

**Assessment of Emergency Response Worker Training
During the Deepwater Horizon Oil Spill**

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ABSTRACT

The importance of emergency response worker training increases as disasters scale up in magnitude and effect. In the Deepwater Horizon Oil Spill response efforts of 2010, cleanup worker training took three separate forms: the traditional 40-hour Hazardous Waste Operations and Emergency Response training, a BP-created 4-hour training, and a pocket-sized Oil Spill Cleanup Guide. In this study, these three training materials are analyzed for key differences. A questionnaire is developed to assess the cleanup workers' reactions to their training courses and materials, their overall knowledge retention, and their relevant duties in the field. Using a community-based approach, two community organizations in Louisiana and Alabama gathered workers to take this questionnaire. The results of the questionnaire are analyzed, issues are highlighted, and the information is made available for more in-depth studies of worker training in the Oil Spill.

INTRODUCTION

EMERGENCY RESPONSE

Since the early 2000s, the United States has experienced several national disasters—the September 11th attacks on the World Trade Center and Pentagon in 2001, Hurricanes Katrina and Rita in 2005, and the Deepwater Horizon Oil Spill in 2010. Among the first on scene after emergencies of this scale are the emergency responders—the firefighters, air and water sampling personnel, and cleanup workers. These emergency responders are trained and prepared for duty according to protocols previously set in place in the event of an emergency.

While emergency response is a continuously changing field that is often disaster specific, federal and state officials have set procedures and guidelines for various events. Since 2001, emphasis has been placed on emergency planning with focus on coordination among law enforcement, military, policymakers, and elected officials.¹ Agencies that typically respond to natural disasters such as the Environmental Protection Agency and the Center for Disease Control are now combining with other agencies that respond to law enforcement such as the Coast Guard and Intelligence.¹

Many studies often examine the communication challenges in emergency response efforts including issues with technology, social differences, and organizational challenges among the different responders.² Often overlooked in this process are the safety and needs of emergency responders who risk their lives on the scene immediately following a disaster. The safety and rights of these workers are important to their performance in the

field. Because of this, the training that these individuals undergo is especially critical. By assuring that the workers are adequately trained and prepared, successful and smooth response efforts can take place.

DEEPWATER HORIZON OIL SPILL

On April 20, 2010, the worst oil spill in United States history began in the Gulf of Mexico when British Petroleum's (BP) Deepwater Horizon drilling rig exploded. The Gulf of Mexico is highly populated and rich with wildlife. It is estimated that the Deepwater Horizon Oil Spill will impact more than 12 hectares of coastal ecosystems, the true impact of which will not be fully realized for many years.³ The Gulf of Mexico is home to over 20 million people and is growing at a phenomenal rate—103 percent between 1970 and 2008.⁴ If this area were considered an individual country, it would have the seventh largest economy in the world, with the five states that border the Gulf—Florida, Alabama, Louisiana, Mississippi, and Texas—having a combined GDP of 2.2 trillion dollars.⁴ Half of the wetlands in the country are in this area as well as numerous bays, estuaries, tidal flats, barrier islands, and forests—all of which are threatened by the Oil Spill.⁴

The response activities to mitigate the effects of the disaster are crucial to preserving the ecosystem in the Gulf of Mexico. Due to the persistence and bioaccumulation of oil in the ecosystem and food chain, the oil spill threatens natural ecology, biodiversity, and human health. Oil is listed as a hazardous material under the Superfund and Reauthorization Act of 1986 (SARA). Through cooperative agreements, the National Institute of Environmental Health Sciences (NIEHS) has supported the training of more than 1.4

million workers across the country in the Hazardous Waste Worker Training Program.⁵ The typical training session for Hazardous Waste Operations and Emergency Response (HAZWOPER) training is 40 hours. After the Deepwater Horizon Oil Spill, NIEHS printed and distributed over 5,000 pocket-sized Oil Spill Cleanup Guides, which were available in English, Spanish, and Vietnamese, in order to help cleanup workers in the field.⁵

Due to the scale of the Deepwater Horizon Oil Spill, approximately 150,000 workers were trained in the aftermath of the oil spill for cleanup and mitigation duties.⁶ The vastness and speed at which the oil spill was spreading called for adaptations in the training process and curriculum. With the help of its contractors, BP created a training session that consisted of a 4-hour long module. This training session was offered in English only, with no real assessment of knowledge or understanding at the end of the session before the trainees were certified.

