provide the most comprehensive available description of a variety of physical and mental health behaviors and substance use patterns in the population of the Gulf Coast region most affected by the *Deepwater Horizon* oil spill. These data may be informative to public health officials as they determine priorities, and in planning and administration of mental and behavioral health services in this region.

The NSDUH results indicate that, after the oil spill, there were increases in past month marijuana and alcohol use among persons aged 12 or older and aged 26 or older; and increases in past year depression, serious suicide thoughts, and suicide plans, mostly among 18 to 25 year olds. However, the rates of cigarette use, nonmedical use of pain relievers, substance use disorder, psychological distress, any mental illness, serious mental illness, suicide attempts, and mental health services utilization were similar before and after the spill in the GCDA populations examined. Results of the GSPS indicated that people living in the coastal counties were more likely than those living in noncoastal counties to report decreased income or lost jobs because of the oil spill but did not indicate any substantial differences in chronic physical or mental health conditions or health behaviors between coastal and noncoastal counties in the region. BRFSS data collected in the 25 coastal counties between 2004 and 2010 were, for the most part, not substantially different from that in the year following the spill.

Although the changes in behavioral health after the spill noted cannot be ignored, this mixed picture could indicate that the behavioral health impact of the Gulf Coast oil spill may not be widespread across the entire population of the counties most affected by the spill. Unlike other disasters such as the *Exxon Valdez* oil spill or Hurricane Katrina, the impact of the *Deepwater Horizon* oil spill was more widely distributed and less intensely destructive. Resources that were mobilized to reduce the economic and behavioral health impacts of the oil spill on GCDA residents may have resulted in a reduction in mental health problems relative to what would have occurred if those resources had not been mobilized. Although these events may have had some positive impact on behavioral health outcomes, it is not possible using NSDUH or GSPS data to determine any specific explanation as to why there were not more marked region-level behavioral health problems following the oil spill. In addition, these analyses focus on the population of the region as a whole and there may have been more marked increases in mental health problems among subpopulations within the GCDA, such as those who were impacted economically by the oil spill.

## Future Analyses

The feasibility of conducting additional focused analyses (e.g., analyses that might explore comparisons of demographic groups other than age groups, such as persons who work in specific industries most affected by the oil spill) is currently being explored. Future analyses of NSDUH data may also examine pre- and post-oil spill substance use and mental health for specific subgroups such as gender and racial/ethnic groups, as well as the longer-term impacts of the oil spill on behavioral health in the affected area. If feasible, NSDUH data will also be used to assess behavioral health in the GCDA during the period of the oil spill (spring and summer 2010).

Further analyses of GPS data will (1) identify psychosocial determinants of health in the coastal population; (2) evaluate access and use of health care by people with depression and anxiety in the coastal population; (3) assess the direct and indirect costs of depression and anxiety in the coastal population; (4) assess associations of exposure to the oil spill and health; and (5) develop models of community resilience and health.

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# 1. Introduction

## 1.1 Background

On April 20, 2010, the *Deepwater Horizon* oil rig at the Macondo well, owned by Transocean Ltd., and contracted to BP, exploded and sank, killing 11 oil workers on the platform. Repeated efforts were made to cap the well, which was located 48 miles off the shore of Louisiana, but an estimated 55,000 barrels of oil per day continued to flow into the Gulf of Mexico for 87 days until the flow was stopped by a temporary cap placed on the well on July 15, 2010. Hundreds of square miles of coastline in Louisiana, Mississippi, Alabama, and Florida were affected by the oil spill. Beyond the direct impact felt by families and friends of the workers who died in the disaster, there is evidence that the oil spill had an almost immediate effect on the livelihood of many individuals and communities (Butler, 2010; Coastal Recovery Commission, 2011; National Institute for Occupational Safety and Health [NIOSH], 2010). Fishing, oil, and related industries were forced to slow or stop their operations, and tourism-related businesses suffered.

Soon after the oil spill began, a committee was appointed by the Institute of Medicine (IOM), at the request of the U.S. Department of Health and Human Services (HHS), and was charged with providing advice to HHS on research priorities for assessing the spill's health effects. IOM and other observers anticipated that this spill was likely to produce effects similar to those following the *Exxon Valdez* oil spill and Hurricane Katrina (see Chapter 2 for a summary of the health effects from prior oil spills). IOM suggested an underlying strategy of providing surveillance and monitoring of acute and long-term physical and behavioral health effects of the spill on workers and the public, implementing and evaluating control efforts for emerging health issues following the spill, and using the information to provide advice on the public health response to future disasters. Public health surveillance is particularly important for detecting and understanding physical and behavioral health needs after an event such as the oil spill. However, existing surveillance systems were insufficient to provide a full understanding of the overall public health impact of the spill.

In September 2010, 6 months following the spill, SAMHSA and the Centers for Disease Control and Prevention (CDC) initiated a series of data collection efforts supported by funds from BP, under a memorandum of agreement and conducted independently by SAMSHA and CDC, intended to assess the behavioral health status of the coastal population affected by the oil spill. These efforts focused on the residents of the Gulf Coast Disaster Area (GCDA), which includes counties and parishes in Alabama, Florida, Louisiana, and Mississippi (see [Figure 1.1](#)), and reported on the prevalence of mental health and substance use disorders and chronic health conditions, as well as on the utilization of behavioral health services. Data collection efforts included an oversample of residents in the GCDA conducted as part of the National Survey on Drug Use and Health (NSDUH), sponsored by SAMHSA, and the Gulf States Population Survey (GSPS), a survey of residents in the GCDA sponsored by CDC. Previously collected data for the region enabled the comparison of the behavioral health status for this population before and after the oil spill.

This report is the result of these efforts involving SAMHSA and CDC. The report focuses on the prevalence of behavioral-health issues (mental health problems, substance use and abuse, domestic violence) in the GCDA before and after the oil spill. NSDUH data also are available for the affected States in geographic areas outside of the GCDA and for the remainder of the United States. The next section discusses relevant data sources for surveillance and monitoring of effects of the oil spill on the physical and behavioral health of the population in the GCDA.

## **1.2 Description of Data Sources**

### **1.2.1 National Survey on Drug Use and Health (NSDUH)**

NSDUH is the primary source of statistical information on the use of illegal drugs, alcohol, and tobacco by the U.S. civilian, noninstitutionalized population aged 12 or older, and also provides information on mental health problems and mental health service utilization. Conducted by the Federal Government since 1971, the survey collects data through face-to-face interviews with a representative sample of the population at the respondent's place of residence. NSDUH collects information from residents of households and noninstitutional group quarters (e.g., shelters, rooming houses, dormitories) and from civilians living on military bases. The survey excludes homeless persons who do not use shelters, military personnel on active duty, and residents of institutional group quarters, such as jails and hospitals. NSDUH interview is conducted using computer-assisted interviewing (CAI). Most of the questions are administered with audio computer-assisted self-interviewing (ACASI). ACASI is designed to provide the respondent with a highly private and confidential mode for responding to questions in order to increase the level of honest reporting of illicit drug use and other sensitive behaviors. Less sensitive items are administered by interviewers using computer-assisted personal interviewing (CAPI). Appendix A provides additional details about NSDUH methods and measures. NSDUH provides national, State, and substate estimates of substance use and mental health problems annually.

The 2011 NSDUH included the Gulf Coast Oversample (GCO), which included additional interviews in Alabama, Florida, Louisiana, and Mississippi. The majority of these supplemental interviews were conducted in 32 designated counties and parishes that were identified as those most likely to be affected by the oil spill based on the following criteria:

- claims activity to BP for economic and related health needs;
- county and parish involvement with U.S. Department of Education and Administration for Children and Families programming; and
- State assessment of impacted counties and parishes based on consultation with SAMHSA during the preparation of aid applications.

The GCO increased the total sample size in these four States by approximately 2,000 completed interviews over the course of the year, with approximately 1,400 of the additional interviews in the 32 affected counties and the remaining 600 additional interviews in other counties within Alabama, Louisiana, and Mississippi. These additional 600 interviews were included to facilitate comparisons between the group of 32 counties and parishes in the affected

area and the rest of the States as a group. When added to the base samples for 2011 for these regions, the supplementary sample from the GCO resulted in 2,313 completed interviews in the 32 affected counties and parishes and 6,071 completed interviews in those four States outside of those 32 counties.

### **1.2.2 Gulf States Population Survey (GSPS)**

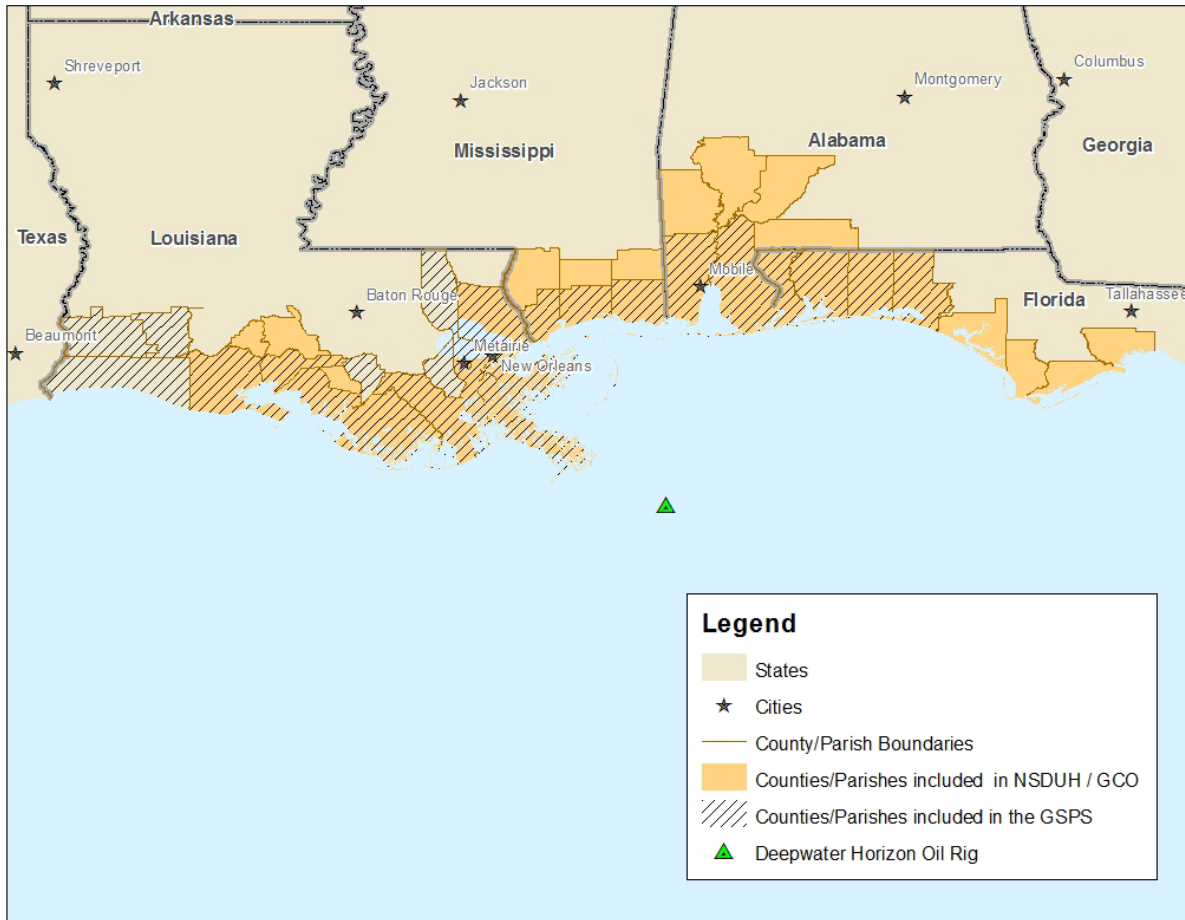
In addition to utilizing data collected through SAMHSA's NSDUH, CDC and SAMHSA entered into an interagency agreement (IAA) to administer the GSPS, a random-digit dial (RDD) telephone survey conducted from December 2010 through December 2011. The purpose of the GSPS was to provide State health departments and SAMHSA with the necessary data to assess the need for mental health services in the 25 coastal counties within 32 miles of an area where fishing was closed due to the oil spill. In May 2011, the GSPS sample area was extended to the entirety of the four Gulf States to allow comparison of results from the Gulf Coast counties to noncoastal counties. A total of 27,947 interviews were completed in coastal counties, and a total of 10,414 interviews were completed in noncoastal counties.

The 32 counties and parishes that were included in the 2011 NSDUH GCO, and the 25 coastal counties included in the GSPS, are shown in [Figure 1.1](#). The GSPS included the following parishes in Louisiana that were not included in the NSDUH GCO: Tangipahoa, Calcasieu, Jefferson Davis, Cameron, St. Charles, and Assumption. The NSDUH GCO included the following parishes and counties not included in the GSPS: Clarke, Escambia, Monroe, and Washington in Alabama; Bay, Franklin, Gulf, and Wakulla in Florida; St. Martin and Lafayette in Louisiana; George, Pearl River, and Stone in Mississippi.

### **1.2.3 SAMHSA Emergency Response Grants (SERG)**

In partnership with the Federal Government, 3 States in the GCDA also participated in the SERG program, which is intended to address emergent behavioral health surveillance needs of States affected by disasters. Alabama, Mississippi, and Louisiana received SERG grants. Although other sources of funding were available to supplement behavioral health services for populations impacted by the spill, no other resources existed to fund data collection, analysis, and reporting efforts within the region. SERG grantees initially developed community-level behavioral health indicators in order to understand how services can best meet the needs of the communities. However, the activities of SERG grantees in the GCDA are not yet complete. Therefore, findings from the GCDA SERG grantees are not included in this report but will be reported separately in the near future.

**Figure 1.1 Counties and Parishes Included in the NSDUH GCO and in the GSPS**



### **1.3 This Report and Its Organization**

This report is intended to address the following questions:

- What changes in behavioral health (substance use, mental health problems) and physical health occurred before and after the oil spill in the affected counties, and how did those changes compare to changes in other geographic regions?
- In the period after the oil spill, how did the behavioral and physical health of residents of coastal counties in the affected States compare with noncoastal counties in those same States?

The report is divided into chapters, and is organized as follows: Summary of Relevant Literature (Chapter 2), Findings from the Population Surveys (Chapter 3), Limitations and Future Analyses (Chapter 4), Discussion (Chapter 5), and References (Chapter 6). Technical appendices include NSDUH Methods (Appendix A), NSDUH Data Tables (Appendix B), and GSPS Questionnaire and Survey Methodology (Appendix C).



## 2. Summary of Relevant Literature

The 2010 explosion of the *Deepwater Horizon* oil platform and subsequent months-long oil spill in the Gulf of Mexico (referred to as the “Gulf Coast oil spill” in this chapter) constituted an ecological disaster unprecedented in magnitude, duration, complexity, and techniques used to manage the spill (Goldstein, Osofsky, & Lichtveld, 2011). These factors, combined with pre-existing vulnerabilities among residents of the Gulf Coast States, might result in significant adverse behavioral health effects—that is, effects on mental health and substance abuse. In this summary, we review the research findings on the behavioral health impacts of previous oil spills, as well as previously published studies specifically on the Gulf Coast oil spill.

Studies for inclusion in this review were identified through searches of PsychINFO<sup>®</sup>, MEDLINE<sup>®</sup>, PsychARTICLES<sup>®</sup>, the Psychology and Behavioral Sciences Collection<sup>™</sup> from EBSCOhost, and Google Scholar. The search terms included: [mental health, mental illness, substance abuse, or drug use] and [oil spill, chemical disaster, or technological disaster]. The search was limited to articles published in English. The reference lists of identified articles were then searched for additional sources. This initial search resulted in identifying 72 documents, and examining these reference lists identified 15 more articles and reports. This literature review focuses specifically on peer-reviewed *original* research, which excluded many of the documents identified in the original search, which were book chapters, reports, and commentaries (a review of media documentation has also been completed: RTI International, 2010).

### 2.1 Behavioral Health Impacts of Prior Oil Spills

There is little direct research into the behavioral health effects of individuals’ exposure to an oil spill. The majority of these studies involved psychological/psychiatric effects resulting from the *Exxon Valdez* oil spill in 1989, which resulted in 11 million gallons of oil leaking into communities in Prince William Sound, Alaska. Several other spills such as the *Prestige* oil spill in Galiza, Spain, in 2002, are also represented in research. These studies can be organized by specific outcomes of interest: nonspecific psychological stress/distress, psychiatric outcomes, substance abuse, and violence.

#### 2.1.1 Stress and Psychological Distress

Oil spill disasters may result in long-term chronic psychological distress. Picou and Gill (1996) found that approximately 18 months after the *Exxon Valdez* oil spill there were significantly higher levels of psychological stress among residents of communities inside the region of the spill than among residents of communities with similar demographics (e.g., age, sex, marital status, race/ethnicity, and household income distribution, percent of commercial fishing households) located outside of the oil spill area. Moreover, within the affected community, commercial fishers had significantly higher spill-related intrusive stress than nonfishers. As with many of these studies, there was no predisaster baseline information, and therefore analyses did not control for differences in communities at baseline.

Not all studies have found lasting general mental health effects. A study of mental health symptoms comparing communities exposed to the *Prestige* oil spill in Galiza, Spain, in 2002

with matched nonexposed communities 1.5 years after the disaster found that exposed residents (both community exposed and personally exposed) were not more likely to report general mental health problems than unexposed community residents (Carrasco et al., 2007). However, other researchers studying the impact of this same spill have documented specific psychiatric symptoms arising after the *Prestige* oil spill (see Sabucedo and colleagues, discussed in the next section: Sabucedo Cameselle, Arce Fernández, Ferraces Otero, Merino Madrid, & Durán Rodríguez, 2009; Sabucedo, Arce, Senra, Seoane, & Vázquez, 2010).

### **2.1.2 Psychiatric Symptoms and Disorders**

In 1996, the *Sea Empress* ran aground in a harbor in the southwest of Wales, spilling more than 130,000 tons of light crude oil. Lyons and colleagues (1999) reported that living in the area exposed to the spill was significantly associated with higher past-month anxiety and depression symptoms 4 weeks after the spill. In a similar, but separate analysis evaluating psychological symptoms of individuals randomly selected from general practitioners' records 7 weeks after exposure to the *Sea Empress* oil spill, Gallacher and colleagues (2007) found no significant relationship between oil spill exposure and the development of anxiety or depression symptoms. However, they did find that the perception of greater health risk related to oil exposure and perception of greater financial risk due to the spill were associated with depression and anxiety symptoms.

