

# ASSESSING THE EFFECTS OF THE GULF OF MEXICO OIL SPILL ON HUMAN HEALTH

A Summary of the June 2010 Workshop

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*Rapporteurs*

INSTITUTE OF MEDICINE  
OF THE NATIONAL ACADEMIES

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The serpent has been a symbol of long life, healing, and knowledge among almost all cultures and religions since the beginning of recorded history. The serpent adopted as a logotype by the Institute of Medicine is a relief carving from ancient Greece, now held by the Staatliche Museen in Berlin.

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*“Knowing is not enough; we must apply.  
Willing is not enough; we must do.”*

—Goethe



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AN INSTITUTE OF MEDICINE WORKSHOP<sup>1</sup>**

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<sup>1</sup>The role of the planning committee was limited to planning and preparation of the workshop. This document was prepared by rapporteurs as a factual summary of what was presented and discussed at the workshop.



# Reviewers

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Research Council's (NRC's) Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the process. We wish to thank the following individuals for their review of this report:

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Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the final draft of the report before its release. The review of this report was overseen by **Robert B. Wallace**, Irene Ensminger Stecher Professor of Epidemiology and Internal Medicine in the College of Public Health at the University of Iowa. Appointed by the NRC and Institute of Medicine, he was responsible for making certain that an independent

examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authors and the institution.



# Preface

On April 20, 2010, 11 oil workers lost their lives when the Deepwater Horizon, a semi-submersible offshore drilling rig in the Gulf of Mexico, exploded and created one of the largest environmental disasters in U.S. history. In the weeks and months that followed, hundreds of millions of liters of crude oil spewed into the Gulf of Mexico, threatening the waters and surrounding lands, marshes, and beaches; damaging fish and wildlife; and disrupting the lives of many residents and communities in the Gulf region.

This is not the first oil spill disaster. Other oil spill catastrophes have occurred in the United States and around the world. But, the Gulf oil spill is distinctive in its magnitude, in its duration, and in the complexity of its assessment. Unlike most spills in which there is a single event and measurable release of oil, the Deepwater Horizon spill has been plagued not only by its resolution (as of this writing, the success of capping the well is still in doubt) but also by its wide-reaching and likely prolonged impact on communities in the affected regions. The extensive, prolonged use of dispersants is also unprecedented, and the risks associated with their use are unknown, as are risks associated with fumes from the oil and controlled burns. In fact, it may be the sheer level of uncertainty that best defines the Gulf of Mexico oil spill.

Since the Gulf oil spill began, there have been concerns about the extent to which related hazards, such as physical and chemical exposures and social and economic disruptions, will impact human health. In addition to concerns about the impact of the spill on the general population of

the Gulf region, some populations are potentially at increased risk of short- and long-term physical and psychological health damage. The latter include clean-up workers and volunteers, who are exposed to extreme heat and fatigue, fishermen, oil rig workers, and countless others, who wait to hear when and if they can go back to their livelihoods and their way of life. While studies of previous oil spills provide some basis for identifying and mitigating the human health effects of these exposures, the existing data are insufficient to fully understand and predict the overall impact of hazards from the Deepwater Horizon oil spill on the health of individuals—including workers, volunteers, residents, visitors, and special populations.

The Secretary of the U.S. Department of Health and Human Services, Kathleen Sebelius, asked the Institute of Medicine (IOM) to hold a workshop to inform efforts to monitor the health effects of the Gulf oil spill and to communicate information concerning these risks to the public. Reflecting the urgency of the issue and the dedication and hard work of the IOM staff, the workshop was held within two weeks of receiving the Secretary's request. I was honored to chair the planning committee, which included distinguished colleagues with diverse backgrounds and expertise. With only 1 week's notice, 37 experts and health officials and four community representatives participated in the workshop in New Orleans and gave excellent presentations. Over 300 other participants attended the workshop, and hundreds more have viewed the webcast. Public commentary was submitted via a specially developed portal on the World Wide Web.

This publication captures many of the observations, ideas, and suggestions offered by participants. In 2 days it was not possible to design a surveillance system, but the discussion pointed to key considerations that should be used in designing such a system. By identifying what is already known and what is missing, policy makers, public health officials, academics, community advocates, scientists, and members of the public can work together to create a monitoring and surveillance system that results in "actionable" information that identifies emerging health risks in specific populations. Doing so can help target resources to high-risk populations for treatment, and foster new approaches for the prevention of adverse health effects.