In a study produced by the Center for Progressive Reform, a nonprofit research and educational organization dedicated to public health and the environment, several problems were identified with the response efforts in the Oil Spill. Among the problems identified include “inadequate training on the use of personal protective equipment” and “insufficient understanding of the chemical exposures” by workers and contractors.⁷

PURPOSE OF STUDY

With the growing population and development of the world, more people are affected by disasters as they become more catastrophic and devastating. The role of emergency

responders and responder training is more important as these disasters strike areas growing with people. Experiences such as September 11th, Hurricanes Katrina and Rita, and the Deepwater Horizon Oil Spill provide the opportunity to develop and refine procedures for responding to environmental emergencies. Without the effective work of emergency response workers, the efforts of local, state, and federal government would be in vain.

The purpose of this study is to examine three different training materials used during the Oil Spill: the 4-hour BP training, the 40-hour standard HAZWOPER training, and the pocket-sized Oil Spill Cleanup Guide. Using content analysis of these three training materials, a questionnaire is developed to capture worker feedback on the training courses and materials, measure their understanding and knowledge, and inquire about their activities on the job. With this type of feedback, training sessions can be modified and adapted to better meet their goals of preparing workers for their duties in the field.

Even with thorough preparation and training, responding to a disaster is a unique and critical process that requires continuous feedback and improvement. After major disasters, agencies issue lessons-learned reports in order to address some of the issues experienced and make improvements for the future. The information and feedback gathered in this study contributes to the lessons-learned process. Furthermore, this study acts as a pilot for a more complete cleanup worker evaluation to be conducted by NIEHS in upcoming months.

METHODOLOGY

CONTENT ANALYSIS

Using a conventional style content analysis as described by Hsieh and Shannon, themes emerging from the three training materials were noted and categorized.⁸ After the themes were determined, the definitions for these codes were set. Ten themes were identified and defined in Table 1 below.

The Occupational Safety and Health Act (OSHA) sets standards for a set of established minimum criteria for the 40-hour HAZWOPER training sessions.⁹ All of the grantees and cooperative partnerships that NIEHS funds in order to train and certify workers to handle hazardous waste are required to meet these standards. The minimum criteria are broken down into three sections: an off-site portion of the training, a refresher course, and an on-site portion of the training. The refresher course is an eight-hour long course required annually that reviews all relevant topics covered in 40-hour training as needed and dictated by the members of the class. The on-site portion is the job-specific portion of the training course, which acquaints the workers with their job site and job placement. This study focuses on the off-site portion of the training, which is where workers learn the regulatory knowledge, technical knowledge, and technical skills needed to perform their jobs in the field. All of the ten themes are addressed in the 40-hour training followed by application of the knowledge and hands-on practice with the skills obtained. Demonstration of proficiency of knowledge and skills is required in the 40-hour HAZWOPER training.

Table 1: Themes identified in the 4-hour training course and pocket-sized Oil Spill Cleanup Guide

Theme	Definition
Cleanup Methods	Specific methods used during cleanup activities, eg. bioremediation, chemical dispersants, controlled burning, shoveling, and high-pressure water
Emergency Response Plans	Brief overview of the chain of command and the National Contingency Plan
Employer and Worker Responsibilities and Rights	Safety and health rules according to Occupational Safety and Health Act (OSHA)
Environmental Damage	Environmental effects on habitats, ecosystems, and organisms
Equipment	Detail cleanup equipment and proper use, eg. containment boom, oil skimmer, vacuum, rake, plastic bag, lining, sorbent pad
Hazards	Any substance that poses potential risks to human health, regulations and standards for the standard, eg. weathered oil, tarballs, nitrogen dioxide, sulfur dioxide, gasoline and diesel, carbon dioxide, and carbon monoxide
Heat	Details the different types of heat exposure, its symptoms, side effects, and prevention methods
Prevention	Precautions, procedures, and regulations used to prevent human health effects, eg. personal protective equipment, decontamination
Training Goals	Goals stated for specific material or training course
Worker Safety	Worker hazards and safety practices, eg. sunburn, eye injuries, noise exposures, slips, trips, falls, lifting heavy equipment, trench foot, vehicle use, drowning, puncture wounds, windburn, entanglements