Other factors that have been implicated in the development of psychological symptoms resulting from exposure to an oil spill disaster include degree of exposure, social support, and economic aid received after a spill. Sabucedo and colleagues (2010) studied psychological symptoms approximately a year after exposure to the *Prestige* oil spill off the Galician coast and found that among the approximately 900 participants interviewed, symptoms of somatization, anxiety, depression, obsessive-compulsive disorder, and hostility were all significantly related to level of exposure (low, medium, high). Additionally, levels of anxiety and hostility in this sample were significantly lower among individuals with high levels of social support and among individuals who were satisfied with the financial aid they received after the disaster (Sabucedo Cameselle et al., 2009).

Palinkas and colleagues (1993a) conducted a set of descriptive analyses evaluating psychiatric diagnoses and depression symptoms among approximately 600 households a year after the *Exxon Valdez* oil spill (11 of the 13 sampling communities were directly exposed to the oil spill). They reported that the odds of past-year generalized anxiety disorder (GAD) and posttraumatic stress disorder (PTSD) among individuals from high-exposure communities were double those among individuals from communities not exposed to the spill and the odds of high past-week depression symptoms were 1.8 times greater among individuals from high-exposure communities compared with nonexposed communities. In a further analysis, Palinkas and colleagues (1993b) reported that women from high-exposure communities were particularly at risk for having GAD and high rates of depressive symptoms, compared with women from nonexposure communities. Additionally, the odds of having high levels of depressive symptoms or PTSD among those exposed to the oil spill were higher among Alaska Natives than among non-Hispanic whites (Palinkas, Petterson, Russell, & Downs, 2004).

In a study of commercial fishers in Cordova, Alaska, 6 years after the *Exxon Valdez* oil spill an estimated 23 percent of men and 13 percent of women reported clinically significant levels of anxiety; 39 percent of men and 20 percent of women reported clinically significant levels of depression; and 34 percent of males and 40 percent of female fishers had clinically significant PTSD symptoms (Arata, Picou, Johnson, & McNally, 2000). Moreover, regression analyses indicated that the level of current psychological symptoms was strongly related to resources reportedly lost directly as a result of the oil spill.

### **2.1.3 Substance Abuse**

One study was identified that addressed substance use following an oil spill disaster. In the Palinkas and colleagues (1993a) descriptive study of 600 households, more respondents in communities directly exposed to the *Exxon Valdez* oil spill reported increases in drinking, drinking problems, drug use, and drug problems among members of their community a year after the spill compared with residents not directly exposed to the spill. For example, 51.0 percent of Alaska Natives in the high-exposure communities reported more drinking problems since the spill, compared with 14.0 percent of Alaska Natives in nonexposed communities. Similar findings were demonstrated when respondents were asked about drinking and drug problems among family and friends.

## **2.2 Findings on the Impact of the Gulf Coast Oil Spill**

Public health officials were concerned that several vulnerabilities that existed in the Gulf Coast might complicate the recovery following the Gulf Coast oil spill, including experiencing prior trauma (Kennedy, 2010; Nelson, 2010; Voelker, 2010), prior resource losses (Arata et al., 2000; Ritchie, Gill, & Picou, 2011), and the public's loss of confidence in authority (Becker, 1997; Button, 1995; García-Mira, Real, Uzzell, San Juan, & Pol, 2006; Osofsky, Palinkas, & Galloway, 2010; Solomon & Janssen, 2010).

The experience of prior trauma is a significant risk factor for developing negative behavioral health outcomes after a traumatic event (Neria, Nandi, & Galea, 2008). Although the Gulf Coast oil spill occurred 5 years after Hurricanes Katrina and Rita, it is possible that individuals dually exposed to the hurricanes and the Gulf Coast oil spill might be more likely to report negative behavioral health outcomes and a greater constellation of symptoms as past traumatic stress is "reactivated" (Voelker, 2010). Moreover, resource loss is one of the most consistently demonstrated risk factors for negative behavioral health conditions following a technological disaster. In a study evaluating mental health functioning 6 years after the *Exxon Valdez* oil spill, Arata and colleagues (2000) identified income loss as one of the most important predictors of depression, anxiety, and PTSD among individuals affected by that disaster. The fishing and oil industry workers were both affected by the Gulf Coast oil spill not long after facing the disruption from Hurricanes Katrina and Rita.

Another factor involved in the potential development of adverse behavioral health conditions after a technological disaster is general uncertainty and a loss of confidence in authorities (Becker, 1997; Button, 1995; García-Mira et al., 2006), both of which were documented after the Gulf Coast oil spill (Safina, 2011). In a natural disaster, people generally agree that there is no person directly to blame (experiencing the disaster as an act of God or

nature); however, in a technological disaster such as an oil spill (or the levee failures in New Orleans that occurred during Hurricane Katrina), conflict can arise about who is responsible (e.g., government, industry, workers) (Becker, 1997; Button, 1995; Safina, 2011). This can lead to significant community division. Additionally, public health professionals were uncertain about the long-term health effects of the Gulf Coast oil spill on community residents (Slomski, 2010; Solomon & Janssen, 2010), and environmental experts were uncertain about the long-term ecological impacts (Becker, 1997; Button, 1995; Safina, 2011), which could engender a further lack of confidence in authorities (Miraglia, 2002).

Studies that have investigated behavioral health conditions following the Gulf Coast oil spill had had inconsistent findings. Gill and colleagues (2012) compared the level of event-specific psychological distress of 412 residents of southern Mobile County, Alabama, 5 months after the start of the Gulf Coast oil spill with results observed in analyses of the city of Cordova, Alaska, which was significantly affected by the *Exxon Valdez* oil spill. Analyses indicated that the distribution of event-specific psychological stress among Mobile residents as measured by *The Impact of Event Scale* (Horowitz, Wilner, & Alvarez, 1979) was similar to that found in Cordova in the year following the *Exxon Valdez* oil spill. In both samples, 37 percent of those surveyed reported mild levels of psychological distress; 25 percent of Mobile residents reported moderate psychological distress, compared with 37 percent of Cordova residents; 20 percent of Mobile residents reported subclinical levels of psychological distress, compared with 11 percent of Cordova residents; and 18 percent of Mobile residents had clinical levels of psychological distress, which was similar to the 15 percent reported among Cordova residents.

In a small study comparing 23 residents of a community directly affected by the Gulf Coast oil spill (oil reached the shoreline) with 71 residents of a community indirectly affected by the spill (oil did not reach the shoreline but affected fishing and tourism), Grattan and colleagues (2011) found no difference in rates of psychological distress between communities as measured by the *Profile of Mood States* (McNair et al. 1992). However, in both communities, psychological distress was higher among those with spill-related income loss than among those without spill-related income loss. This study must be interpreted with caution, however, because sample sizes were small, potential confounding variables were not controlled for, and sampling biases suggest a nonrepresentative sample of the population.

Osofsky and colleagues (2011) have also recently examined factors related to psychological distress and PTSD symptoms in the Gulf Coast region. Among the 452 adults interviewed from four parishes in Louisiana between August and December 2010, 12 percent of respondents exceeded the cutoff for probable PTSD (as measured by the *Posttraumatic Symptom Checklist for Civilians* [Weathers, Litz, Herman, Huska, & Keane T, 1993]), and 15 percent had elevated levels of psychological distress (scores on the Kessler-6 scale [Kessler et al., 2003] of 13 or higher). Psychological distress symptoms were significantly higher among those reporting disruption in life, work, and family as a result of the oil spill. The Osofsky and colleagues (2011) study used a convenience sample (recruited through community events) with oversampling of individuals directly in closer proximity to the oil spill, and thus did not include representative sample of the region as a whole. In another study, Lee and Blanchard (2012) surveyed three coastal Louisiana parishes during the Gulf Coast oil spill, finding adults who had higher levels of community attachment were the most likely to report high levels of negative affect, regardless of their ties to the fishing community, the oil industry, or neither industry. Furthermore, reports

from mental health professionals (Devi, 2010) and call volumes on mental health and domestic violence hotlines (Goldstein et al., 2011) suggested initial increases in levels of anxiety, depression, substance abuse, and domestic violence following the oil spill.

Taken together, these studies suggest that the Gulf Coast oil spill did have some effect on the behavioral health of Gulf Coast residents who were directly affected by the spill. These studies do not address the issue of a broader, population-level impact on the region as a whole. The intention of the current report is to use data from two population-based surveys to provide an initial look at the behavioral and physical health of the region affected by the Gulf Coast oil spill.

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# 3. Findings from Population Surveys

This chapter presents findings from two population surveys related to substance use, mental health problems, and physical health problems in the regions of the Gulf Coast affected by the *Deepwater Horizon* oil spill. Data from the National Survey on Drug Use and Health (NSDUH) provide comparisons of substance use and mental health in this region both before and after the spill. Data from the Gulf States Population Survey (GSPS) provide comparisons of substance use, mental health, and physical health issues in coastal and noncoastal counties in the affected region after the oil spill, as well as providing comparisons with data from these same regions before the oil spill from the Behavioral Risk Factor Surveillance System (BRFSS) data.

## 3.1 National Survey on Drug Use and Health (NSDUH)

Analyses of NSDUH data involved comparisons between the pre-oil spill period (combined 2007 to 2009 data) and the post-oil spill period (2011). Future analyses may include comparisons between these periods and the “event” period during 2010.

For comparison, estimates of behavioral health in these two time periods are presented separately for four geographic regions:

- the Gulf Coast Disaster Area (GCDA; the 32 counties or parishes in Louisiana, Mississippi, Alabama, and Florida that were most affected by the Gulf Coast oil spill);
- the remainder of the Gulf Coast oil spill States (all counties or parishes in those four States other than the 32 included in the GCDA);
- the remainder of the United States (all States and the District of Columbia other than Louisiana, Mississippi, Alabama, and Florida); and
- the total United States.

### 3.1.1 Past Month Substance Use and Mental Health Measures

Illicit Drug Use. Respondents aged 12 or older provide information on past month illicit drug use, including marijuana/hashish, cocaine (including crack), heroin, hallucinogens, inhalants, as well as the nonmedical use of prescription-type pain relievers, tranquilizers, stimulants, and sedatives (collectively referred to as "psychotherapeutics"). Estimates of "illicit drug use" included in this report reflect the use of any of these nine drug categories. Estimates are also presented for past month use of marijuana/hashish, nonmedical use of prescription-type psychotherapeutics, and pain relievers.

Cigarette Use. Respondents aged 12 or older provide information on past month cigarette use, defined as smoking "part or all of a cigarette" in the last 30 days.

Alcohol Use. Respondents aged 12 or older provide information on the recency and frequency of consumption of alcoholic beverages, such as beer, wine, whiskey, brandy, and

mixed drinks. For this report, estimates for the prevalence of alcohol use are reported at three levels defined for both males and females and for all ages as follows:

- Current (past month) use: At least one drink in the past 30 days.
- Binge use: Five or more drinks on the same occasion (i.e., at the same time or within a couple of hours of each other) on at least 1 day in the past 30 days.
- Heavy use: Five or more drinks on the same occasion on each of 5 or more days in the past 30 days.

Note that the definitions of binge and heavy alcohol use used in NSDUH differ from the definitions for these measures used in the GSPS.

Psychological Distress. Respondents aged 18 or older provide information on nonspecific psychological distress in the past month using the Kessler-6 (K6) scale (Kessler et al., 2003). The six domains covered by the questions on the K6 correspond to how nervous, hopeless, restless or fidgety, sad or depressed, or worthless the respondent felt and to what extent everything felt like an effort to the respondent. This report includes estimates of past 30-day serious psychological distress (SPD; K6 scores of 13 or higher), as well as the mean K6 score (range of 0 to 24), among adults aged 18 or older. Questions about past month psychological distress were not included in the 2007 NSDUH, so estimates from the pre-oil spill period are based on 2008 and 2009 data only.

### **3.1.2 Past Year Substance Use Disorder and Mental Health Measures**

Substance Use Disorder. Substance use disorder (SUD) refers to past year alcohol or illicit drug dependence or abuse. Substance dependence or abuse is based on definitions found in the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV).

Major Depressive Episode. Major depressive episode (MDE) is defined as in the DSM-IV, which specifies a period of at least 2 weeks when a person experienced a depressed mood or loss of interest or pleasure in daily activities and had a majority of specified depression symptoms. Respondents with unknown past year MDE were excluded. Estimates for MDE are presented for adolescents and for adults separately; because of variation in question wording for adolescents and adults, as well as variation in the context of those questions within the survey, estimates are not presented for all persons 12 or older.

Any Mental Illness and Serious Mental Illness. Any mental illness (AMI) is defined as having a diagnosable mental, behavioral, or emotional disorder, other than a substance use disorder, that met the criteria found in the DSM-IV. Serious mental illness (SMI) among adults is defined as persons aged 18 with AMI who also reported in substantial impairment in carrying out major life activities. These measures are not available for 2007; therefore the pre-oil spill estimates are based on 2008 and 2009 data only.

Suicidality. Adults aged 18 or older were asked whether they had seriously thought about trying to kill themselves at any time during the past 12 months. Those saying yes to having



serious thoughts about suicide were also asked if they made any plans to kill themselves or attempted suicide anytime during the past 12 months.

Mental Health Treatment/Counseling. Receipt of mental health treatment or counseling for adults aged 18 is defined as having received inpatient care or outpatient care or having used prescription medication for problems with emotions, nerves, or mental health. For this report, estimates were generated of the receipt of *any mental health treatment or counseling*, as well as receipt of *outpatient mental health treatment or counseling* (defined as outpatient treatment received at [1] an outpatient mental health clinic or center, [2] the office of a private therapist, psychologist, psychiatrist, social worker, or counselor that was not part of a clinic, [3] a doctor's office that was not part of a clinic; [4] an outpatient medical clinic; [5] a partial day hospital or day treatment program; or [6] some other place). Respondents were not to include treatment for drug or alcohol use. Respondents with unknown treatment/counseling information were excluded.

Receipt of Specialty Mental Health Services. Receipt of specialty mental health services for persons aged 12 to 17 is defined as having received treatment/counseling for emotional or behavioral problems not caused by drug or alcohol use from an outpatient source including (1) private therapist, psychologist, psychiatrist, social worker, or counselor; (2) mental health clinic or center; (3) partial day hospital or day treatment program; or (4) in-home therapist, counselor, or family preservation worker, or from an inpatient source with overnight or longer stay in a (a) hospital; (b) residential treatment center; or (c) foster care or therapeutic foster care home.

### **3.1.3 Analytic Strategy**

For the NSDUH data included in this report, statistical tests have been conducted for all statements appearing in the text of the report that compare estimates between survey years. Unless explicitly stated that a difference is not statistically significant, all statements that describe differences between survey years are significant at either the .05 or .10 level. Although there is less confidence in conclusions reached from the tests with an alpha level between .05 and .10 than from tests with an alpha below .05, differences are considered significant up to an alpha level of .10 in this report because of the relatively low level of statistical power for these tests due to the limited sample size in the GCDA. In situations where differences are presented with alpha levels between .05 and .10, the *p* value is presented. In addition, reliability checks were conducted on all NSDUH estimates, and no estimates were excluded due to low precision.

In the NSDUH tables included in this chapter and in Appendix B of this report, substance use and mental health measures are compared between the pre-oil spill period and the post-oil spill period within each of the four geographic areas (GCDA, remainder of the Gulf Coast States, remainder of the United States, and the total United States). Estimates are presented for all persons aged 12 or older, for all adults aged 18 or older, as well as for those aged 12 to 17, 18 to 25, and 26 or older (the NSDUH sample is divided approximately equally between these last three age groups). It is possible that changes over time in the GCDA may reflect regional or national trends rather than the impact from the oil spill. For this reason, analyses were conducted that tested whether there was greater change in the GCDA than in the remainder of the Gulf

Coast States, the remainder of the United States, or the total United States. Additional information on these statistical tests is presented in Section A.5 of Appendix A.

Additional detailed tables, including estimated number of persons who used substances or had mental health problems in each region, standard errors of estimates, and *p* values from statistical tests are presented in Appendix B.

It should be noted that for some respondents, the past year measures from the 2011 survey overlap with the time of the oil spill. For example, a respondent interviewed in January 2011 who reports having a MDE in the past year could have been referring to an episode that happened at any time in 2010, meaning that the episode could have occurred before the spill, during the spill, or after the spill. It also should be noted that all estimates presented from the NSDUH are weighted and representative of the population. Thus, findings are presented in terms of residents in the population and not in terms of persons in the sample.

### **3.1.4 Demographic and Socioeconomic Characteristics**

Demographic and socioeconomic characteristics across the two time periods and the four geographic areas are presented in [Table 3.1](#). In the pre-oil spill period, approximately 3.1 million persons aged 12 or older lived in the oil spill area, 22.1 million lived in the remainder of the Gulf Coast States, and 224.7 million lived in the remainder of the United States. The population in the oil spill area and in the remainder of the Gulf Coast States increased by about 4.5 percent from the pre-oil spill to the post-oil spill periods, whereas the population in the remainder of the United States increased by about 2.2 percent during between these periods.

Compared with the remainder of the United States, persons living in the GCDA were:

- more likely to be non-Hispanic black and less likely to be Hispanic;
- more likely to have less than a high school education;
- more likely to have an annual household income of \$20,000 or less; and
- similar in regards to age group, gender composition, and employment status.

The following trends in demographic and socioeconomic characteristics of the GCDA before and after the spill were also observed in the remainder of the GCDA and in the remainder of the United States:

- a smaller percentage of residents had less than a high school education after the spill;
- a smaller percentage of residents were employed full time after the spill; and
- the percentages were similar for gender, Hispanic origin and race, and family income before and after the spill.