Workshop participants from the local area poignantly described the frustration and struggle faced by Gulf residents and reminded us of the importance of incorporating the concerns and expertise of community members. Surveillance activities will need to be coordinated and should

involve federal, state, and local governments; academic institutions; advocacy groups; private industry; and community networks. By including all the relevant parties, we can develop more comprehensive and effective surveillance systems to inform decision makers and the public about the physical and psychological health issues related to the Deepwater Horizon oil spill and other environmental disasters in the future.

Nancy E. Adler  
*Chair*, Planning Committee on  
Assessing the Effects of the Gulf of  
Mexico Oil Spill on Human Health: An  
Institute of Medicine Workshop



# Acknowledgments

This publication is the product of a small army of dedicated individuals, and the Institute of Medicine (IOM) is grateful to all for their commitment, patience, and professionalism in developing and executing this workshop within a two-week timeframe.

Substantial recognition must be extended to the Secretary of the U.S. Department of Health and Human Services, Kathleen Sebelius; to Nicole Lurie, Assistant Secretary for Preparedness and Response (ASPR); and the ASPR staff for their vision and generous support for this workshop.

This workshop would not have been possible without the expertise of the planning committee members and their skilled navigation of the questions and challenges. Under Nancy Adler's adept direction, the planning committee assembled an impressive agenda of distinguished speakers, whose presentations both informed and provoked thoughtful discussions over the course of the workshop.

Many devoted IOM staff members supported the planning and execution of the summit. Bruce Altevogt, Christine Coussens, Meg McCoy, and Kathleen Stratton provided steadfast support to the planning committee and project, while Clyde Behney, Cathy Liverman, Andy Pope, and Judith Salerno offered their guidance and leadership. Thanks go to Shelly Cooke, Pam Lighter, Janet Stoll, and Trevonne Walford for their assistance at the workshop; to Judy Estep, Jill Grady, and Hope Hare for their administrative support; to Marton Cavani, Lauren Tobias, and Jordan Wyndelts for their communications and technological expertise; and to Christine Stencel for her work with the media. The IOM extends special thanks to Katharine Bothner for her initiative and management

skills, and to Abbey Meltzer for her dedication throughout the project. Additional recognition goes to numerous IOM staff members who contributed to the development of the workshop and to the production and dissemination of this publication; Christie Bell, Jody Evans, Linda Kilroy, Donna Randall, and Viliija Teel.

The workshop was webcast by Digitell and transcribed by Debra Gilliam. The IOM is grateful to the staff of the Hotel Monteleone for their generosity and flexibility while hosting the workshop. Thanks go to Leslie Pray for her rapid writing; to Mark Goodin for copyediting the summary; and to Francesca Moghari for designing the cover.

Finally, the IOM would like to express its appreciation to each workshop speaker and participant for enriching the workshop discussions by sharing their diverse perspectives and experiences.

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# Overview

On June 22-23, 2010, in New Orleans, Louisiana, the Institute of Medicine (IOM) convened a workshop, Assessing the Human Health Effects of the Gulf of Mexico Oil Spill. The workshop brought together more than 350 federal, state, and local government officials, expert scientists, academic leaders, policy experts, health care providers, public health advocates, community representatives and residents, and other participants from diverse disciplines to examine options for measuring the Gulf oil spill's potential health effects on different human populations. This publication summarizes the background, presentations, discussions, and public comments that occurred during the workshop.

## INTRODUCTION

On April 20, 2010, the Deepwater Horizon offshore drilling rig in the Gulf of Mexico exploded, causing a sea-floor oil leak 1 mile beneath the ocean's surface. The explosion killed 11 workers and unleashed one of the largest off-shore oil spills in United States history, threatening the entire Gulf and Atlantic coastline. The depth of the oil source has made it difficult to accurately measure how much oil is being discharged. At the time of this workshop,<sup>1</sup> official estimates of the amount of oil released daily into the Gulf of Mexico ranged drastically (MacDonald et al.,

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<sup>1</sup>This report summarizes a workshop that took place on June 22-23, 2010. All of the information presented, including estimated flow rates, is stated as of those approximate dates.

2010). The effects of this much oil on a community so dependent upon the Gulf waters will be far-reaching and pronounced, leading many to describe the situation in the Gulf of Mexico as an oil disaster rather than an oil spill.

From the leak's origin, to the amount of oil released into the environment, to the duration and ongoing nature of the spill, the Gulf oil spill has presented many unique challenges. The clean-up efforts have been the most demanding on-water response in U.S. history, involving the use of more than 1 million gallons of oil spill dispersants (Judson et al., 2010) and the deployment of thousands of skimming vessels (Deepwater Horizon Response, 2010), including local boat operators who assist with containment and response activities using their "vessels of opportunity." Many on- and off-shore commercial workers, clean-up workers, and volunteers have subjected themselves to numerous physical hazards (such as chemical exposures, heat stress, and injury) through response activities involving chemical dispersants, booms, and skimmers. Long work days and weeks are common as workers and volunteers combat waves and plumes of oil that continue to threaten their communities, livelihoods, and ways of life.