Compared to the pocket-sized Oil Spill Cleanup Guide, the 4-hour BP-created training is more concise and provides more disaster-specific information. The only *hazard* mentioned in the May 2010 training course is weathered oil, possibly because this was the most common hazard in this Oil Spill. *Worker safety* is the most common theme in this training course, listing more worker hazards than the Oil Spill Cleanup Guide, such

as drowning, mislaid equipment, puncture wounds, windburn, entanglements, downed power lines, tidal pools and undertow, low oxygen levels, flammability, gas leaks, and confined spaces. *Equipment* detailed in this course that is not mentioned in the Oil Spill Cleanup Guide includes rakes, plastic bags, lining, sorbent pads, and workboats. While both the Oil Spill Cleanup Guide and the 4-hour training course address *heat* with a color-coded urine chart, the training course explains heat exposure using a metaphor of an old pickup truck. This training course also describes and diagrams the site safety and hazard control zones. Compared to the standard 40-hour HAZWOPER training, this training course is not as exhaustive and provides no hands-on activities or skills trainings. The only assessment is a brief true or false exam at the end of the 4-hour course that is taken together as a group.

The Oil Spill Cleanup Guide is the only one of the three materials to be translated into another language besides English. Both Spanish and Vietnamese copies were distributed to the workers. The Oil Spill Cleanup Guide begins with an overview of the National Contingency Plan and describes the HAZWOPER training program. More *hazards* are listed in this guide, including tarballs, nitrogen dioxide, sulfur dioxide, gasoline and diesel, carbon dioxide, and carbon monoxide. More *cleanup methods* are also described, including bioremediation, chemical dispersants, controlled burning, shoveling, and high-pressure water. This guide also describes containment boom, oil skimmer, and vacuum as *equipment*. The theme of *environmental damage* is only mentioned in this guide and not mentioned in the 4-hour training course. The Oil Spill Cleanup Booklet is not incident-specific but rather a more general guideline and therefore has more complete lists that may not be particularly relevant to the current disaster.

QUESTIONNAIRE

Using an adaptation of Kirkpatrick’s training evaluation framework, a questionnaire was created to assess workers’ reactions to the training course and materials, assessment of knowledge retention, and frequency of application of knowledge in the field.¹⁰ Questions are in several formats, including scale-ranging, multiple-choice, check-all-that-apply, and open-ended free response questions. Questions follow the format of the South Central Center for Public Health Preparedness Evaluation Framework, which is a developed method for evaluating the effectiveness of training techniques.¹¹ A frequency scale of 1 to 7 is used throughout the questionnaire, with the following designations:

Rating	Definition
1	Never
2	Almost Never
3	Occasionally
4	Sometimes
5	Usually
6	Almost Always
7	Always

Example questions are given in Table 2 on the following page, and the full questionnaire is in Appendix A.

Table 2: Example Questionnaire Items

Section 1

The language in the training was easy to understand.

My training course was useful when working in the field.

I found the pocket-sized Oil Spill Cleanup Guide useful.

Section 2

After working in the field, you should always wash your hands before eating or smoking.

When working close to the water, wearing a lifejacket is optional.

It is appropriate to drink large amounts of alcohol before a day of working in the field.

Section 3

The potential hazards and risks of cleanup activities were made clear to me in the field.

I wore Personal Protective Equipment when working in the field.

My supervisor or coordinator was helpful and provided answers and solutions to my questions and concerns.

The first section evaluates worker reactions to the course training. Reactions include feelings, perceived effectiveness of the instructor, content, format, delivery of information, levels of satisfaction and enjoyment, and perceived relevance and utility of the course. This section is the most commonly used section in evaluations. Although reactions do not directly measure worker learning and retention, studies show that perceived relevance or utility is strongly correlated with knowledge acquisition and performance.¹²

The second section of the questionnaire assesses worker learning with a series of knowledge-related questions. Each question is based directly on the training course and instructional objectives. This section usually includes a written assessment as well as a performance-based assessment. Due to the nature of this questionnaire, however, only a

written assessment will be included in the evaluation. The information in the questions is taken from the two training courses and the Oil Spill Cleanup Guide.

The third section of the evaluation measures the extent to which the acquired learning from the training course is applied in fieldwork. In order to assess behaviors in the field, workers are asked to use a frequency scale to answer how often they used learned techniques and encountered incidents and accidents. Free response opportunities are also given to workers to elaborate on their experiences on the job.