**Table 3.1 Numbers in Thousands and Percent Distribution of Persons for Geographic Area and Time Period by Demographic and Socioeconomic Characteristics: 2007-2009 and 2011 NSDUH**

Demographic/ Socioeconomic Characteristic	Gulf Coast Oil Spill Disaster Area		Remainder of Gulf Coast States		Remainder of United States		Total United States	
	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011
<b>POPULATION ESTIMATE<sup>1</sup></b>	3,069	3,207	22,065	23,038	224,691	231,353	249,825	257,599
<b>AGE<sup>1</sup></b>								
12-17	10.1	9.6	9.3	9.0	10.0	9.8	10.0	9.7
18 or Older	89.9	90.4	90.7	91.0	90.0	90.2	90.0	90.3
18-25	12.7	12.8	12.5	12.7	13.3	13.4	13.2	13.3
26 or Older	77.1	77.6	78.2	78.3	76.6	76.9	76.8	77.0
<b>GENDER<sup>1</sup></b>								
Male	47.5	47.8	48.0	47.9	48.6	48.4	48.5	48.4
Female	52.5	52.2	52.0	52.1	51.4	51.6	51.5	51.6
<b>HISPANIC ORIGIN AND RACE<sup>1</sup></b>								
Not Hispanic or Latino								
Latino	96.4	95.5	85.2	83.6	85.9	84.7	86.0	84.7
White	70.1	68.2	62.8	60.4	68.3	66.1	67.8	65.7
Black or African American	23.3	23.1	19.7	19.8	10.9	10.8	11.9	11.8
Other	3.0	4.2	2.7	3.4	6.7	7.7	6.3	7.3
Hispanic or Latino	3.6	4.5	14.8	16.4	14.1	15.3	14.0	15.3
<b>EDUCATION</b>								
< High School	21.2 <sup>a</sup>	16.5	17.9 <sup>a</sup>	15.6	15.5 <sup>a</sup>	14.0	15.8 <sup>a</sup>	14.2
High School Graduate	35.4	35.7	33.9 <sup>b</sup>	31.2	30.4	29.8	30.7 <sup>b</sup>	30.0
Some College	25.0	27.5	26.1	26.7	25.5 <sup>a</sup>	26.5	25.6 <sup>a</sup>	26.5
College Graduate	18.4	20.4	22.1 <sup>a</sup>	26.5	28.6 <sup>a</sup>	29.7	27.9 <sup>a</sup>	29.3
<b>CURRENT EMPLOYMENT</b>								
Full-Time	52.6 <sup>a</sup>	47.4	50.6 <sup>a</sup>	46.2	53.4 <sup>a</sup>	50.1	53.1 <sup>a</sup>	49.8
Part-Time	11.1	13.2	11.6 <sup>a</sup>	13.3	13.8	14.0	13.6	13.9
Unemployed	4.0 <sup>a</sup>	6.8	4.7 <sup>a</sup>	6.5	4.6 <sup>a</sup>	5.8	4.6 <sup>a</sup>	5.8
Other	32.3	32.6	33.1	34.0	28.2 <sup>a</sup>	30.1	28.7 <sup>a</sup>	30.5
<b>FAMILY INCOME</b>								
Less Than \$20,000	22.5	21.0	21.3	22.6	17.0 <sup>a</sup>	18.8	17.5 <sup>a</sup>	19.2
\$20,000 - \$49,999	36.9	37.5	36.5	37.1	32.1	31.8	32.6	32.4
\$50,000 - \$74,999	15.9	16.6	18.1	16.3	18.0 <sup>a</sup>	17.1	18.0 <sup>a</sup>	17.0
\$75,000 or More	24.7	24.9	24.1	24.0	32.8	32.2	31.9	31.4

NOTE: This table corresponds to [Table B.1B](#) in Appendix B of this report, which contains additional information on this table.

<sup>a</sup> Difference between Pre-Oil Spill estimate and Post-Oil Spill estimate is statistically significant at the .05 level.

<sup>b</sup> Difference between Pre-Oil Spill estimate and Post-Oil Spill estimate is statistically significant at the .10 level.

<sup>c</sup> Difference between area effect (Post-Oil Spill Period estimate minus Pre-Oil Spill Period estimate) for this geographic region and the area effect for the Gulf Coast Oil Spill Disaster Area is statistically significant at the .05 level.

<sup>d</sup> Difference between area effect (Post-Oil Spill Period estimate minus Pre-Oil Spill Period estimate) for this geographic region and the area effect for the Gulf Coast Oil Spill Disaster Area is statistically significant at the .10 level.

<sup>1</sup> The size of this domain is forced to match the U.S. Census Bureau population estimate through the weight calibration process, and so is free of sampling error. Therefore, statistically significant differences were not tested for this subpopulation.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2007-2009 (revised March 2012) and 2011.

### 3.1.5 Past Month Illicit Drug Use among Adolescents and Adults

Estimates of past month substance use among persons aged 12 or older are presented in [Table 3.2](#).

- For persons aged 12 or older, the prevalence of past month illicit drug use in the GCDA increased from 7.1 percent in the pre-oil spill period to 9.7 percent in the post-oil spill period. There was also an increase in past month illicit drug use in the total United States. The increase in the GCDA was greater than the change between these periods in the remainder of the United States ( $p = .0994$ ) and the total United States ( $p = .0995$ ).
- The prevalence of past month marijuana use in the GCDA increased from 4.7 percent in the pre-oil spill period to 7.3 percent in the post-oil spill period. There were also increases in past month marijuana use in the remainder of the United States and the total United States, but the increase in the GCDA was greater than the change between these periods for the remainder of the United States ( $p = .0646$ ) and the total United States ( $p = .0649$ ).

**Table 3.2 Past Month Substance Use among Persons Aged 12 or Older, by Geographic Region and Time Period: Percentages, 2007-2009 and 2011 NSDUH**

Past Month Substance Use	Gulf Coast Oil Spill Disaster Area		Remainder of Gulf Coast States		Remainder of United States		Total United States	
	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011
<b>SUBSTANCE USE</b>								
Illicit Drugs	7.1 <sup>a</sup>	9.7	7.7	8.2	8.3 <sup>b</sup>	8.7 <sup>d</sup>	8.3 <sup>a</sup>	8.7 <sup>d</sup>
Marijuana	4.7 <sup>a</sup>	7.3	5.5 <sup>b</sup>	6.3	6.3 <sup>a</sup>	7.1 <sup>d</sup>	6.2 <sup>a</sup>	7.0 <sup>d</sup>
Nonmedical Use of Prescription-Type Psychotherapeutics	3.4	3.5	2.8	2.3	2.7 <sup>a</sup>	2.4	2.7 <sup>a</sup>	2.4
Pain Relievers	2.6	2.6	2.1	1.6	2.0 <sup>a</sup>	1.7	2.0 <sup>a</sup>	1.7
Cigarettes	26.9	27.6	24.7	23.6	23.7 <sup>a</sup>	21.8	23.8 <sup>a</sup>	22.1
Alcohol	48.1 <sup>b</sup>	53.1	48.8	49.2	51.9	52.0 <sup>d</sup>	51.6	51.8 <sup>d</sup>
Binge Alcohol	23.9	22.5	22.1 <sup>b</sup>	20.2	23.6 <sup>a</sup>	22.9	23.5 <sup>a</sup>	22.6
Heavy Alcohol	6.5	7.1	6.7	6.4	6.9 <sup>a</sup>	6.1	6.9 <sup>a</sup>	6.2

NOTE: Measures included in this table are defined in Section 3.1.1. This table corresponds to [Table B.2B](#) in Appendix B of this report, which contains additional information on this table.

<sup>a</sup> Difference between Pre-Oil Spill estimate and Post-Oil Spill estimate is statistically significant at the .05 level. P-values are located in Appendix B [table B.2P](#).

<sup>b</sup> Difference between Pre-Oil Spill estimate and Post-Oil Spill estimate is statistically significant at the .10 level. P-values are located in Appendix B [table B.2P](#).

<sup>c</sup> Difference between area effect (Post-Oil Spill Period estimate minus Pre-Oil Spill Period estimate) for this geographic region and the area effect for the Gulf Coast Oil Spill Disaster Area is statistically significant at the .05 level. P-values are located in Appendix B [table B.11](#).

<sup>d</sup> Difference between area effect (Post-Oil Spill Period estimate minus Pre-Oil Spill Period estimate) for this geographic region and the area effect for the Gulf Coast Oil Spill Disaster Area is statistically significant at the .10 level. P-values are located in Appendix B [table B.11](#).

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2007-2009 (revised March 2012) and 2011.

- The prevalence of past month alcohol use in the GCDA increased from 48.1 percent in the pre-oil spill period to 53.1 percent in the post-oil spill period ( $p = .0734$ ). This difference was greater than the difference between these time periods in the remainder of the United States ( $p = .0881$ ) and the total United States ( $p = .0890$ ).
- For persons aged 12 or older, there were not statistically significant differences in the past month use of any other substances shown in [Table 3.2](#) between the pre-spill and post-spill periods in the GCDA.

Estimates of past month substance use and psychological distress among persons aged 18 or older are presented in [Table 3.3](#).

**Table 3.3 Past Month Substance Use and Psychological Distress among Persons Aged 18 or Older, by Geographic Region and Time Period: Percentages, 2007-2009 and 2011 NSDUH**

Past Month Substance Use	Gulf Coast Oil Spill Disaster Area		Remainder of Gulf Coast States		Remainder of United States		Total United States	
	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011
<b>SUBSTANCE USE</b>								
Illicit Drugs	7.1 <sup>b</sup>	9.9	7.6	8.2	8.2 <sup>b</sup>	8.6	8.1 <sup>a</sup>	8.6
Marijuana	4.6 <sup>a</sup>	7.6	5.5	6.3 <sup>d</sup>	6.2 <sup>a</sup>	7.0 <sup>c</sup>	6.1 <sup>a</sup>	6.9 <sup>c</sup>
Nonmedical Use of Prescription-Type Psychotherapeutics	3.5	3.5	2.7	2.3	2.6 <sup>a</sup>	2.3	2.6 <sup>a</sup>	2.3
Pain Relievers	2.7	2.6	2.0	1.6	2.0 <sup>a</sup>	1.7	2.0 <sup>a</sup>	1.7
Cigarettes	28.7	29.5	26.3	25.3	25.3 <sup>a</sup>	23.3	25.4 <sup>a</sup>	23.6
Alcohol	51.4 <sup>b</sup>	57.1	52.3	52.9	56.0	56.2 <sup>d</sup>	55.6	55.9 <sup>d</sup>
Binge Alcohol	25.5	24.1	23.4	21.6	25.2 <sup>b</sup>	24.6	25.1 <sup>a</sup>	24.3
Heavy Alcohol	7.0	7.8	7.2	6.9	7.4 <sup>a</sup>	6.6	7.4 <sup>a</sup>	6.7
<b>PSYCHOLOGICAL DISTRESS</b>								
Serious Psychological Distress	5.6	5.3	4.7	5.4	4.6	4.6	4.6	4.7
Average K6 Score	3.8	3.5	3.7	3.6	3.8 <sup>a</sup>	3.7	3.8 <sup>a</sup>	3.7

NOTE: Measures included in this table are defined in Section 3.1.1. This table corresponds to [Table B.3B](#) in Appendix B of this report, which contains additional information on this table.

<sup>a</sup> Difference between Pre-Oil Spill estimate and Post-Oil Spill estimate is statistically significant at the .05 level. P-values are located in Appendix B [table B.3P](#).

<sup>b</sup> Difference between Pre-Oil Spill estimate and Post-Oil Spill estimate is statistically significant at the .10 level. P-values are located in Appendix B [table B.3P](#).

<sup>c</sup> Difference between area effect (Post-Oil Spill Period estimate minus Pre-Oil Spill Period estimate) for this geographic region and the area effect for the Gulf Coast Oil Spill Disaster Area is statistically significant at the .05 level. P-values are located in Appendix B [table B.12](#).

<sup>d</sup> Difference between area effect (Post-Oil Spill Period estimate minus Pre-Oil Spill Period estimate) for this geographic region and the area effect for the Gulf Coast Oil Spill Disaster Area is statistically significant at the .10 level. P-values are located in Appendix B [table B.12](#).

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2007-2009 (revised March 2012) and 2011.

- For persons aged 18 or older, the prevalence of past month illicit drug use in the GCDA increased from 7.1 percent in the pre-oil spill period to 9.9 percent in the post-oil spill period ( $p = .0590$ ). This increase was not significantly different than the changes between these time periods in any of the other regions.
- The prevalence of past month marijuana use in the GCDA increased from 4.6 percent in the pre-oil spill period to 7.6 percent in the post-oil spill period. There were also increases in past month marijuana use in the remainder of the United States and the total United States, but the increase in the GCDA was greater than the change between these periods in remainder of the Gulf Coast States ( $p = .0681$ ), and was also greater than the change between these periods for the remainder of the United States and the total United States.
- The prevalence of past month alcohol use in the GCDA increased from 51.4 percent in the pre-oil spill period to 57.1 percent in the post-oil spill period ( $p = .0606$ ). This difference was greater than the difference between these time periods in the remainder of the United States ( $p = .0775$ ) or the total United States ( $p = .0786$ ).
- For persons aged 18 or older, there were no statistically significant differences in the past month use of any other substances shown in [Table 3.3](#) between the pre-spill and post-spill periods in the GCDA.

Estimates of past month substance use among adolescents aged 12 to 17 are presented in [Table 3.4](#).

- For persons aged 12 to 17, there were no statistically significant differences in the past month use of any other substances shown in [Table 3.4](#) between the pre-spill and post-spill periods in the GCDA.

**Table 3.4 Past Month Substance Use among Persons Aged 12 to 17, by Geographic Region and Time Period: Percentages, 2007-2009 and 2011 NSDUH**

Past Month Substance Use	Gulf Coast Oil Spill Disaster Area		Remainder of Gulf Coast States		Remainder of United States		Total United States	
	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011
<b>SUBSTANCE USE</b>								
Illicit Drugs	7.4	8.5	8.8	8.4	9.8	10.3	9.7	10.1
Marijuana	5.4	4.7	5.5	6.4	7.1 <sup>a</sup>	8.1	6.9 <sup>a</sup>	7.9
Nonmedical Use of Prescription-Type Psychotherapeutics	2.7	3.4	3.5	3.2	3.1 <sup>a</sup>	2.7	3.1 <sup>a</sup>	2.8
Pain Relievers	2.2	2.9	3.0	2.4	2.5 <sup>b</sup>	2.2	2.5 <sup>b</sup>	2.3
Cigarettes	10.8	10.0	8.7 <sup>a</sup>	6.3	9.4 <sup>a</sup>	7.9	9.4 <sup>a</sup>	7.8
Alcohol	18.7 <sup>b</sup>	15.1	14.7 <sup>a</sup>	11.8	15.2 <sup>a</sup>	13.4	15.2 <sup>a</sup>	13.3
Binge Alcohol	9.9	8.1	8.6 <sup>a</sup>	6.4	9.2 <sup>a</sup>	7.5	9.2 <sup>a</sup>	7.4
Heavy Alcohol	2.3	1.1	2.0 <sup>a</sup>	1.1	2.2 <sup>a</sup>	1.6	2.2 <sup>a</sup>	1.5

NOTE: Measures included in this table are defined in Section 3.1.1. This table corresponds to [Table B.4B](#) in Appendix B of this report, which contains additional information on this table.

<sup>a</sup> Difference between Pre-Oil Spill estimate and Post-Oil Spill estimate is statistically significant at the .05 level. P-values are located in Appendix B [table B.4P](#).

<sup>b</sup> Difference between Pre-Oil Spill estimate and Post-Oil Spill estimate is statistically significant at the .10 level. P-values are located in Appendix B [table B.4P](#).

<sup>c</sup> Difference between area effect (Post-Oil Spill Period estimate minus Pre-Oil Spill Period estimate) for this geographic region and the area effect for the Gulf Coast Oil Spill Disaster Area is statistically significant at the .05 level. P-values are located in Appendix B [table B.13](#).

<sup>d</sup> Difference between area effect (Post-Oil Spill Period estimate minus Pre-Oil Spill Period estimate) for this geographic region and the area effect for the Gulf Coast Oil Spill Disaster Area is statistically significant at the .10 level. P-values are located in Appendix B [table B.13](#).

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2007-2009 (revised March 2012) and 2011.

Estimates of past month substance use and psychological distress among young adults aged 18 to 25 are presented in [Table 3.5](#).

- Among adults aged 18 to 25, the prevalence of nonmedical use of prescription-type psychotherapeutics decreased from 8.1 percent in the pre-oil spill period to 5.5 percent in the post-oil spill period in the GCDA ( $p = .0763$ ). This decrease was not significantly different than the changes between these time periods in any of the other regions.
- The prevalence of past month nonmedical use of pain relievers decreased from 7.0 percent in the pre-oil spill period to 3.5 percent in the post-oil spill period in the GCDA. There were also decreases between these periods for each of the other three geographic regions. The decrease in the GCDA was greater than the decrease in the remainder of the United States, and also greater than the change between these periods for the total United States ( $p = .0567$ ).
- For persons aged 18 to 25, there were no statistically significant differences in the past month use of any other substances shown in [Table 3.5](#) between the pre-spill and post-spill periods in the GCDA.

**Table 3.5 Past Month Substance Use and Psychological Distress among Persons Aged 18 to 25, by Geographic Region and Time Period: Percentages, 2007-2009 and 2011 NSDUH**

Past Month Substance Use	Gulf Coast Oil Spill Disaster Area		Remainder of Gulf Coast States		Remainder of United States		Total United States	
	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011
<b>SUBSTANCE USE</b>								
Illicit Drugs	16.6	18.1	18.3	19.8	20.5 <sup>a</sup>	21.6	20.3 <sup>a</sup>	21.4
Marijuana	13.0	16.1	14.9 <sup>a</sup>	17.5	17.4 <sup>a</sup>	19.2	17.1 <sup>a</sup>	19.0
Nonmedical Use of Prescription-Type Psychotherapeutics	8.1 <sup>b</sup>	5.5	6.2 <sup>a</sup>	4.1	6.0 <sup>a</sup>	5.1	6.1 <sup>a</sup>	5.0
Pain Relievers	7.0 <sup>a</sup>	3.5	4.6 <sup>a</sup>	2.8	4.6 <sup>a</sup>	3.6 <sup>c</sup>	4.7 <sup>a</sup>	3.6 <sup>d</sup>
Cigarettes	36.5	36.6	35.3 <sup>b</sup>	32.4	36.0 <sup>a</sup>	33.6	35.9 <sup>a</sup>	33.5
Alcohol	56.8	58.7	56.5	57.2	61.9	61.0	61.4	60.7
Binge Alcohol	35.6	35.6	37.0 <sup>b</sup>	34.3	42.1 <sup>a</sup>	40.4	41.6 <sup>a</sup>	39.8
Heavy Alcohol	10.4	10.5	12.3	11.1	14.6 <sup>a</sup>	12.3	14.4 <sup>a</sup>	12.1
<b>PSYCHOLOGICAL DISTRESS</b>								
Serious Psychological Distress	8.4	8.8	7.5	8.4	7.6	7.6	7.6	7.7
Average K6 Score	4.9	5.3	5.0	5.0	5.2 <sup>b</sup>	5.1	5.1	5.1

NOTE: Measures included in this table are defined in Section 3.1.1. This table corresponds to [Table B.5B](#) in Appendix B of this report, which contains additional information on this table.