In addition to the physical stressors, the Deepwater Horizon oil disaster has disrupted delicate social, economic, and psychological balances in communities across the Gulf region. Local fishermen and women in the region are grappling with possibly permanent disruptions to their long-standing livelihoods. Fears associated with contaminated beaches and food continue to dissuade tourists from visiting an area still recovering from the devastation of Hurricanes such as Katrina, Rita, and Gustav. Communities question the safety of their most vulnerable populations and worry about the effects that the Gulf oil disaster will have on their immediate and long-term health. The resulting uncertainty about physical, social, and economic health has profound implications for the psychological wellbeing of individuals in affected communities.

Despite information available through studies of past oil spills and other disaster responses, uncertainty continues to mount in the absence of reliable and trustworthy information about the hazards posed by the Gulf oil spill and its related clean-up activities. A number of federal, state, academic, private-industry, and community efforts are already underway to help generate data that can answer some of the most pressing questions. However, more information is needed to best protect the health of affected populations in the context of both the Deepwater Horizon oil spill and of future public health disasters.

**ASSESSING THE EFFECTS OF THE GULF OF MEXICO  
OIL SPILL ON HUMAN HEALTH:  
AN INSTITUTE OF MEDICINE WORKSHOP**

To explore the needs for appropriate surveillance systems to monitor the spill's potential short- and long-term health effects on affected communities and individuals, Secretary Kathleen Sebelius of the U.S. Department of Health and Human Services (HHS) contracted with the IOM to convene the public workshop *Assessing the Human Health Effects of the Gulf of Mexico Oil Spill in the Gulf region*. Nancy Adler chaired a 6-member planning committee.<sup>2</sup> The workshop explored available scientific evidence to guide the development of appropriate surveillance systems and to establish possible directions for additional research. Specifically, HHS asked the IOM to: (1) identify and discuss the populations most vulnerable to or at increased risk for adverse health effects, including worker sub-populations; (2) review current knowledge and identify knowledge gaps regarding the human health effects of exposure to oil, weathered oil products, dispersants, and environmental conditions such as heat; (3) consider effective communication strategies to convey information about health risks to at-risk populations, accounting for cultural, health literacy, linguistic, technological, and geographical barriers; (4) explore research methodologies and appropriate data collection to further our understanding of the risks to human health; and (5) review and assess components of a framework for short-term and long-term surveillance to monitor the spill's potential adverse health effects.

The 2-day workshop included expert presentations, 6 panel discussions, and an open-microphone dialogue with the audience. Sessions were designed to focus mainly on one of the five charges described above, but some overlap occurred. An additional goal of the workshop was to afford substantial opportunity to hear from members of the public. To accomplish this goal, the planning committee designed four methods for members of the public to submit their questions and comments to the workshop: (1) submitting electronic comments through the IOM website; (2) submitting a written comment sheet during the workshop; (3) completing question cards for individual panels; and (4) providing an oral statement during the workshop's public comment session. Appendix D

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<sup>2</sup>The planning committee's role was limited to planning and preparing the workshop. This document was prepared by rapporteurs as a factual summary of the workshop's presentations and discussions.

includes a brief summary of the public comments and questions submitted to the IOM through all four methods.

## WORKSHOP THEMES

The workshop provided the opportunity for all attendees to hear and to provide a rich array of experiences, diverse perspectives, and a variety of fresh ideas. Over the course of the workshop, certain ideas were often repeated in different ways. The emerging themes are summarized in Box S-1. These themes capture some of the overarching ideas and considerations that could inform the development of a successful surveillance and monitoring system.

### BOX S-1 Emerging Workshop Themes

**Complexity.** Assessing the effects on human health of oil spills and response activities is complex.

**Multiple dimensions.** Human health is multidimensional and includes physical, psychological, and socioeconomic dimensions.

**Uncertainty.** Information about the specific hazards related to the Gulf oil spill and the range of potential acute and long-term effects of oil spills on human health is incomplete and leads to uncertainty.

**Immediacy.** Understanding the current state of knowledge can guide immediate actions to mitigate known risks and to fill existing knowledge gaps.

**Community engagement.** Community involvement and collaboration are essential when designing surveillance systems, related research activities, and effective risk communication strategies.

**Coordination.** Coordination can strengthen existing and developing surveillance and monitoring systems.

**Commitment.** Long-term surveillance and related research activities are critical to identifying acute, chronic, and long-term health effects of oil spills.