The questionnaire first asks the cleanup workers basic questions such as when they received their training, which training they received—whether it was the 40-hour HAZWOPER training or the 4-hour BP training—and if English is their primary language. The first section of worker reactions has ten questions, including two free response questions where workers are able to elaborate on any aspect of the training course or material. Three of these questions in this section refer specifically to the pocket-sized Oil Spill Cleanup Guide. The second section includes eight knowledge-based questions, five of which are true or false questions and two of which are check-all-that-apply. The final section has eight questions inquiring about the frequency of activities performed in the field. Five of these questions are rated on the frequency scale of 1 to 7, one question is in the check-all-that-apply form, and two questions are free response. The 29 questions of the questionnaire can be completed in 30 to 45 minutes. No personal data is collected so that the workers' identities remain anonymous. The responses are kept confidential in order to ensure honest disclosure.

COMMUNITY-BASED STUDY

Poor relationships between disadvantaged communities and research organizations in the past have caused problems in public health studies. Since President Clinton's 1997 apology to the survivors of the Tuskegee Syphilis Study and call to the Department of Health and Human Services to establish better relationships between researchers and communities, there has been a move to increase the use of community-based research in recent years.¹³ Researchers are now promoting community participation in public health research in order to find issues that are significant, pertinent, and culturally sensitive to the community.

Community-based research has many benefits to both the community and the researchers, including "community driven" issue selection that addresses problems of concern for the community members.¹³ These studies are designed in a culturally-sensitive manner that leads to increased accuracy and interpretation of findings.¹³ Through community-based research, community trust also increases, leading to informed consent from members of the community and increased rates of recruitment and retention.¹⁴

Eligible participants were gathered to take this questionnaire through a community-based research effort. Eligibility in this study required that the individual be at least 21 years of age; be trained either through the 40-hour HAZWOPER training course, 4-hour BP training course, or both; and has worked in the Deepwater Horizon Oil Spill cleanup efforts. Two community organizations—the Deep South Center for Environmental Justice in New Orleans, Louisiana and the Boat People SOS in Bayou La Batre, Alabama—gathered participants to take the questionnaire.

The Deep South Center for Environmental Justice located at Dillard University in New Orleans, Louisiana, is one of the grantees of NIEHS that trains community members using the 40-hour HAZWOPER training. Founded in 1992, the Deep South Center collaborates with the community and surrounding universities in order to educate and provide community members with training initiatives that will allow them to find jobs working in environmental fields. These training initiatives include programs such as Hazardous Waste Worker, Asbestos Abatement, Mold Remediation, and Weatherization.¹⁵

The Boat People SOS community group in Bayou La Batre, Alabama, is a Vietnamese-American community group that aims to promote and empower the Vietnamese population in the United States.¹⁶ Because of the large Vietnamese population located in the Gulf of Mexico, many Vietnamese people participated in the training programs and cleanup efforts in the Oil Spill. These individuals are mostly fishermen who have a personal stake in remediating the effects of the Oil Spill and often do not read or write English. The Boat People SOS community group has several translators who were able to help administer the questionnaire by translating the questions and reading them aloud to the participants. They also helped participants answer the free response questions by translating their thoughts into English.

The specific demographics of the cleanup worker population make contact through mail, phone, or Internet difficult as many workers often move and do not have reliable access to phone or Internet. Because of the large size of the population and the difficulty in establishing contact, a random and representative sample is difficult to achieve. A

convenience sample was used instead in this study, meaning the most accessible participants who were eligible were contacted and gathered.¹⁷ Because both of these community groups have centralized centers that community members frequently visit, an in-person method of recruitment was used.

The Institutional Review Board at the University of North Carolina exempted this study and the administration of the questionnaire from further review, citing exemption category 2: survey, interview, public observation. The questionnaire was in pencil and paper form and administered at the Deep South Center for Environmental Justice in New Orleans and the Boat People SOS community center in Bayou La Batre on April 12 and 13, 2011, respectively.