<sup>a</sup> Difference between Pre-Oil Spill estimate and Post-Oil Spill estimate is statistically significant at the .05 level. P-values are located in Appendix B [table B.5P](#).

<sup>b</sup> Difference between Pre-Oil Spill estimate and Post-Oil Spill estimate is statistically significant at the .10 level. P-values are located in Appendix B [table B.5P](#).

<sup>c</sup> Difference between area effect (Post-Oil Spill Period estimate minus Pre-Oil Spill Period estimate) for this geographic region and the area effect for the Gulf Coast Oil Spill Disaster Area is statistically significant at the .05 level. P-values are located in Appendix B [table B.14](#).

<sup>d</sup> Difference between area effect (Post-Oil Spill Period estimate minus Pre-Oil Spill Period estimate) for this geographic region and the area effect for the Gulf Coast Oil Spill Disaster Area is statistically significant at the .10 level. P-values are located in Appendix B [table B.14](#).

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2007-2009 (revised March 2012) and 2011.

Estimates of past month substance use and psychological distress among adults aged 26 or older are presented in [Table 3.6](#).



**Table 3.6 Past Month Substance Use and Psychological Distress among Persons Aged 26 or Older, by Geographic Region and Time Period: Percentages, 2007-2009 and 2011 NSDUH**

Past Month Substance Use	Gulf Coast Oil Spill Disaster Area		Remainder of Gulf Coast States		Remainder of United States		Total United States	
	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011
<b>SUBSTANCE USE</b>								
Illicit Drugs	5.5 <sup>b</sup>	8.5	5.9	6.3	6.0	6.3	6.0	6.3
Marijuana	3.3 <sup>a</sup>	6.2	4.0	4.5 <sup>d</sup>	4.3 <sup>a</sup>	4.8 <sup>d</sup>	4.2 <sup>a</sup>	4.8 <sup>d</sup>
Nonmedical Use of Prescription-Type Psychotherapeutics	2.8	3.2	2.1	2.0	2.0	1.8	2.0	1.9
Pain Relievers	2.0	2.4	1.6	1.4	1.5	1.3	1.5	1.4
Cigarettes	27.5	28.3	24.9	24.1	23.5 <sup>a</sup>	21.6	23.6 <sup>a</sup>	21.9
Alcohol	50.5 <sup>b</sup>	56.9	51.6	52.2	55.0	55.3 <sup>d</sup>	54.6	55.1 <sup>d</sup>
Binge Alcohol	23.8	22.2	21.3	19.5	22.3	21.8	22.2	21.6
Heavy Alcohol	6.4	7.3	6.4	6.2	6.2 <sup>a</sup>	5.6	6.2 <sup>a</sup>	5.7
<b>PSYCHOLOGICAL DISTRESS</b>								
Serious Psychological Distress	5.2	4.8	4.2	4.9	4.0	4.1	4.1	4.2
Average K6 Score	3.6	3.2	3.4	3.4	3.6 <sup>b</sup>	3.5	3.5 <sup>b</sup>	3.5

NOTE: Measures included in this table are defined in Section 3.1.1. This table corresponds to [Table B.6B](#) in Appendix B of this report, which contains additional information on this table.

<sup>a</sup> Difference between Pre-Oil Spill estimate and Post-Oil Spill estimate is statistically significant at the .05 level. P-values are located in Appendix B [table B.6P](#).

<sup>b</sup> Difference between Pre-Oil Spill estimate and Post-Oil Spill estimate is statistically significant at the .10 level. P-values are located in Appendix B [table B.6P](#).

<sup>c</sup> Difference between area effect (Post-Oil Spill Period estimate minus Pre-Oil Spill Period estimate) for this geographic region and the area effect for the Gulf Coast Oil Spill Disaster Area is statistically significant at the .05 level. P-values are located in Appendix B [table B.15](#).

<sup>d</sup> Difference between area effect (Post-Oil Spill Period estimate minus Pre-Oil Spill Period estimate) for this geographic region and the area effect for the Gulf Coast Oil Spill Disaster Area is statistically significant at the .10 level. P-values are located in Appendix B [table B.15](#).

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2007-2009 (revised March 2012) and 2011.

- For persons aged 26 or older, the prevalence of past month illicit drug use in the GCDA increased from 5.5 percent in the pre-oil spill period to 8.5 percent in the post-oil spill period ( $p = .0801$ ). This increase was not significantly different than the changes between these time periods in any of the other regions.
- The prevalence of past month marijuana use in the GCDA increased from 3.3 percent in the pre-oil spill period to 6.2 percent in the post-oil spill period. There were also increases in past month marijuana use in the remainder of the United States and the total United States, but the increase in the GCDA was greater than the change between these periods for the remainder of the Gulf Coast States ( $p = .0686$ ), the remainder of the United States ( $p = .0533$ ), and the total United States ( $p = .0523$ ).

- The prevalence of past month alcohol use in the GCDA increased from 50.5 percent in the pre-oil spill period to 56.9 percent in the post-oil spill period ( $p = .0664$ ). This difference was greater than the difference between these time periods in the remainder of the United States ( $p = .0918$ ) or the total United States ( $p = .0919$ ).
- For persons aged 26 or older, there were no statistically significant differences in the past month use of any other substances between the pre-spill and post-spill periods in the GCDA.

### **3.1.6 Past Month Psychological Distress among Adults**

Estimates of past month SPD and mean score on the K6 scale are presented for those all adults aged 18 or older in [Table 3.3](#), for young adults aged 18 to 25 in [Table 3.5](#), and for adults aged 26 or older in [Table 3.6](#).

- There were no differences between the pre-spill and post-spill periods in SPD or in the mean K6 score for any of the geographic regions in any of the adult age groups.

### **3.1.7 Past Year Substance Use Disorder among Adolescents and Adults**

Estimates of past year SUD (illicit drug or alcohol dependence or abuse) for all persons aged 12 or older and for all persons aged 18 or older are presented in [Table 3.7](#), for adolescents aged 12 to 17 in [Table 3.8](#), for young adults aged 18 to 25 in [Table 3.9](#), and for adults aged 26 or older in [Table 3.10](#).

- There were no differences between the pre-spill and post-spill periods in past year SUD in the GCDA for any of the age groups.
- There were decreases in the rate of SUD between the pre-spill and post-spill periods in past year SUD in the total United States in each age group.

### **3.1.8 Past Year Mental Health Problems and Mental Health Treatment among Adolescents and Adults**

Estimates of past year mental health problems and receipt of mental health treatment among adults aged 18 or older are presented in [Table 3.7](#).

- For persons aged 18 or older, the prevalence of making a suicide plan in the past year in the GCDA increased from 0.5 percent in the pre-oil spill period to 1.2 percent in the post-oil spill period. There were no differences between these periods in the other three geographical regions, and the increase in the GCDA was greater than the change between these periods for the remainder of the Gulf Coast States and the total United States, and also greater than the change between these periods in the remainder of the United States ( $p = .0530$ ).
- For persons aged 18 or older, there were no statistically significant differences between the pre-spill period and the post-spill period in any of the other measures of past year mental health problems or in receipt of mental health treatment shown in [Table 3.7](#) in the GCDA or in any of the other geographic regions.

**Table 3.7 Past Year Substance Dependence or Abuse among Persons Aged 12 or Older and Past Year Substance Dependence or Abuse and Mental Health Problems and Treatment among Persons Aged 18 or Older, by Geographic Region and Time Period: Percentages, 2007-2009 and 2011 NSDUH**

Past Year Measure	Gulf Coast Oil Spill Disaster Area		Remainder of Gulf Coast States		Remainder of United States		Total United States	
	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011
<b>ILLICIT DRUG OR ALCOHOL DEPEDENCE OR ABUSE</b>								
12+	7.9	8.0	8.6 <sup>a</sup>	6.6	9.0 <sup>a</sup>	8.1	9.0 <sup>a</sup>	8.0
18+	8.1	8.3	8.8 <sup>a</sup>	6.8	9.2 <sup>a</sup>	8.3	9.2 <sup>a</sup>	8.1
<b>ADULT PAST YEAR MENTAL HEALTH PROBLEMS &amp; TREATMENT (AGED 18+)</b>								
Major Depressive Episode	6.8	6.9	6.2	5.7	6.6	6.6	6.6	6.6
Serious Mental Illness	5.1	4.2	4.7	4.9	4.6 <sup>b</sup>	5.0	4.6 <sup>b</sup>	5.0
Any Mental Illness	22.1	19.3	18.5	18.6	19.9	19.7	19.8	19.6
Had Serious Thoughts of Suicide	2.6	3.5	3.4	3.5	3.8	3.7	3.7	3.7
Made Any Suicide Plans	0.5 <sup>a</sup>	1.2	1.2	1.0 <sup>c</sup>	1.0	1.0 <sup>d</sup>	1.0	1.0 <sup>c</sup>
Attempted Suicide	0.4	0.6	0.5	0.5	0.5	0.5	0.5	0.5
Received Mental Health Treatment/Counseling	14.5	12.7	12.1	11.1	13.5	13.9	13.4	13.6
Received Outpatient Mental Health Treatment/ Counseling	6.2	5.3	5.9 <sup>b</sup>	4.9	6.8	6.9	6.7	6.7

NOTE: Measures included in this table are defined in Section 3.1.2. This table corresponds to [Table B.7B](#) in Appendix B of this report, which contains additional information on this table.

<sup>a</sup> Difference between Pre-Oil Spill estimate and Post-Oil Spill estimate is statistically significant at the .05 level. P-values are located in Appendix B [table B.7P](#).

<sup>b</sup> Difference between Pre-Oil Spill estimate and Post-Oil Spill estimate is statistically significant at the .10 level. P-values are located in Appendix B [table B.7P](#).

<sup>c</sup> Difference between area effect (Post-Oil Spill Period estimate minus Pre-Oil Spill Period estimate) for this geographic region and the area effect for the Gulf Coast Oil Spill Disaster Area is statistically significant at the .05 level. P-values are located in Appendix B [table B.16](#).

<sup>d</sup> Difference between area effect (Post-Oil Spill Period estimate minus Pre-Oil Spill Period estimate) for this geographic region and the area effect for the Gulf Coast Oil Spill Disaster Area is statistically significant at the .10 level. P-values are located in Appendix B [table B.16](#).

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2007-2009 (revised March 2012) and 2011.

Estimates of past year mental health problems and receipt of mental health treatment among adolescents aged 12 to 17 are presented in [Table 3.8](#).

- For adolescents aged 12 to 17, there were no statistically significant differences between the pre-spill period and the post-spill period in past year MDE or in receipt of specialty mental health services in the GCDA or in any of the other geographic regions.

**Table 3.8 Past Year Substance Dependence or Abuse and Mental Health Problems and Treatment among Persons Aged 12 to 17, by Geographic Region and Time Period: Percentages, 2007-2009 and 2011 NSDUH**

Past Year Measure	Gulf Coast Oil Spill Disaster Area		Remainder of Gulf Coast States		Remainder of United States		Total United States	
	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011
<b>SUBSTANCE DEPENDENCE OR ABUSE</b>								
Illicit Drug or Alcohol Dependence or Abuse	6.6	5.5	6.6 <sup>b</sup>	5.4	7.6 <sup>b</sup>	7.0	7.5 <sup>a</sup>	6.9
<b>YOUTH PAST YEAR MENTAL HEALTH PROBLEMS &amp; TREATMENT</b>								
Major Depressive Episode	7.2	9.3	7.7	6.8	8.3	8.4	8.2	8.2
Received Specialty Mental Health Services	12.0	10.9	11.7 <sup>b</sup>	10.3	12.6	13.0	12.5	12.7

NOTE: Measures included in this table are defined in Section 3.1.2. This table corresponds to [Table B.8B](#) in Appendix B of this report, which contains additional information on this table.

<sup>a</sup> Difference between Pre-Oil Spill estimate and Post-Oil Spill estimate is statistically significant at the .05 level. P-values are located in Appendix B [table B.8P](#).

<sup>b</sup> Difference between Pre-Oil Spill estimate and Post-Oil Spill estimate is statistically significant at the .10 level. P-values are located in Appendix B [table B.8P](#).

<sup>c</sup> Difference between area effect (Post-Oil Spill Period estimate minus Pre-Oil Spill Period estimate) for this geographic region and the area effect for the Gulf Coast Oil Spill Disaster Area is statistically significant at the .05 level. P-values are located in Appendix B [table B.17](#).

<sup>d</sup> Difference between area effect (Post-Oil Spill Period estimate minus Pre-Oil Spill Period estimate) for this geographic region and the area effect for the Gulf Coast Oil Spill Disaster Area is statistically significant at the .10 level. P-values are located in Appendix B [table B.17](#).

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2007-2009 (revised March 2012) and 2011.

Estimates of past year mental health problems and receipt of mental health treatment among young adults aged 18 to 25 or older are presented in [Table 3.9](#).

- For persons aged 18 to 25, the prevalence of past year MDE in the GCDA increased from 6.7 percent in the pre-oil spill period to 12.0 percent in the post-oil spill period. This increase was significantly greater than the change between those time periods for each of those other regions.
- For persons aged 18 to 25, the prevalence of serious thoughts of suicide in the past year in the GCDA increased from 5.1 percent in the pre-oil spill period to 9.4 percent in the post-oil spill period. This increase was significantly greater than the change between those time periods for the remainder of the United States and the total United States, and also greater than the difference for the remainder of the Gulf Coast States ( $p = .0973$ ).
- For persons aged 18 to 25, the prevalence of making a suicide plan in the past year in the GCDA increased from 1.8 percent in the pre-oil spill period to 4.3 percent in the post-oil spill period. This increase was greater than the change between those periods for each of the other regions.

- For persons aged 18 to 25, there were no statistically significant differences between the pre-spill period and the post-spill period in any of the other measures of past year mental health problems or in receipt of mental health treatment shown in [Table 3.9](#) in the GCDA or in any of the other geographic regions.

**Table 3.9 Past Year Substance Dependence or Abuse and Mental Health Problems and Treatment among Persons Aged 18 to 25, by Geographic Region and Time Period: Percentages, 2007-2009 and 2011 NSDUH**

Past Year Measure	Gulf Coast Oil Spill Disaster Area		Remainder of Gulf Coast States		Remainder of United States		Total United States	
	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011
<b>SUBSTANCE DEPENDENCE OR ABUSE</b>								
Illicit Drug or Alcohol Dependence or Abuse	16.9	17.9	17.9	16.9	20.9 <sup>a</sup>	18.7	20.6 <sup>a</sup>	18.6
<b>ADULT PAST YEAR MENTAL HEALTH PROBLEMS &amp; TREATMENT</b>								
Major Depressive Episode	6.7 <sup>a</sup>	12.0	6.9	7.2 <sup>c</sup>	8.3	8.4 <sup>c</sup>	8.2	8.3 <sup>c</sup>
Serious Mental Illness	8.8	8.4	6.4	7.2	7.5	7.7	7.4	7.6
Any Mental Illness	26.2	31.2	27.1	27.8	31.1 <sup>b</sup>	29.9	30.7 <sup>b</sup>	29.8
Had Serious Thoughts of Suicide	5.1 <sup>a</sup>	9.4	6.2	7.6 <sup>d</sup>	6.5	6.7 <sup>c</sup>	6.4	6.8 <sup>c</sup>
Made Any Suicide Plans	1.8 <sup>a</sup>	4.3	2.2	2.3 <sup>c</sup>	1.9	1.9 <sup>c</sup>	2.0	1.9 <sup>c</sup>
Attempted Suicide	1.2	1.8	1.2	1.7	1.2	1.2	1.2	1.2
Received Mental Health Treatment/Counseling	10.9	12.2	9.4	9.4	11.0	11.6	10.9	11.4
Received Outpatient Mental Health Treatment/Counseling	5.9	6.0	4.9	5.0	6.0	6.3	5.9	6.2

NOTE: Measures included in this table are defined in Section 3.1.2. This table corresponds to [Table B.9B](#) in Appendix B of this report, which contains additional information on this table.

<sup>a</sup> Difference between Pre-Oil Spill estimate and Post-Oil Spill estimate is statistically significant at the .05 level. P-values are located in Appendix B [table B.9P](#).

<sup>b</sup> Difference between Pre-Oil Spill estimate and Post-Oil Spill estimate is statistically significant at the .10 level. P-values are located in Appendix B [table B.9P](#).

<sup>c</sup> Difference between area effect (Post-Oil Spill Period estimate minus Pre-Oil Spill Period estimate) for this geographic region and the area effect for the Gulf Coast Oil Spill Disaster Area is statistically significant at the .05 level. P-values are located in Appendix B [table B.18](#).

<sup>d</sup> Difference between area effect (Post-Oil Spill Period estimate minus Pre-Oil Spill Period estimate) for this geographic region and the area effect for the Gulf Coast Oil Spill Disaster Area is statistically significant at the .10 level. P-values are located in Appendix B [table B.18](#).

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2007-2009 (revised March 2012) and 2011.

Estimates of past year mental health problems and receipt of mental health treatment among young adults aged 26 or older are presented in [Table 3.10](#).

- For persons aged 26 or older, there were no statistically significant differences between the pre-spill period and the post-spill period in any of the other measures of past year mental health problems or in receipt of mental health treatment shown in [Table 3.10](#) in the GCDA or in any of the other geographic regions.