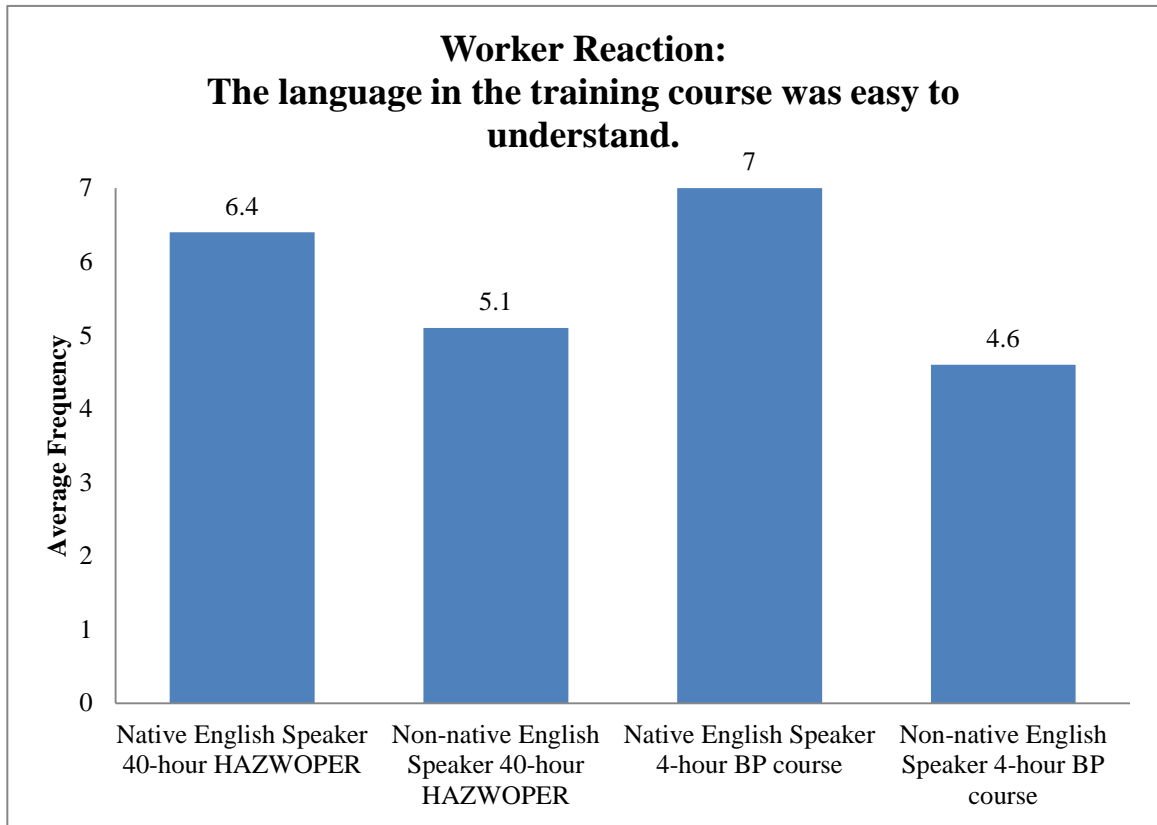
RESULTS

REACTIONS TO THE TRAINING

Of the 30 questionnaire respondents, four groups were created using two variables: type of training course and primary language. No participants were double counted. If a participant took both the 4-hour BP training and the 40-hour HAZWOPER training, only the 40-hour HAZWOPER training counted because of the more complete and exhaustive nature of that course. There are two groups of native English speakers: those who took the 4-hour BP course and those who took the 40-hour HAZWOPER course. There are also two groups of non-native English speakers: those who took the 4-hour BP course and those who took the 40-hour HAZWOPER course.