**Table 3.10 Past Year Substance Dependence or Abuse and Mental Health Problems and Treatment among Persons Aged 26 or Older, by Geographic Region and Time Period: Percentages, 2007-2009 and 2011 NSDUH**

Past Year Measure	Gulf Coast Oil Spill Disaster Area		Remainder of Gulf Coast States		Remainder of United States		Total United States	
	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011	Pre-Spill 2007-2009	Post-Spill 2011
<b>SUBSTANCE DEPENDENCE OR ABUSE</b>								
Illicit Drug or Alcohol Dependence or Abuse	6.7	6.7	7.4 <sup>a</sup>	5.1	7.2 <sup>a</sup>	6.4	7.2 <sup>a</sup>	6.3
<b>ADULT PAST YEAR MENTAL HEALTH PROBLEMS &amp; TREATMENT</b>								
Major Depressive Episode	6.8	6.1	6.0	5.5	6.4	6.3	6.3	6.3
Serious Mental Illness	4.5	3.5	4.4	4.5	4.1 <sup>b</sup>	4.5	4.1 <sup>b</sup>	4.5
Any Mental Illness	21.4	17.3	17.1	17.2	17.9	17.9	17.9	17.8
Had Serious Thoughts of Suicide	2.1	2.6	3.0	2.8	3.3	3.2	3.3	3.1
Made Any Suicide Plans	0.3	0.7	1.0	0.7	0.8	0.9	0.8	0.9
Attempted Suicide	0.2	0.4	0.3	0.3	0.4	0.4	0.4	0.4
Received Mental Health Treatment/Counseling	15.2	12.8	12.5	11.4	13.9	14.3	13.8	14.0
Received Outpatient Mental Health Treatment/Counseling	6.2	5.2	6.0 <sup>b</sup>	4.8	6.9	7.0	6.8	6.7

NOTE: Measures included in this table are defined in Section 3.1.2. This table corresponds to [Table B.10B](#) in Appendix B of this report, which contains additional information on this table.

<sup>a</sup> Difference between Pre-Oil Spill estimate and Post-Oil Spill estimate is statistically significant at the .05 level. P-values are located in Appendix B [table B.10P](#).

<sup>b</sup> Difference between Pre-Oil Spill estimate and Post-Oil Spill estimate is statistically significant at the .10 level. P-values are located in Appendix B [table B.10P](#).

<sup>c</sup> Difference between area effect (Post-Oil Spill Period estimate minus Pre-Oil Spill Period estimate) for this geographic region and the area effect for the Gulf Coast Oil Spill Disaster Area is statistically significant at the .05 level. P-values are located in Appendix B [table B.19](#).

<sup>d</sup> Difference between area effect (Post-Oil Spill Period estimate minus Pre-Oil Spill Period estimate) for this geographic region and the area effect for the Gulf Coast Oil Spill Disaster Area is statistically significant at the .10 level. P-values are located in Appendix B [table B.19](#).

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2007-2009 (revised March 2012) and 2011.

### 3.2 Gulf States Population Survey (GSPS)

The Centers for Disease Control and Prevention (CDC) calculated prevalence estimates for selected variables by topic area and by State. Of the 38,361 interviews presented in this report: 5,177 were conducted with respondents living in coastal areas of Florida, 4,533 in coastal areas of Alabama, 3,209 in coastal areas of Mississippi, 15,028 in coastal areas of Louisiana, and 10,414 in noncoastal areas of all four States. For trend comparisons, BRFSS data from 2004 through 2010 in the coastal counties were presented in all figures. The total number of respondents for the BRFSS comparison data ranged from 2,128 in 2005 to 6,198 in 2010. GSPS analyses included in this report are intended to be descriptive in nature and have not been tested for statistical significance.

### 3.2.1 Demographic Characteristics

Respondents in coastal and noncoastal counties were similar in proportions by gender, percentage white, percentage black/African American (non-Hispanic), and percentage married (Table 3.11). Compared with coastal areas, noncoastal areas had a higher proportion of Hispanic respondents. Respondents in coastal areas were more likely to indicate that they had household incomes of \$75,000 or higher.

**Table 3.11 Demographic Characteristics by State: GSPS December 2010-December 2011**

Characteristic	Coastal Counties Weighted %					Noncoastal Counties %
	Florida (n = 5,177)	Alabama (n = 4,533)	Mississippi (n = 3,209)	Louisiana (n = 15,028)	4 States Combined (n = 27,947)	4 States Combined (n = 10,414)
Female	50.0	52.7	54.2	54.3	53.2	51.6
White Non-Hispanic	77.6	70.9	76.7	66.1	70.2	69.8
Black/African American Non-Hispanic	12.8	23.2	18.1	26.1	22.2	20.2
Hispanic	5.8	2.8	3.0	4.9	4.5 <sup>a</sup>	11.2 <sup>a</sup>
65 Years or Older	19.6	18.7	11.0	15.6	16.5 <sup>a</sup>	20.7 <sup>a</sup>
Married	56.9	56.2	57.2	49.5	52.8	52.0
Income < \$10,000	4.9	6.0	7.4	7.7	6.8	6.2
Income ≥ \$75,000	29.6	30.5	27.7	31.7	30.7 <sup>a</sup>	26.5 <sup>a</sup>

Notes: Wording for GSPS available at [http://www.cdc.gov/osels/phsipo/docs/pdf/GSPS\\_questionnaire.pdf](http://www.cdc.gov/osels/phsipo/docs/pdf/GSPS_questionnaire.pdf). Number of responses may vary by question, as respondents may respond “don’t know/” or “not sure” or refuse to answer a question.

<sup>a</sup> Differences between coastal and noncoastal respondents are statistically significant at the .05 level.

### 3.2.2 Self-Assessments of Overall Physical and Mental Health

GSPS respondents were asked several questions on general health and overall physical and mental health. For example, respondents were asked to rate their physical, mental and general health as “excellent,” “very good,” “good,” “fair,” or “poor.” Prevalence for the percentage of respondents who indicated that their general health, overall physical health or overall mental health was “fair” or “poor” were not substantially different between coastal and noncoastal areas.

GSPS respondents were also asked a question about their overall satisfaction with life. Respondents were able to indicate whether they were “very satisfied,” “satisfied,” “dissatisfied,” or “very dissatisfied” with life. The prevalence of respondents who selected “dissatisfied” or “very dissatisfied” with life was similar among States and consistent when coastal and noncoastal area were compared. Respondents were asked whether they “always,” “often,” “sometimes,” “rarely,” or “never” get the emotional support they need. The percentage of persons who indicated that they receive support “rarely” or “never” was consistent across States and between coastal and noncoastal areas.

Respondents were asked four questions relating to mental and physical health within the 30 days preceding the interview. For each of these questions, respondents were asked to recall the number of days within the past 30 days that their physical or mental health was not good, and



then were asked to recall the number of days that their physical or mental health prevented them from taking part in their regular activities. The prevalence for each of these questions also remained relatively similar across States, and was not substantially different between coastal and noncoastal areas (Table 3.12).

**Table 3.12 Prevalence Estimates for Self-Reported General Health, Physical Health, Mental Health, Days Lost Due to Physical and Mental Health, Life Satisfaction and Emotional Support: Gulf States Population Survey (GSPS), December 2010-December 2011**

Characteristic	Coastal Counties Weighted %					Noncoastal Counties %
	Florida (n = 5,177)	Alabama (n = 4,533)	Mississippi (n = 3,209)	Louisiana (n = 15,028)	4 States Combined (n = 27,947)	4 States Combined (n = 10,414)
General Health “Fair” or “Poor”	15.1	16.1	16.0	16.2	15.9	16.1
Physical Health “Fair” or “Poor”	19.6	20.3	19.2	20.9	20.4	19.0
Mental Health “Fair” or “Poor”	9.5	8.9	11.4	11.2	10.5	11.3
≥14 Days of Physical Health Not Good in Past 30 Days	15.1	13.7	16.8	15.2	15.1	15.6
≥14 Days of Mental Health Not Good in Past 30 Days	12.1	13.8	16.8	15.2	14.7	13.4
≥14 Days Unable to Do Regular Activities Due to Physical Health in Past 30 Days	8.5	8.4	9.2	9.3	9.0	9.6
≥14 Days Unable to Do Regular Activities Due to Mental Health in Past 30 Days	3.5	3.9	6.7	5.4	4.9	5.3
“Dissatisfied” or “Very Dissatisfied” with Life	6.2	6.3	8.2	5.9	6.3	7.3
“Rarely” or “Never” Get Emotional Support	6.8	8.6	8.3	9.9	8.9	8.8

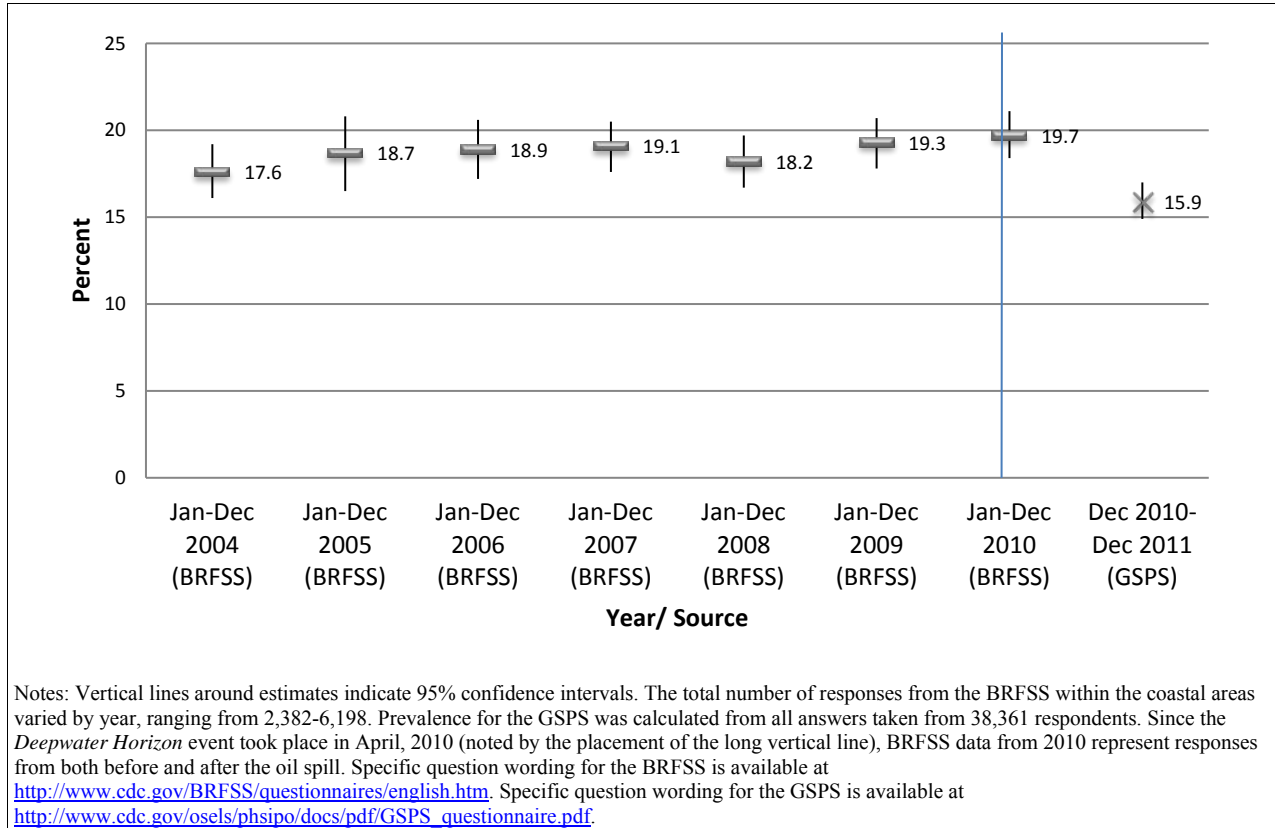
Notes: Wording for GSPS available at [http://www.cdc.gov/osels/phsipo/docs/pdf/GSPS\\_questionnaire.pdf](http://www.cdc.gov/osels/phsipo/docs/pdf/GSPS_questionnaire.pdf). Number of responses may vary by question, as respondents may respond “don’t know/” or “not sure” or refuse to answer a question.

General health, physically unhealthy days and mentally unhealthy days were similarly measured by both GSPS and BRFSS. BRFSS respondents from 2004-2010 in the coastal counties were compared with GSPS respondents from the same areas (Figures 3.1-3.3). It should be noted that the 2010 BRFSS survey data include responses from before and after the *Deepwater Horizon* oil spill in April 2010.

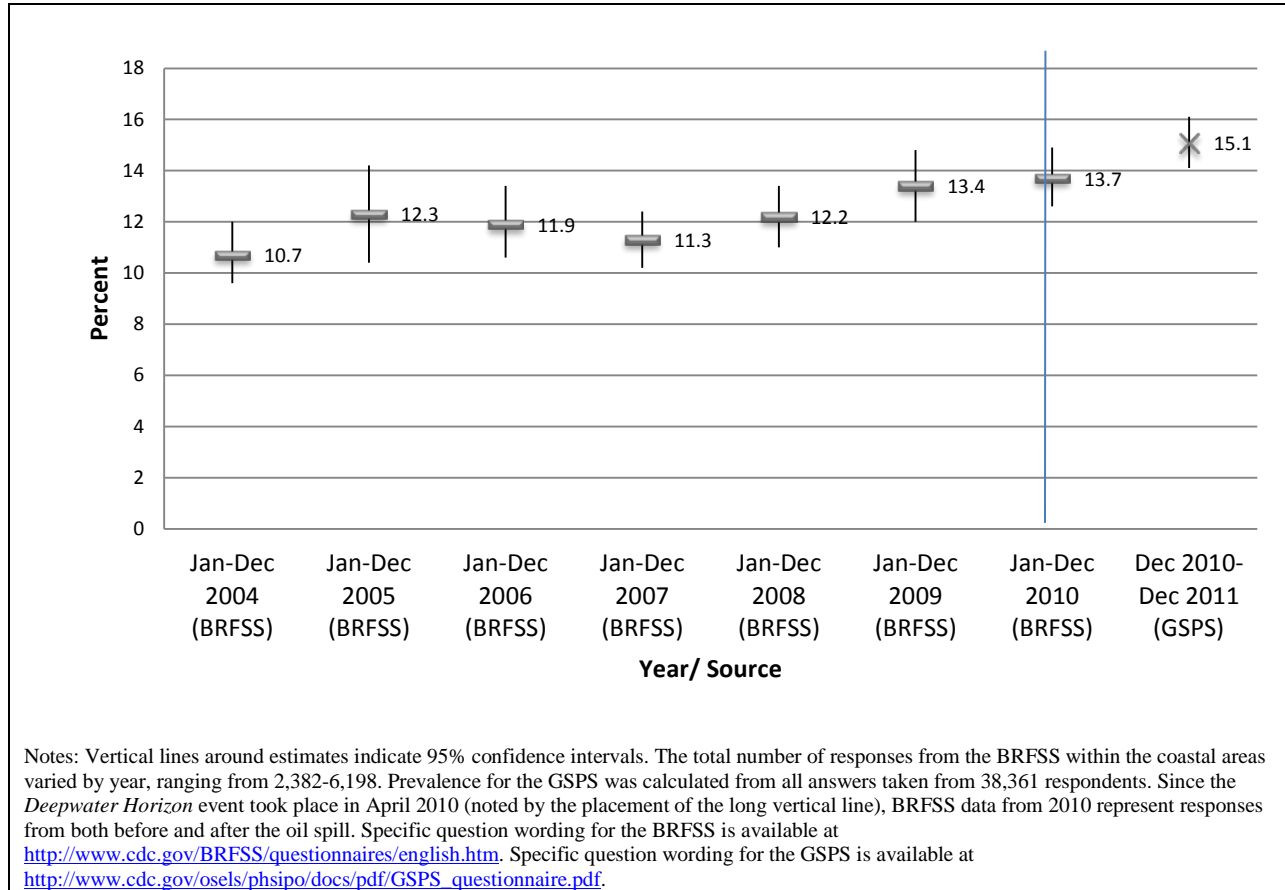
The percentage of GSPS respondents who indicated that their general health was “fair” or “poor” was lower than preceding years’ BRFSS prevalence estimates (Figure 3.1). However, the prevalence of having 14 or more physically unhealthy days within the past 30 days (Figure 3.2) was higher for the GSPS than for previous years using BRFSS data, although the trend has been increasing since 2007/2008. The prevalence of 14 or more mentally unhealthy days (Figure 3.3) estimated using GSPS data was only slightly higher than for previous years’ BRFSS data, and no trend is apparent.



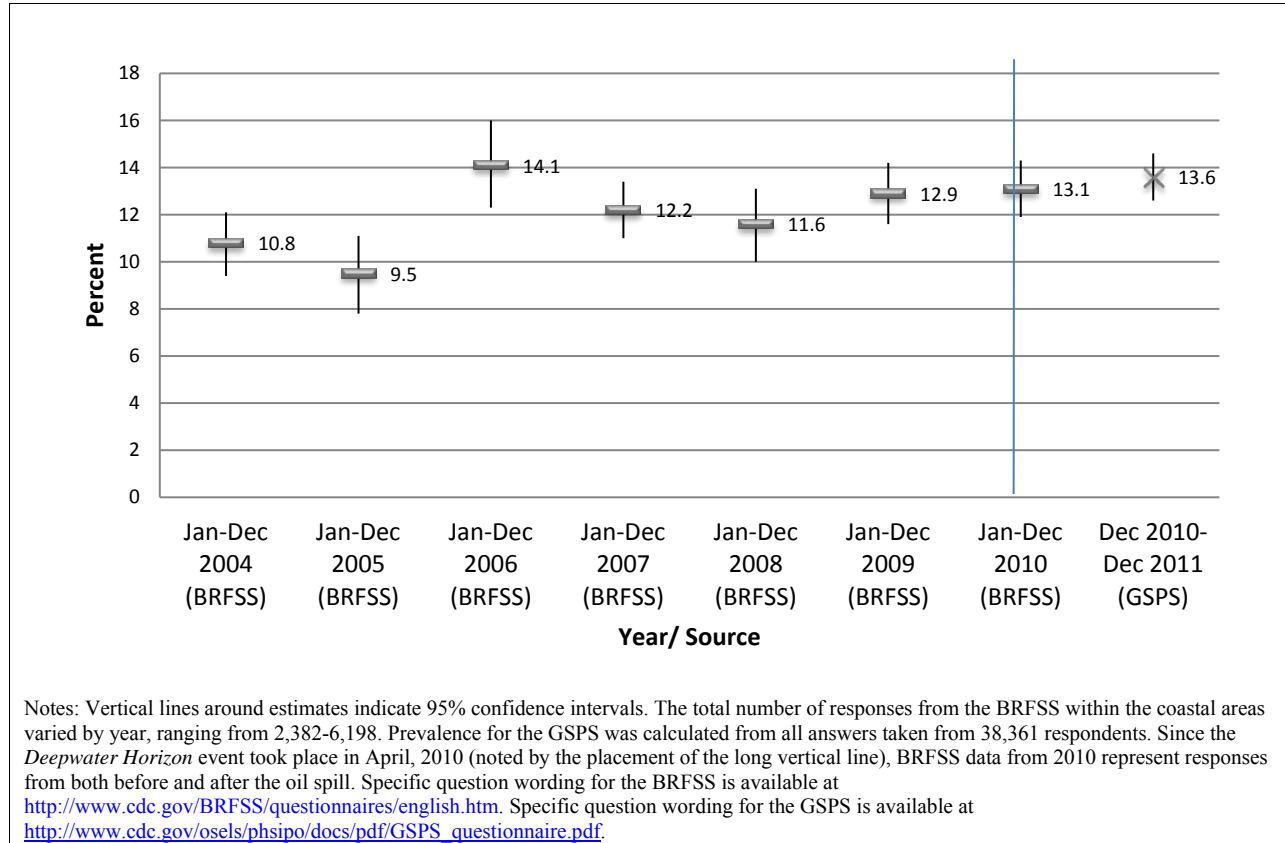
**Figure 3.1 Prevalence Estimates for Self-Rated “Fair” or “Poor” General Health, 25 Coastal Counties: Behavioral Risk Factor Surveillance System (BRFSS), January-December 2004-2010, and the Gulf States Population Survey (GSPS), December 2010-December 2011**



**Figure 3.2 Prevalence Estimates for 14 or More Days Physical Health Not Good in Last 30 Days, 25 Coastal Counties: Behavioral Risk Factor Surveillance System (BRFSS), January-December, 2004-2010, and the Gulf States Population Survey (GSPS), December 2010-December 2011**



**Figure 3.3 Prevalence Estimates for 14 or More Days Mental Health Not Good in Last 30 Days, 25 Coastal Counties: Behavioral Risk Factor Surveillance System (BRFSS), January-December 2004-2010, and the Gulf States Population Survey (GSPS), December 2010-December 2011**



### 3.2.3 Selected Health Risk Behaviors

Table 3.13 summarizes everyday smoking, heavy drinking, binge drinking, use of prescription medication without a physician’s advice, and lack of regular exercise in coastal and noncoastal populations. It should be noted that definitions of binge drinking and heavy drinking differed in the GSPS than definitions for these terms in the NSDUH. For the GSPS, binge drinking was defined as having 5 or more drinks on one occasion in the past month for male respondents, and having 4 or more drinks on one occasion in the past month for female respondents. Heavy drinking was defined as having more than 2 drinks per day for males and having more than one drink per day for females. Using these definitions there were no substantial differences between coastal and noncoastal areas (Table 3.13).

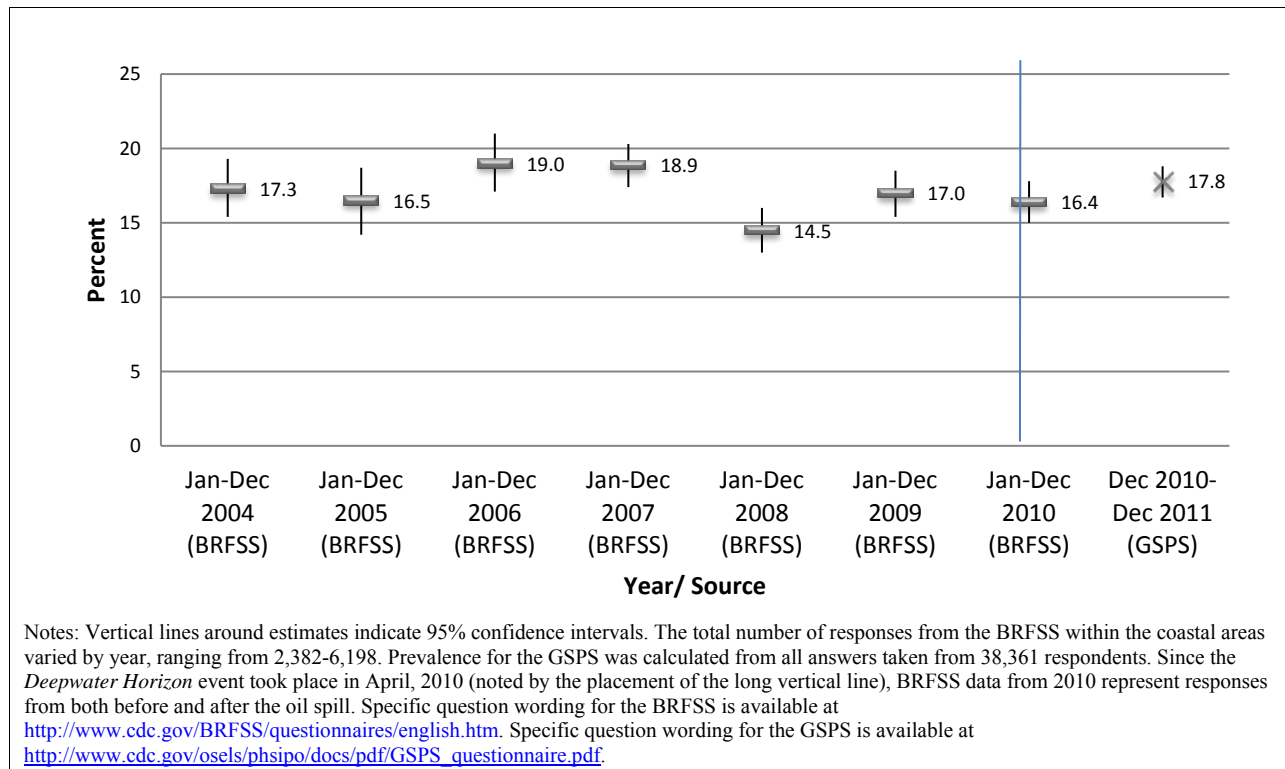
**Table 3.13 Prevalence Estimates for Self-Reported Health Risk Behaviors: Gulf States Population Survey (GSPS), December 2010-December 2011**

Characteristic	Coastal Counties Weighted %					Noncoastal Counties %
	Florida (n = 5,177)	Alabama (n = 4,533)	Mississippi (n = 3,209)	Louisiana (n = 15,028)	4 States Combined (n = 27,947)	4 States Combined (n = 10,414)
Everyday Smoking	15.8	15.3	24.2	17.5	17.8	15.7
Heavy Drinking	5.6	5.0	5.1	6.5	6.0	6.5
Binge Drinking	13.4	13.5	14.9	16.2	15.1	14.7
Increased Prescription Medication without Physician Advice	2.6	3.7	1.8	3.0	2.9	2.8
No Physical Exercise	23.8	27.2	27.4	26.7	26.5	26.1

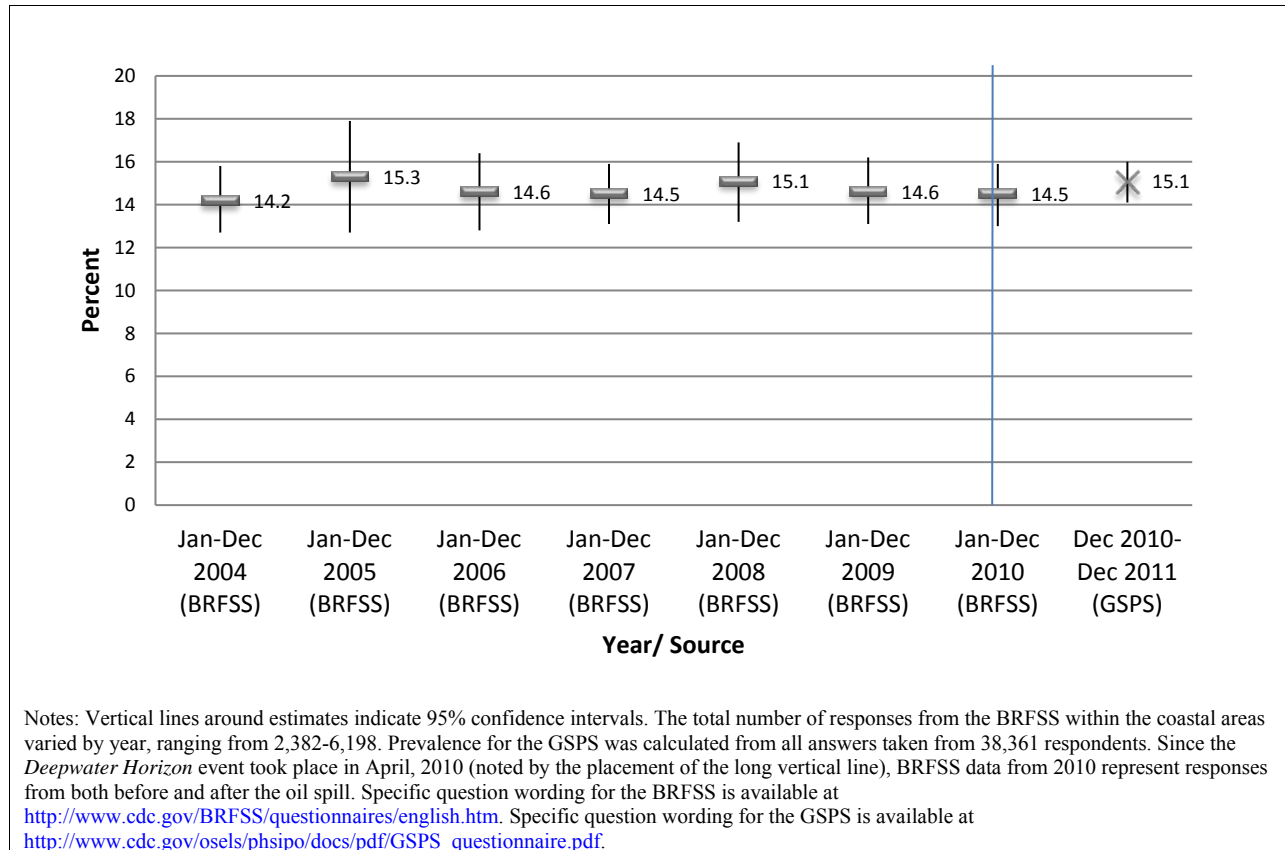
Notes: Wording for the GSPS is available at [http://www.cdc.gov/osels/phsipo/docs/pdf/GSPS\\_questionnaire.pdf](http://www.cdc.gov/osels/phsipo/docs/pdf/GSPS_questionnaire.pdf). Heavy drinking is defined by respondents indicating more than 2 servings of alcohol daily for males and more than 1 serving of alcohol each day for females. Binge drinking is defined as having 5 or more servings of alcohol on a single occasion within the past 30 days for men, or 4 or more servings of alcohol on a single occasion within the past 30 days for women. No physical exercise is defined as no leisure physical activity within the past 30 days. The total number of responses may vary by question, as respondents may refuse to answer specific questions. Data are calculated from those who responded substantively to each of the questions.

Two health risk behaviors measured by both the GSPS and BRFSS were examined in a comparison of trends from 2004 to 2011. In a comparison of everyday smoking taken from the 2004-2010 BRFSS and the GSPS, no trend is discernible (Figure 3.4). A trend comparison of prevalence estimates of binge drinking does not show a pattern among weighted estimates during 2004-2011 (Figure 3.5). The 2010 BRFSS includes data collected both before and after the *Deepwater Horizon* oil spill.

**Figure 3.4 Prevalence Estimates for Everyday Smoking, 25 Coastal Counties: Behavioral Risk Factor Surveillance System (BRFSS), January-December 2004-2010, and the Gulf States Population Survey (GSPS), December 2010-December 2011**



**Figure 3.5 Prevalence Estimates for Binge Drinking, 25 Coastal Counties: Behavioral Risk Factor Surveillance System (BRFSS), January-December 2004-2010, and the Gulf States Population Survey (GSPS), December 2010-December 2011**



### 3.2.4 Selected Chronic Disease Indicators

The prevalence lifetime diagnoses of asthma, diabetes, stroke, asthma, coronary heart disease, and heart attack remained similar across State prevalence estimates (Table 3.14). One estimate (coronary heart disease diagnosis) is lower in noncoastal areas.

**Table 3.14 Prevalence of Diagnosed Chronic Medical Conditions: Gulf States Population Survey (GSPS), December 2010-December 2011**

Characteristic	Coastal Counties Weighted %					Noncoastal Counties %
	Florida (n = 5,177)	Alabama (n = 4,533)	Mississippi (n = 3,209)	Louisiana (n = 15,028)	4 States Combined (n = 27,947)	4 States Combined (n = 10,414)
Heart Attack Diagnosis	6.6	7.0	4.7	5.9	6.1	6.5
Coronary Heart Disease Diagnosis	6.9	7.0	4.5	6.6	6.5 <sup>a</sup>	4.8 <sup>a</sup>
Stroke Diagnosis	4.3	4.9	3.2	4.1	4.2	4.3
Asthma Diagnosis	15.6	14.5	13.7	15.1	15.0	15.1
Current Asthma	10.0	9.2	10.4	9.4	9.6	9.3
Diabetes Diagnosis (Other than Pregnancy)	12.1	11.9	10.4	11.0	11.3	12.1
Arthritis/Form of Arthritis Diagnoses	31.8	31.1	27.7	28.4	29.4	28.6

Notes: Wording for GSPS available at [http://www.cdc.gov/osels/phsipo/docs/pdf/GSPS\\_questionnaire.pdf](http://www.cdc.gov/osels/phsipo/docs/pdf/GSPS_questionnaire.pdf). Number of responses may vary by question, as respondents may respond “don’t know” or “not sure” or refuse to answer a question.

<sup>a</sup> Differences between coastal and noncoastal respondents are significant at the .05 level.

### 3.2.5 Economic and Environmental Factors

GSPS respondents were asked a series of questions regarding household economic conditions, changes in employment and contact with the oil spill. Differences in direct contact with the oil and participation in cleanup activities were observed for coastal areas compared with noncoastal areas (Table 3.15). The prevalence of households that reported decreased income and the prevalence of households where respondents reported losing jobs were substantially higher for coastal counties than for noncoastal counties. Approximately 19 percent of the coastal population reported employment changes since the oil spill. Prevalence estimates were similar between coastal and noncoastal areas for changes in employment, those who were employed for wages prior to the oil spill, and those employed for wages at the time of the interview. Coastal and noncoastal county residents provided similar responses when asked about stress related to having enough money to pay household mortgage or rent or to buy nutritious meals. Two of the indicators (i.e., worried about rent/mortgage and worried/stressed about nutritious meals) were higher for Mississippi than for Florida. Mississippi respondents were more likely than respondents of two other States (i.e., Florida and Louisiana) to report employment status changes and they were more likely than respondents of Louisiana to report decreased household income due to the oil spill.

**Table 3.15 Prevalence Estimates for Oil Exposure and Economic Impact, 25 Coastal Counties, by State, and Noncoastal Counties: Gulf States Population Survey (GSPS), December 2010-December 2011**

Characteristic	Coastal Counties Weighted %					Noncoastal Counties %
	Florida (n = 5,177)	Alabama (n = 4,533)	Mississippi (n = 3,209)	Louisiana (n = 15,028)	4 States Combined (n = 27,947)	4 States Combined (n = 10,414)
Direct Contact with Oil Spill	19.3	19.7	20.2	9.8	14.3 <sup>a</sup>	5.1 <sup>a</sup>
Participated in Cleanup Activities	7.3	9.8	10.0	6.5	7.5 <sup>a</sup>	4.4 <sup>a</sup>
Employment Status Changes since Oil Spill	18.0	20.0	25.1	18.2	19.1	17.4
Currently Employed for Wages	45.2	43.5	45.0	46.1	45.5	42.7
Employed for Wages Prior to Oil Spill	46.5	44.9	48.2	47.5	47.0	44.5
Households Indicating Decreased Household Income Due to Oil Spill	25.9	22.8	28.4	21.9	23.5 <sup>a</sup>	11.7 <sup>a</sup>
Households Indicating Lost Jobs Due to Oil Spill	9.5	12.8	13.7	10.3	10.9 <sup>a</sup>	4.5 <sup>a</sup>
“Usually” or “Always” Worried about Rent or Mortgage	17.6	20.4	25.0	20.7	20.4	22.2
“Usually” or “Always” Worried/Stressed about Nutritious Meals	9.6	11.0	14.6	13.9	12.6	11.6

Notes: Wording for GSPS available at [http://www.cdc.gov/osels/phsipo/docs/pdf/GSPS\\_questionnaire.pdf](http://www.cdc.gov/osels/phsipo/docs/pdf/GSPS_questionnaire.pdf). Number of responses may vary by question, as respondents may respond “don’t know/” or “not sure” or refuse to answer a question.

<sup>a</sup> Differences between coastal and noncoastal respondents are significant at the .05 level.

### 3.2.6 Current and Lifetime Anxiety and Depression

The GSPS contained questions from the 8-item Patient Health Questionnaire (PHQ-8) and the 7-item Generalized Anxiety Disorder (GAD-7) questionnaire, which can be used to screen for moderate to severe depression and generalized anxiety disorder, respectively. Prevalence estimates for current moderate to severe depression (PHQ-8 score of  $\geq 10$  on a scale from 0 to 24) and moderate to severe generalized anxiety disorder (GAD score  $\geq 10$  on a scale from 0 to 21) were similar across States and between coastal and noncoastal residents (Table 3.16). Respondents also were asked whether they have ever been diagnosed with depression and/or anxiety. State-to-State comparisons indicate that respondents from different States provided similar responses. Responses were also similar to those provided by residents in noncoastal counties.



**Table 3.16 Prevalence Estimates for Current Moderate to Severe Depression and Anxiety and Past Diagnosis of Depression and Anxiety: Gulf States Population Survey (GSPS), December 2010-December 2011**

Characteristic	Coastal Counties Weighted %					Noncoastal Counties %
	Florida (n = 5,177)	Alabama (n = 4,533)	Mississippi (n = 3,209)	Louisiana (n = 15,028)	4 States Combined (n = 27,947)	4 States Combined (n = 10,414)
Current Moderate/Severe Depression	13.0	15.3	17.2	16.4	15.6	15.7
Current Moderate/Severe Anxiety	12.8	13.3	18.6	16.6	15.5	14.7
Lifetime Diagnosis of Depression	25.7	22.6	28.9	23.1	24.1	22.8
Lifetime Diagnosis of Anxiety	19.0	16.4	28.5	22.3	21.3	19.2

Notes: Wording for the GSPS is available at [http://www.cdc.gov/osels/phsipo/docs/pdf/GSPS\\_questionnaire.pdf](http://www.cdc.gov/osels/phsipo/docs/pdf/GSPS_questionnaire.pdf). Scores for current depression and anxiety are based on the PHQ-8 and GAD-7, respectively. They were calculated based on the number of days respondents reported on each depression or anxiety symptoms in the past 14 days: 0 to 1 days = “not at all”; 2 to 6 days = “several days”; 7 to 11 days = “more than half the days”; and 12 to 14 days = “nearly every day”; points 0 to 3 were assigned to each category, respectively. PHQ-8 and GAD-7 scores ranged from 0 to 24 and from 0 to 21, respectively. Current depression and current anxiety are defined as scores of 10 or higher on these scales. The total number of responses may vary by question, as respondents may refuse to answer specific questions.