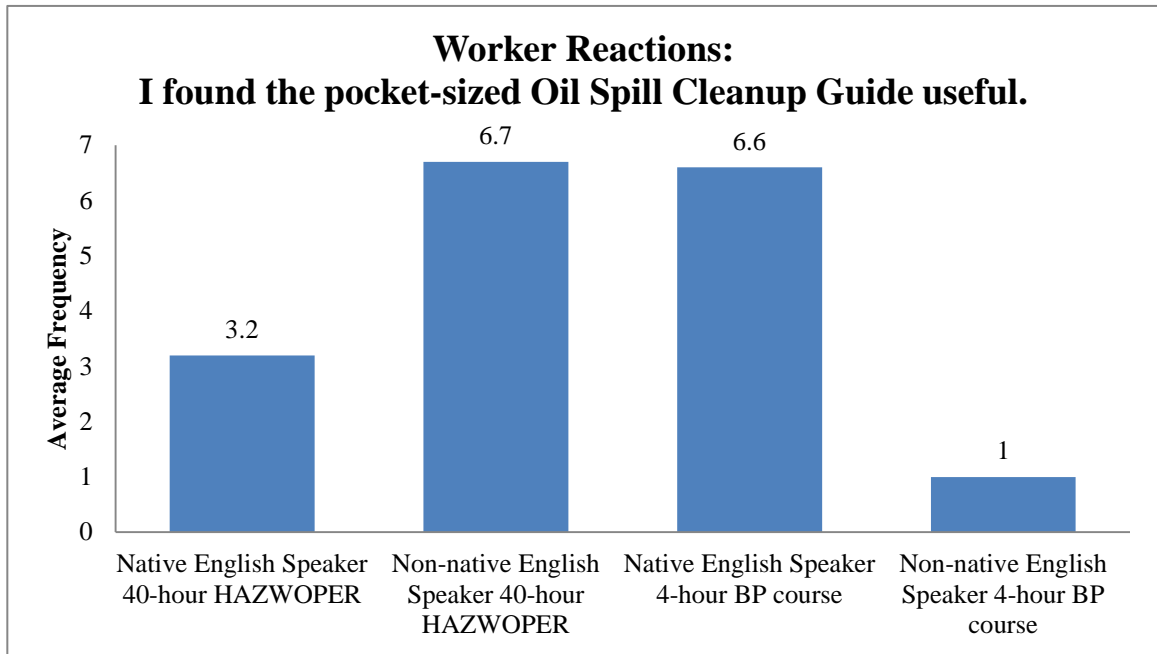
Of the 23 participants who took the 40-hour HAZWOPER course, 13 were native-English speakers and ten were non-native English speakers. The most distinct difference between these two groups was their response to the Question 6: “The language in the training was easy for me to understand,” as shown in Figure 1 below. On a frequency scale of 1 to 7, with 7 representing always, the 13 native English speakers averaged 6.4 while the ten non-native English speakers averaged 5.1. A similar pattern can be found in the questionnaire respondents who only took the 4-hour BP training course. Of the seven who took the 4-hour BP course, the five non-native English speakers averaged a 4.6 while the two native English speakers averaged 7 for the same question on training course language.

Figure 1: Questionnaire item 6 results.



Another key difference between the native English speakers and the non-native English speakers was in their use of the pocket-sized Oil Spill Cleanup Guide. As shown below in Figure 2, the native English speakers who took the 40-hour HAZWOPER course reported that they did not find the pocket-sized Oil Spill Cleanup Guide helpful, averaging 3.2 for Question 12: “I found the pocket-sized Oil Spill Cleanup Guide useful.” A few of these workers reported that they never received one. One of the two native English speakers who took the 4-hour training course reported they had never used the guide. The non-native English speakers, on the other hand, found the guide to be helpful, averaging a 6.7 for those who received the 40-hour HAZWOPER training and 6.6 for those who received the 4-hour BP training.

Figure 2: Questionnaire item 12 results.



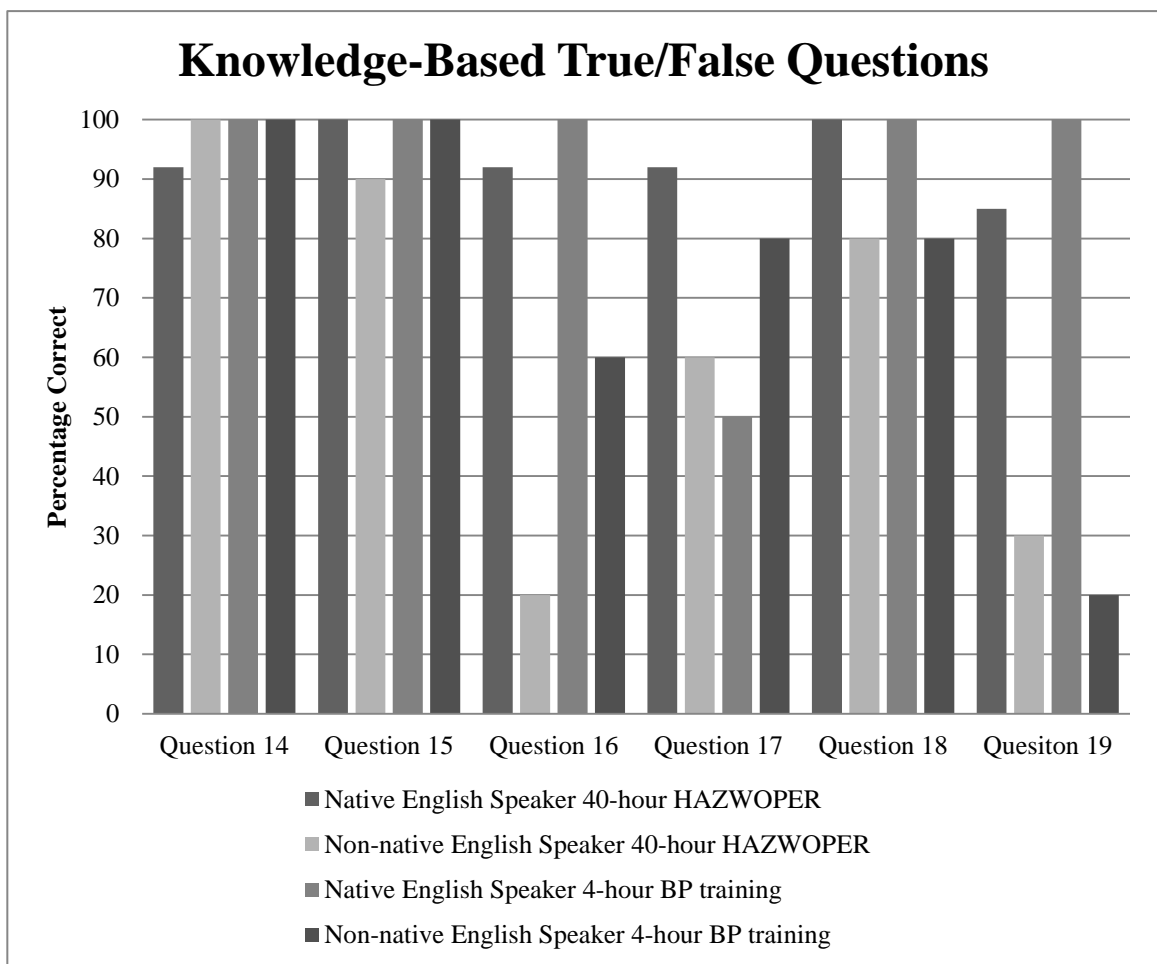
In the free response questions for this section, the native English-speaking participants who received the 40-hour HAZWOPER training reported that the most useful parts of the training included learning “how to handle and identify and how to contain a matter” and “how to protect yourself.” Other comments from this group complimented the training session for being effective and easy to understand.