GSPS respondents were asked questions regarding whether they had serious thoughts of suicide within the past year (Table 3.17). Two questions regarding intimate partner violence were also asked of respondents. State-to-State comparisons indicate that respondents from different States provided similar responses. Responses were also similar to those provided by residents in noncoastal counties.

GSPS respondents were also asked a number of questions to ascertain their use of mental health services. When asked about whether they had health insurance, approximately 79 percent of residents of coastal areas reported having some form of health insurance (Table 3.18). Approximately 47 percent of all respondents indicated that their insurance included mental health coverage. Respondents were asked whether they ever received counseling and whether they had ever been prescribed medication for their emotions, nerves or mental health. Follow-up questions were asked to ascertain whether respondents had received counseling and/or been prescribed medication within the past year. Responses to health insurance coverage, mental health insurance coverage, receiving counseling, and being prescribed medication were consistent across States and between coastal and noncoastal counties. There were differences in the prevalence of being prescribed medication in the past year between coastal and noncoastal county residents.

**Table 3.17 Prevalence of Suicidal Thoughts and Intimate Partner Violence: Gulf States Population Survey (GSPS), December 2010-December 2011**

Characteristic	Coastal Counties Weighted %					Noncoastal Counties %
	Florida (n = 5,177)	Alabama (n = 4,533)	Mississippi (n = 3,209)	Louisiana (n = 15,028)	4 States Combined (n = 27,947)	4 States Combined (n = 10,414)
In the Past 12 Months, Serious Thoughts of Suicide	3.5	4.8	7.2	5.0	4.9	5.0
In the Past 12 Months, Intimate Partner Slapped, Pushed Kicked or Hurt	2.4	4.1	4.1	2.6	3.0	2.7
In the Past 12 Months, Intimate Partner Put Down, Humiliated, or Tried to Control	8.3	10.6	13.0	9.1	9.5	8.8

Notes: Wording for GSPS available at [http://www.cdc.gov/osels/phsipo/docs/pdf/GSPS\\_questionnaire.pdf](http://www.cdc.gov/osels/phsipo/docs/pdf/GSPS_questionnaire.pdf). Number of responses may vary by question, as respondents may respond “don’t know/” or “not sure” or refuse to answer a question.

**Table 3.18 Prevalence Estimates for Access to Health Care and Mental Health Treatment: Gulf States Population Survey (GSPS), December 2010-December 2011**

Characteristic	Coastal Counties Weighted %					Noncoastal Counties %
	Florida (n = 5,177)	Alabama (n = 4,533)	Mississippi (n = 3,209)	Louisiana (n = 15,028)	4 States Combined (n = 27,947)	4 States Combined (n = 10,414)
Has health insurance	82.4	78.9	75.9	78.5	79.1	79.7
Has mental health insurance coverage	52.2	46.5	46.8	46.1	47.4	47.3
Ever received counseling for emotions, nerves or mental health	27.2	23.8	34.1	25.4	26.4	26.5
Received counseling for emotions, nerves or mental health within past year	11.2	10.3	17.8	11.2	11.7	10.5
Ever prescribed medication for emotions, nerves or mental health	19.0	17.2	25.0	17.0	18.2	16.6
Prescribed medication for emotions, nerves or mental health within past year	5.1	4.5	6.8	4.8	5.0 <sup>a</sup>	2.2 <sup>a</sup>

Notes: Wording for GSPS available at [http://www.cdc.gov/osels/phsipo/docs/pdf/GSPS\\_questionnaire.pdf](http://www.cdc.gov/osels/phsipo/docs/pdf/GSPS_questionnaire.pdf). Number of responses may vary by question, as respondents may respond “don’t know/” or “not sure” or refuse to answer a question.

<sup>a</sup> Differences between coastal and noncoastal respondents are significant at the .05 level.

GSPS respondents were also asked about anxious or depressed behavior on the part of children within their households. Approximately 40 percent of all households in coastal counties and 36 percent of households in noncoastal areas reported having at least one child (Table 3.19). Of households with children, prevalence estimates were calculated for children experiencing sadness or depression, feeling nervous or afraid, having difficulty sleeping, and/or having problems getting along with others. State-to-State comparisons indicate that respondents from different States provided similar responses. Responses were also similar to those provided by residents in noncoastal counties.

**Table 3.19 Prevalence Estimates for Child Related Problems among Households with Children: Gulf States Population Survey (GSPS), December 2010-December 2011**

Characteristic	Coastal Counties Weighted %					Noncoastal Counties %
	Florida (n = 5,177)	Alabama (n = 4,533)	Mississippi (n = 3,209)	Louisiana (n = 15,028)	4 States Combined (n = 27,947)	4 States Combined (n = 10,414)
Households with Children	37.9	42.2	49.3	38.5	40.1	35.5
Households with Children Reporting Children Experiencing Sadness or Depression	8.5	11.3	9.6	12.1	11.0	11.5
Households with Children Reporting Children Feeling Nervous or Afraid	13.1	16.7	18.3	18.8	17.3	20.1
Households with Children Reporting Problems with Children Sleeping	14.7	18.4	18.1	18.6	17.8	16.0
Households with Children Reporting Problems of Children Getting Along with Other Children	12.1	12.4	16.9	16.2	14.8	14.3

Notes: Wording for GSPS available at [http://www.cdc.gov/osels/phsipo/docs/pdf/GSPS\\_questionnaire.pdf](http://www.cdc.gov/osels/phsipo/docs/pdf/GSPS_questionnaire.pdf). Number of responses may vary by question, as respondents may respond “don’t know/” or “not sure” or refuse to answer a question.

### 3.2.7 Self-Mastery (Resiliency/Coping)

GSPS respondents were asked to respond to a series of five statements on self-mastery adapted from the Self-Mastery Scale (Pearlin & Schooler, 1978) (Table 3.20). Self-mastery is a perception that reflects one’s personal mastery or control over life outcomes, and it has been defined as the “extent to which one regards one’s life-chances as being under one’s own control in contrast to being fatalistically ruled” (Pearlin & Schooler, 1978, p. 5). A heightened level of self-mastery is associated with one’s resilience or ability to cope with stressful events. A composite self-mastery scale (range from 5 to 25) was created by summing scores from the five questions, with higher scores indicating higher self-mastery. Weighted percent of the population by self-mastery were similar across states and between coastal and noncoastal areas (Table 3.20).

**Table 3.20 Weighted Prevalence of Limited and Heightened Self-Mastery in the 25 coastal counties and Noncoastal Counties: Gulf States Population Survey (GSPS), December 2010-December 2011**

Self-Mastery	Coastal Counties Weighted Prevalence (%) Limited and Heightened Self-Mastery					
	Florida Coastal (n = 5,177)	Alabama Coastal (n = 4,533)	Mississippi Coastal (n = 3,209)	Louisiana Coastal (n = 15,028)	Combined Coastal (n = 27,947)	4 States Noncoastal (n = 10,414)
Limited Self-Mastery	16.5	14.7	12.3	16.4	15.7	16.1
Heightened Self-Mastery	35.5	28.8	32.3	28.9	30.1	31.5

Notes: Wording for GSPS available at [http://www.cdc.gov/osels/phsipo/docs/pdf/GSPS\\_questionnaire.pdf](http://www.cdc.gov/osels/phsipo/docs/pdf/GSPS_questionnaire.pdf). Number of responses may vary by question, as respondents may respond “don’t know/” or “not sure” or refuse to answer a question.

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## 4. Limitations and Future Analyses

This chapter discusses limitations of the National Survey on Drug Use and Health (NSDUH) and Gulf States Population Survey (GSPS) that can affect the conclusions reached about the behavioral and physical health of the residents of the Gulf Coast Disaster Area (GCDA). Readers need to keep these limitations in mind when interpreting the results from these surveys. In particular, these studies were geared toward identifying relatively short-term, acute effects. They do not address potential long-term effects of the oil spill on the physical and mental health of the population. Additional limitations of these studies generally fall into the following categories:

- design and sample limitations;
- limitations in measurement; and
- factors other than the oil spill that may impact changes over time or differences between geographic regions studied.

### 4.1 Design and Sample Limitations

NSDUH is a cross-sectional survey, collecting data from separate samples of respondents at various points in time, rather than a longitudinal survey, collecting data from the same sample of respondents at multiple time points. Cross-sectional data can establish associations, such as changes in substance use or mental health indicators before and after the oil spill, but do not allow inferences to be made about whether the oil spill was the direct cause of these changes. Similarly, we cannot infer that differences found between coastal and noncoastal counties in the GSPS necessarily were a direct result of the oil spill.

Both the oversample design in NSDUH and the GSPS targeted counties and parishes that were most likely to be affected by the oil spill, with NSDUH selecting 32 counties and the GSPS selecting 25 counties. However, the studies did not further target subpopulations in these geographic areas that could have been most affected by the oil spill, such as individuals or families in the fishing, oil, or tourism industries, or those who participated in oil spill cleanup activities. As a result, not all respondents surveyed in these affected counties were directly impacted by the oil spill. Consequently, lack of observed differences before or after the oil spill or between the Gulf Coast and other regions should not be interpreted as meaning that there were not behavioral health impacts from the oil spill among the subset of the population in those counties directly affected by the spill.

NSDUH interviews were conducted in English or Spanish (see Section A.2 in Appendix A). The GSPS interview was available only in English prior to May 2011 and was available in English or Spanish for May to December 2011. Neither interview was available in other languages, such as Vietnamese, spoken by some Gulf Coast residents who were directly affected by the oil spill. Respondents whose first language was something other than English or Spanish

could have interpreted and answered questions differently if the survey had been available in their first language.

A further potential design limitation of these studies concerns the ages of eligible respondents. Because children younger than the age of 12 who are living in sampled dwelling units for NSDUH are not interviewed, NSDUH cannot be used to examine any potential impact of the oil spill on children younger than 12. GSPS data were collected only from adults aged 18 or older. GSPS included questions about characteristics of children in the household, but these proxy reports from adults could differ from what children themselves may have reported.

As a telephone survey, GSPS did not include households without telephone coverage in the sample frame. In addition, the GSPS sample frame prior to May 2011 only included households with landline telephones; households covered only by cell phones were added to the sampling frame for May to December 2011. Although these types of noncoverage can be taken into account in the weighting procedures, findings have the potential for bias if behavioral and physical health differs between persons living in households with landline telephones, those with only cell phone coverage, and those without telephones.

## **4.2 Limitations in Measurement**

Measures of substance use, mental health issues, and other topics in these studies are based on respondent self-reports. Measurement of some characteristics (e.g., illicit drug use) other than through self-reports is not practical. Although studies have generally supported the validity of self-report data (Harrison & Hughes, 1997; Harrison, Martin, Enev, & Harrington, 2007), these self-report data may be biased (i.e., underreported or overreported). Data collection methods other than surveys (e.g., record-based data collection) also have their own limitations. Nevertheless, data that do not rely on self-reports (e.g., calls to mental health hotlines) can provide further information about the effects of this disaster.

Further, NSDUH data allow measurement of a variety of substance use and mental health issues, but NSDUH does not collect detailed main survey data<sup>1</sup> on anxiety disorders or data on other manifestations of stress or psychological distress that could have been affected by the oil spill, such as incidents of intimate partner violence. NSDUH also did not include additional questions for Gulf Coast respondents about the direct impact of the oil spill on their lives, such as loss of household income, time lost from work, time spent in the cleanup effort, or compensation received. The GSPS complements NSDUH by collecting data on some of these conditions. In turn, NSDUH measures behaviors or conditions not covered in GSPS (e.g., detailed measures of substance use and substance use disorders).

## **4.3 Other Factors**

It is possible that factors other than the oil spill affected the comparisons over time in NSDUH and the comparisons between regions in the GSPS. For example, mental illness is associated with indicators of disadvantaged social and economic status, including

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<sup>1</sup> Clinical interviews on mental disorders and impairment due to these disorders also are conducted nationally with a subsample of adult NSDUH respondents.

unemployment, coverage by Medicaid or the Children's Health Insurance Program, and family income below the Federal poverty level (CBHSQ, 2012). The analyses presented in this report are descriptive in nature, and do not account for the possible impact of these factors. Consequently, observed differences for the GCDA, the Gulf Coast region outside of the oil spill area, and the remainder of the United States could reflect demographic or socioeconomic differences across these regions rather than effects of the oil spill.

Furthermore, the oil spill did not occur in a vacuum relative to other events. During the pre-spill period, for example, persons in some counties and parishes in these States could have been experiencing residual psychological distress from the effects of Hurricanes Katrina and Rita in 2005 (OAS, 2008) or from Hurricanes Gustav and Ike in 2008. In addition, the distribution of the effects of the economic recession within the Gulf Coast region, Gulf Coast States, and other regions of the United States also could have contributed to differences (or the lack of differences) before and after the oil spill or between geographic regions. Payments from BP to residents of the Gulf Coast to compensate for lost wages began in 2010 and continued throughout 2011; for some individuals, these payments could have reduced or eliminated the symptoms of psychological distress during the post-spill period. The immediate mobilization of additional mental health services to the region by Federal, State, and local governments likely also contributed to a reduction in mental health problems following the oil spill.

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## 5. Discussion

Findings from National Survey on Drug Use and Health (NSDUH) and the GSPS do suggest some modest or minimal changes in behavioral health measures at the aggregate regional level in the Gulf Coast Disaster Area (GCDA) before and after the *Deepwater Horizon* oil spill. NSDUH data indicate that the prevalence of illicit drug use, marijuana use, and alcohol use in the past month increased after the oil spill relative to the period before the oil spill in the GCDA. In addition, among young adults aged 18 to 25, there were increases the prevalence of major depressive disorder, serious thoughts of suicide, and suicide plans in the GCDA before and after the oil spill. Results of the GSPS indicated that people living in the coastal counties were more likely than those living in noncoastal counties to report decreased income or lost jobs because of the oil spill but did not indicate any substantial differences in chronic physical or mental health conditions or health behaviors between coastal and noncoastal counties in the region.

It is important to note that the findings from these studies focus on the full population of the affected region. As noted in Chapter 4, the population-level results from large-scale surveys such as these may not capture effects that are limited to smaller subpopulations. Therefore, lack of significant findings from these population studies does not mean that there are not subgroups of the population in this region that have been affected more by the oil spill than the regional population as a whole.

### 5.1 Comparisons with Previous Disasters

Early reports and predictions regarding the impact of the *Deepwater Horizon* oil spill in 2010 primarily used two previous disasters—the 1989 *Exxon Valdez* oil spill in Alaska and Hurricanes Katrina and Rita in 2005—as points of reference. However, on closer examination of the oil spill in the Gulf of Mexico, it became evident that there are several major differences among these events. These differences can affect the ability to draw parallels between the effects of the previous disasters and the effects of the oil spill on the behavioral and physical health of the residents in the affected region.

On March 24, 1989, the supertanker *Exxon Valdez* ran aground in Prince William Sound, a relatively small and confined geographic area in a sparsely populated and remote region with an extremely cold climate. These conditions hampered cleanup efforts. About 20 years after the *Exxon Valdez* oil spill, most wildlife resources and species had not recovered from the spill. There have been significant declines in local fisheries and reported high levels of collective trauma, social disruption, economic uncertainty, community conflict, and psychological stress (Gill et al, 2011).

Although initial data suggested that the GCDA might experience environmental consequences similar to those following the *Exxon Valdez* spill, the geography and climate in which these two oil spills occurred were markedly different. Consequently, important differences between the two historic spills have come to be recognized, particularly with regard to the geographic area affected, water temperatures, and ecosystems. The *Exxon Valdez* spill affected a relatively small and confined geographic area in a sparsely populated and remote region with an extremely cold climate. These conditions hampered cleanup efforts; they also had a significant

impact on the abundant wildlife in the area, with thick oil affected shorelines and fish stocks for decades. The *Deepwater Horizon* spill, though many times greater in magnitude than the *Exxon Valdez* spill, occurred over a much larger area and in much warmer water that promoted quicker deterioration of the oil and may have limited its long-term effects on wildlife. Researchers also have had more than 20 years to gauge the longer-term impacts of the *Exxon Valdez* oil spill. However, only 2 years have elapsed since the *Deepwater Horizon* oil spill. Consequently, it may be too early to tell how the oil spill will affect the ecosystem in the affected region of the Gulf Coast in the longer term, and in turn, what the effects will be on the general health and psychological well-being of the area's residents.

In addition, a review article in the *New England Journal of Medicine* in 2011 on the impact of the Gulf Coast oil spill (Goldstein, Osofsky, & Lichtveld, 2011) drew parallels with the September 11, 2001, terrorist attacks on the World Trade Center (WTC) and Hurricane Katrina that could have implications for the residents of the affected region. Following those other two disasters, for example, immigrant workers and other vulnerable populations appeared to be less likely to obtain care and more likely to have long-term health consequences compared with the overall population. In addition, factors such as a disproportionately large underlying disease burden and a history of health disparities in the affected region of the Gulf Coast could increase that area's vulnerability to future environmental and natural disasters. However, Goldstein and colleagues' article also concluded that physical exposure to toxic chemicals during the oil spill in the Gulf and the associated health impacts for humans were likely to be minimal.

Note that data from NSDUH (then called the National Household Survey on Drug Abuse, or NHSDA) indicated minimal changes in substance use and mental health problems in New York City and the surrounding areas before and after the September 11, 2001, terrorist attacks (OAS, 2002). In addition, NSDUH data indicated minimal changes in substance use and mental health problems before and after Hurricanes Katrina and Rita in the regions of the Gulf Coast impacted by those storms. However, NSDUH data for the year following Hurricanes Katrina and Rita did indicate that residents who lived in the affected areas who were displaced from their home for 2 weeks or longer following the storms had markedly higher rates of substance use and mental health problems compared with residents in the affected areas who were not displaced from their homes. Though there was little to no displacement from homes as a result of the Gulf Coast oil spill, these findings serve as a general example of how the lack of behavioral health changes at the regional level following a disaster does not rule out behavioral health impacts on subsets of the population within the region.