The most common free response comment among the non-native English speakers, however, was that the class would be better with a Vietnamese teacher. Four of the ten non-native English speakers commented that the class would be “excellent with a Vietnamese teacher.” One participant commented that he felt he needed more training.

KNOWLEDGE

In the knowledge-based sections, the native English-speaking questionnaire respondents answered more of the objective questions correctly compared to the non-native English-speaking respondents. The responses for these questions are summarized in Figure 3 below.

Figure 3: Differences among the four groups in knowledge-based questions



Of the true or false questions in the section, the majority of the 40-hour HAZWOPER-trained native English speakers were able to correctly identify if the statement was true or false. One respondent out of 13 of the native English speakers who had received the 40-

hour HAZWOPER training missed Question 14: “After working in the field, you should always wash your hands before eating or smoking,” Question 16: “When working close to the water, wearing a lifejacket is optional,” and Question 17: “Your clothes, shoes, and tools are not contaminated after coming into contact with poisonous plants.” Two respondents missed Question 19: “You do not need to be decontaminated if you do not see any contamination on yourself.”

These results are compared to the 40-hour HAZWOPER-trained non-native English speakers. While all of the respondents in this group correctly answered Question 14, there was difficulty with the rest of the questions. One out of ten participants missed Question 15: “It is important to apply sun block when working in the field,” eight out of ten missed Question 16, four out of ten missed Question 17, two out of ten missed Question 18: “It is appropriate to drink large amounts of alcohol before a day of working in the field,” and seven out of ten missed Question 19.

The same pattern can be seen in the responses of the 4-hour BP trained workers. Of the two native English speakers, one of them missed Question 17. Of the non-native English speakers, two of the five participants missed Question 16, one of five missed Questions 14 and 15, and four of five missed Question 19.

For Question 20: “Check all of the forms of personal protection equipment worn on your head and face,” there were four pieces of personal protective equipment worn on the head and face. There was no pattern among the four groups, with participants in each of the groups correctly identifying the equipment and others missing a few or marking incorrect choices. In general, earplugs were the most commonly forgotten piece of equipment in all