## **5.2 Implications**

Many residents of the Gulf Coast undoubtedly experienced increased levels of anxiety and stress following the *Deepwater Horizon* oil spill. NSDUH data indicate that for some age groups, there were increases in the prevalence of certain substance use and mental health measures before and after the oil spill event. GSPS data indicate that coastal counties in the region experienced more decreased income or job losses following the spill than noncoastal counties. However, results of NSDUH and the GSPS generally do not suggest major overall increases at the regional level in mental health or substance abuse problems in the GCDA following the oil spill event. Given the differences between the *Deepwater Horizon* oil spill and previous disasters that have been studied, it also seems reasonable to assume that the potential

overall psychological impact of this oil spill might differ from the impacts associated with these other disasters. It is also possible that the resources mobilized to reduce the economic and behavioral health impacts of the oil spill on GCDA residents, including compensation for lost income from BP and increases in available mental health services, may have resulted in a reduction in mental health problems relative to what would have occurred if those resources had not been mobilized.

As mentioned previously, it is important to understand that the effects of the oil spill on smaller subpopulations in the affected regions may not be evident from survey findings for the population as a whole. In particular, the oil spill may have had and may continue to have major impacts on the behavioral health of subgroups or specific individuals who were directly affected by the spill. For example, any disproportionate impact of the Gulf Coast oil spill on ethnic minorities is an important public health concern, particularly for those with limited English language proficiency (e.g., Vietnamese) (Goldstein et al., 2011; Do, 2011). In emergency situations, these individuals may face economic and social barriers, such as in communicating with government personnel, understanding information about environmental hazards, and accessing mental health services during post-disaster events. Even if such respondents were capable of completing a survey in English, their answers could have been affected by English not being their first language.

### **5.3 Future Analyses**

Further analysis of NSDUH data could be conducted for specific demographic groups other than age groups, specific industries, or occupations likely to have been directly affected by the oil spill or to examine longer-term impacts of the oil spill on substance use and mental health. NSDUH sample sizes in the GCDA may be sufficiently large to allow for analyses focusing on certain demographic groups other than age groups, such as estimation for non-Hispanic whites and non-Hispanic blacks. Other variables included in NSDUH that may be included in future analyses are indicators of socioeconomic status, such as coverage by Medicaid or Children's Health Insurance Program (CHIP), family income, and household size. Additional analyses could also address why some measures of substance use and mental health problems were greater in the post-spill period than in the pre-spill period, whereas for other measures the estimates were similar between these periods.

It is likely that the oil spill affected people unequally, according to the industries in which they (or wage earners in the household) were working, particularly people working in the fishing industry (or related industries, such as seafood processing), oil industry, or tourism-related industries (e.g., traveler accommodations). Industry data are available from both NSDUH and GSPS. However, preliminary investigation of NSDUH data for industry categories suggests that sample sizes are not large enough for some specific industries to support analyses (e.g., those in the fishing industry) and that there are few significant differences between the pre-spill and post-spill periods when looking at broader sets of industry categories.

For the GSPS, further analysis is under way to (1) identify psychosocial determinants of health in the coastal population; (2) evaluate access and use of health care by people with depression and anxiety in the coastal population; (3) assess the direct and indirect costs of depression and anxiety in the coastal population; (4) assess associations of exposure to the oil

spill and health; and (5) develop models of community resilience and health. In addition, CDC will evaluate differences between responses for households covered by landlines and cell phones and differences between responses in English and Spanish.

As noted previously, the results included in this report are descriptive in nature, meaning that differences in substance use and mental health reported between time periods or between regions do not control for differences in demographic or socioeconomic factors. Multivariate procedures such as logistic regression modeling can be conducted that will control for these types of factors. The results of those more rigorous statistical procedures will increase confidence in the findings presented in this report. In addition, further study over a longer period of time also is needed to evaluate the potential for longer-term behavioral health impacts related to the spill and its aftermath.

## 6. References

- Arata, C. M., Picou, J. S., Johnson, G. D., & McNally, T. S. (2000). Coping with technological disaster: An application of the conservation of resources model to the *Exxon Valdez* oil spill. *Journal of Traumatic Stress, 13*(1), 23-39. doi:10.1023/a:1007764729337
- Becker, S. M. (1997). Psychosocial assistance after environmental accidents: A policy perspective. *Environmental Health Perspectives, 105*(Suppl 6), 1557.
- Blumberg, S. J., & Luke, J. V. (2010, May 12). *Wireless substitution: Early release of estimates from the National Health Interview Survey, July-December 2009*. Retrieved from <http://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless201005.htm>
- Butler, D., & Sayre, E. (2010, June 14). *Economic impact of the Deepwater Horizon oil spill on south Mississippi: Initial findings on revenue*. Hattiesburg, MS: University of Southern Mississippi. Retrieved from <http://www.usm.edu/oilspill/files/white-papers/Oil-Spill-Economic-Impact-Butler-Sayre.pdf>
- Button, G. V. (1995). "What you don't know can't hurt you": The right to know and the Shetland Island oil spill. *Human Ecology, 23*(2), 241-257.
- Carrasco, J., Pérez-Gómez, B., García-Mendizábal, M., Lope, V., Aragonés, N., Forjaz, M., Guallar-Castillón, P., López-Abente, G., Rodríguez-Artalejo, F., & Pollán, M. (2007). Health-related quality of life and mental health in the medium-term aftermath of the *Prestige* oil spill in Galiza (Spain): A cross-sectional study. *BMC Public Health, 7*(1), 245.
- Center for Behavioral Health Statistics and Quality. (2011). *Results from the 2010 National Survey on Drug Use and Health: Summary of national findings* (NSDUH Series H-41, HHS Publication No. SMA 11-4658). Rockville, MD: Substance Abuse and Mental Health Services Administration.
- Center for Behavioral Health Statistics and Quality. (2012). *Results from the 2010 National Survey on Drug Use and Health: Mental health findings* (NSDUH Series H-42, HHS Publication No. SMA 11-4667). Rockville, MD: Substance Abuse and Mental Health Services Administration.
- Coastal Recovery Commission (CRC) of Alabama. (2011). *A roadmap to resilience: Towards a healthier environment, society and economy for coastal Alabama*. Retrieved from <http://cralabama.org/wp-content/uploads/2011/02/CRC-Report-02-2011.pdf>
- Devi, S. (2010). Anger and anxiety on the Gulf Coast. *The Lancet, 376*(9740), 503-504. doi:10.1016/s0140-6736(10)61237-8
- Deville, J. C., & Särndal, C. E. (1992). Calibration estimators in survey sampling. *Journal of the American Statistical Association, 87*, 376-382.

- Do, P. T. (2011, December 15). Alleviating the negative impact of the 2010 Gulf of Mexico oil leaks on the physical and psychological health of ethnic minority immigrants: A Vietnamese case study. *Traumatology*. Advance online publication. doi: 10.1177/1534765611426785
- Folsom, R. E., & Singh, A. C. (2000). The generalized exponential model for sampling weight calibration for extreme values, nonresponse, and poststratification. In *Proceedings of the 2000 Joint Statistical Meetings, American Statistical Association, Survey Research Methods Section, Indianapolis, IN* (pp. 598-603). Alexandria, VA: American Statistical Association.
- Gallacher, J., Bronstering, K., Palmer, S., Fone, D., & Lyons, R. (2007). Symptomatology attributable to psychological exposure to a chemical incident: A natural experiment. *Journal of Epidemiology and Community Health, 61*(6), 506-512.
- García-Mira, R., Real, J. E., Uzzell, D. L., San Juan, C., & Pol, E. (2006). Coping with a threat to quality of life: The case of the *Prestige* disaster. *Revue Européenne de Psychologie Appliquée/European Review of Applied Psychology, 56*(1), 53-60.
- Gfroerer, J., Lessler, J., & Parsley, T. (1997). Studies of nonresponse and measurement error in the National Household Survey on Drug Abuse. In L. Harrison & A. Hughes (Eds.), *The validity of self-reported drug use: Improving the accuracy of survey estimates* (NIH Publication No. 97-4147, NIDA Research Monograph 167, pp. 273-295). Rockville, MD: National Institute on Drug Abuse.
- Gheyntanchi, A., Joseph, L., Gierlach, E., Kimpara, S., Housley, J., Franco, Z. E., & Beutler, L. E. (2007). The dirty dozen: Twelve failures of the Hurricane Katrina response and how psychology can help. *American Psychologist, 62*(2), 118.
- Gill, D. A., Picou, J. S., & Ritchie, L. A. (2012). The *Exxon Valdez* and BP oil spills: A comparison of initial social and psychological impacts. *American Behavioral Scientist, 56*(1), 3-23.
- Goldstein, B. D., Osofsky, H. J., & Lichtveld, M. Y. (2011). The Gulf oil spill. *New England Journal of Medicine, 364*(14), 1334-1348.
- Grattan, L. M., Roberts, S., Mahan Jr, W. T., McLaughlin, P. K., Otwell, W. S., & Morris Jr., J. G. (2011). The early psychological impacts of the *Deepwater Horizon* oil spill on Florida and Alabama communities. *Environmental Health Perspectives, 119*(6), 838.
- Groves, R. M., Fowler, F. J., Couper, M. P., Lepkowski, J. M., Singer, E., & Tourangeau, R. (2009). *Survey methodology* (2nd ed.). New York, NY: Wiley.
- Harrison, L., & Hughes, A. (1997). *The validity of self-reported drug use: Improving the accuracy of survey estimates* (NIH Publication No. 97-4147, NIDA Research Monograph 167). Rockville, MD: National Institute on Drug Abuse.
- Harrison, L. D., Martin, S. S., Enev, T., & Harrington, D. (2007). *Comparing drug testing and self-report of drug use among youths and young adults in the general population* (DHHS Publication No. SMA 07-4249, Methodology Series M-7). Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies.

- Horowitz, M. J., Wilner, N., & Alvarez, W. (1979). Impact of Event Scale: A measure of subjective stress. *Psychosomatic Medicine*, 41(3), 209-218.
- Hughes, A., Muhuri, P., Sathe, N., & Spagnola, K. (2012). *State estimates of substance use and mental disorders from the 2009-2010 National Surveys on Drug Use and Health* (HHS Publication No. SMA 12-4673, NSDUH Series H-43). Rockville, MD: Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality.
- Kennedy, M. S. (2010). Another tragedy on the Gulf Coast. *AJN: The American Journal of Nursing*, 110(9), 7. doi: 10.1097/1001.NAJ.0000388241.0000398740.0000388245a.
- Kessler, R. C., Barker, P. R., Colpe, L. J., Epstein, J. F., Gfroerer, J. C., Hiripi, E., Howes, M. J., Normand, S-L. T., Manderscheid, R. W., Walters, E. E., & Zaslavsky, A. M. (2003). Screening for serious mental illness in the general population. *Archives of General Psychiatry*, 60(2), 184-189.
- Lee, M. R., & Blanchard, T. C. (2012). Community attachment and negative affective states in the context of the BP *Deepwater Horizon* disaster. *American Behavioral Scientist*, 56(1), 24-47. doi:10.1177/0002764211409384
- Lyons, R. A., Temple, J., Evans, D., Fone, D. L., & Palmer, S. R. (1999). Acute health effects of the *Sea Empress* oil spill. *Journal of Epidemiology and Community Health*, 53(5), 306-310.
- Manly, B. F. J. (1986). *Multivariate statistical methods: A primer*. London, England: Chapman and Hall.
- McNair, D. M., Lorr, M., & Droppleman, L. F. (1992). *Revised manual for the profile of mood states*. San Diego, CA: Educational and Industrial Testing Service.
- Miraglia, R. A. (2002). The cultural and behavioral impact of the *Exxon Valdez* oil spill on the native peoples of Prince William Sound, Alaska. *Spill Science & Technology Bulletin*, 7(1-2), 75-87.
- Morton, K. B., Martin, P. C., Shook-Sa, B. E., Chromy, J. R., & Hirsch, E. L. (2012). Sample design report. In *2011 National Survey on Drug Use and Health: Methodological resource book* (Section 2, prepared for the Substance Abuse and Mental Health Services Administration, under Contract No. HHSS283200800004C, Phase II, Deliverable No. 8, RTI/0211838.203.004). Research Triangle Park, NC: RTI International.
- National Institute for Occupational Safety and Health (NIOSH). (2010). *Deepwater Horizon response: NIOSH voluntary roster of Deepwater Horizon response workers*. Retrieved from <http://cdc.gov/niosh/topics/oilspillresponse/workerroster.html>
- Nelson, R. (2010). Adding insult to injury: Five years after Katrina. *AJN: The American Journal of Nursing*, 110(9), 19-21. doi:10.1097/01.NAJ.0000388256.34180.06
- Neria, Y., Nandi, A., & Galea, S. (2008). Post-traumatic stress disorder following disasters: A systematic review. *Psychological Medicine*, 38(4), 467-480.

- Novak, S. P., Colpe, L. J., Barker, P. R., & Gfroerer, J. C. (2010). Development of a brief mental health impairment scale using a nationally representative sample in the USA. *International Journal of Methods in Psychiatric Research*, 19(Suppl. 1), 49-60. doi: 10.1002/mpr.313.
- Office of Applied Studies. (2002). Impact of September 11, 2001 Events on Substance Use and Mental Health (Analytic Series: A-18, DHHS Publication No. SMA 02-3729). Rockville, MD: Substance Abuse and Mental Health Services Administration. Retrieved from <http://www.samhsa.gov/data/sept11/cover.htm>
- Office of Applied Studies. (2008, January). *The NSDUH Report: Impact of Hurricanes Katrina and Rita on substance use and mental health*. Rockville, MD: Substance Abuse and Mental Health Services Administration.
- Osofsky, H. J., Osofsky, J. D., & Hansel, T. C. (2011). Deepwater Horizon oil spill: Mental health effects on residents in heavily affected areas. *Disaster Medicine and Public Health Preparedness*, 5(4), 280-286.
- Osofsky, H. J., Palinkas, L. A., & Galloway, J. M. (2010). Mental health effects of the Gulf oil spill. *Disaster Medicine and Public Health Preparedness*, 4(4), 273-276.
- Palinkas, L., Petterson, J., Russell, J., & Downs, M. (2004). Ethnic differences in symptoms of posttraumatic stress after the Exxon Valdez oil spill. *Prehospital and Disaster Medicine*, 19(1), 102-112.
- Palinkas, L. A., Downs, M. A., Petterson, J. S., & Russell, J. (1993a). Social, cultural, and psychological impacts of the Exxon Valdez oil spill. *Human Organization*, 52(1), 1-13.
- Palinkas, L. A., Petterson, J. S., Russell, J., & Downs, M. A. (1993b). Community patterns of psychiatric disorders after the Exxon Valdez oil spill. *American Journal of Psychiatry*, 150(10), 1517-1523.
- Pearlin, L. I., & Schooler, C. (1978). The structure of coping. *Journal of Health and Social Behavior*, 19(1), 2-21.
- Picou, J. S., & Gill, D. A. (1996). The Exxon Valdez oil spill and chronic psychological stress. *American Fisheries Society Symposium*, 18, 879-893.
- Rehm, J., Üstün, T. B., Saxena, S., Nelson, C. B., Chatterji, S., Ivis, F., & Adlaf, E. (1999). On the development and psychometric testing of the WHO screening instrument to assess disablement in the general population. *International Journal of Methods in Psychiatric Research*, 8, 110-123.
- Ritchie, L. A., Gill, D. A., & Picou, J. S. (2011). The BP disaster as an Exxon Valdez rerun. *Contexts*, 10(3), 30-35. doi:10.1177/1536504211418454
- Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs*, 80(1), 1-28.
- RTI International. (2008). SUDAAN<sup>®</sup>, Release 10.0 [computer software]. Research Triangle Park, NC: Author.



RTI International. (2010). *Literature, web, and media review of the behavioral health impacts of the Deepwater Horizon Gulf oil spill: Draft report* (Report prepared for the Substance Abuse and Mental Health Services Administration, under Contract No. 283-05-0092, Project No. 9523). Research Triangle Park, NC: Author.

RTI International. (2012). *2010 National Survey on Drug Use and Health: Methodological resource book* (prepared for the Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, under Contract No. HHSS283200800004C, Deliverable No. 39). Research Triangle Park, NC: Author.

Sabucedo Cameselle, J. M., Arce Fernández, C., Ferraces Otero, M. J., Merino Madrid, H., & Durán Rodríguez, M. M. (2009). Psychological impact of the *Prestige* catastrophe. *International Journal of Clinical and Health Psychology*, 9(1), 105-116.

Sabucedo, J. M., Arce, C., Senra, C., Seoane, G., & Vázquez, I. (2010). Symptomatic profile and health-related quality of life of persons affected by the *Prestige* catastrophe. *Disasters*, 34(3), 809-820.

Safina, C. (2011). The 2010 Gulf of Mexico oil well blowout: A little hindsight. *PLoS Biology*, 9(4), e1001049.

Singh, A., Grau, E., & Folsom, R., Jr. (2002). Predictive mean neighborhood imputation for NHSDA substance use data. In J. Gfroerer, J. Eyerman, & J. Chromy (Eds.), *Redesigning an ongoing national household survey: Methodological issues* (HHS Publication No. SMA 03-3768, pp. 111-133). Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies.

Slomski, A. (2010). Experts focus on identifying, mitigating potential health effects of Gulf oil leak. *JAMA: The Journal of the American Medical Association*, 304(6), 621-624.  
doi:10.1001/jama.2010.1053

Solomon, G. M., & Janssen, S. (2010). Health effects of the Gulf oil spill. *JAMA: The Journal of the American Medical Association*, 304(10), 1118-1119.

Voelker, R. (2010). Memories of Katrina continue to hinder mental health recovery in New Orleans. *JAMA: Journal of the American Medical Association*, 304(8), 841-843.  
doi:10.1001/jama.2010.1193

Weathers, F., Litz, B., Herman, D., Huska, J., & Keane, T. (1993, October 24-25). *The PTSD Checklist (PCL): Reliability, validity, and diagnostic utility*. Presented at the International Society for Traumatic Stress Studies Meeting, San Antonio, TX.

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