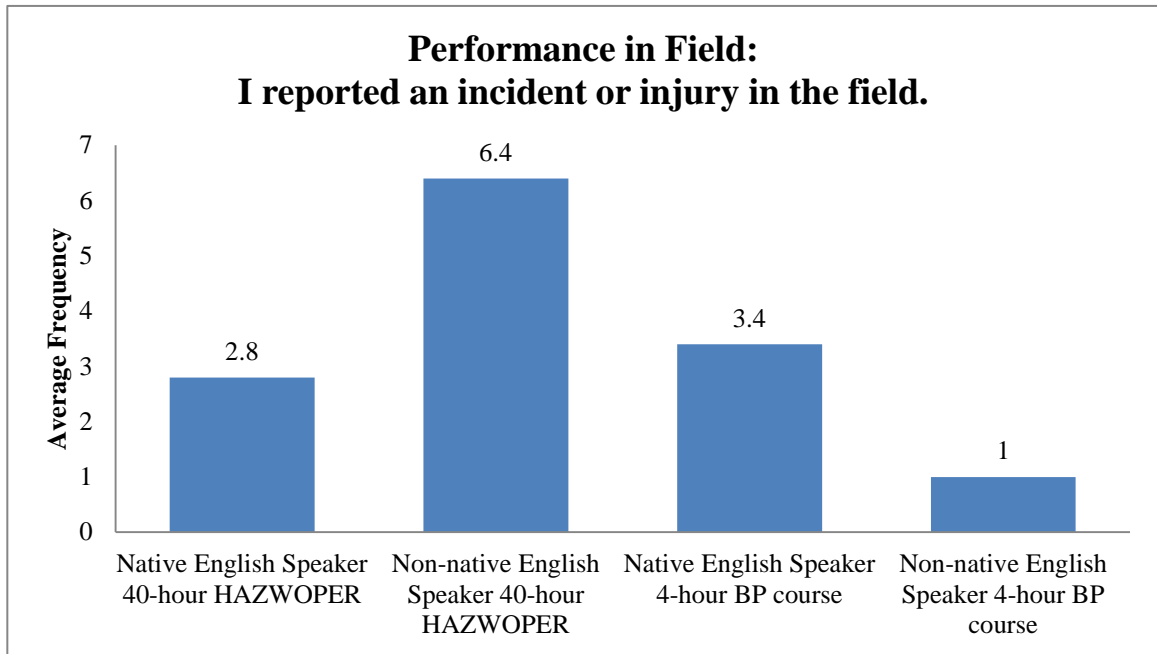
of the groups. There were participants in all of the groups who incorrectly selected equipment that is not worn on the head or face.

For Question 21: “Check all of the ways to prevent heat stress,” there were three ways to prevent heat stress—using cooling fans or air-conditioning, resting regularly, and drinking water regularly. In all four of the groups, the most commonly forgotten method was using cooling fans or air-conditioning. None of the participants in the study wrongly selected any options that did not prevent heat stress.

PERFORMANCE IN THE FIELD

In the performance section, all four of the groups reported that they almost always performed each of the tasks asked about in this section with the exception of Question 26: “I reported an incident or injury while working in the field.” As shown in Figure 4 below, the non-native English speakers who underwent the 40-hour HAZWOPER training reported that they almost always reported an incident or accident in the field. The remaining three groups reported that they never, almost never, or occasionally reported an incident or accident. Question 27 was a free response follow-up question asking for details of the incident or injury. The responses included one instance of cutting a hand on a box cutter and three instances of heat stress.

Figure 4: Questionnaire item 26 results.



For Question 28: “Check all of the following that you experienced when working in the field,” the reported hazards include sunburn, heat stress, puncture wounds, trench foot, workboat hazards, windburn, and heat stroke. Two non-native English speakers reported that they suffered from “body pain.”

For Question 25: “My supervisor or coordinator was helpful and provided answers and solutions to my questions and concerns,” the non-native English-speaking group reported that they found the Coast Guard to be more helpful than their job supervisors. Two non-native English speakers who took the 40-hour HAZWOPER course and one non-native English speaker who took the 4-hour BP course stated that “the Coast Guard was more helpful.”

Similarly, the native English-speaking respondents who received the 40-hour HAZWOPER training course reported that they felt they needed better supervisors. One

participant commented that his supervisor did not know what personal protective equipment was. Another reported that there was no emphasis on safety from the supervisors because of the forced incorrect use of personal protective equipment. Half-tyvek suits as opposed to full ones were worn in the field, exposing half of the workers' bodies to the hazardous materials.

According to the responses from the participants, some of the material in the training courses and guide, such as wearing personal protective equipment, were almost always practiced in the field. Question 24: "I wore Personal Protective Equipment when working in the field" averaged a 7 for always or a 6 for almost always in all four of the groups.

DISCUSSION

LIMITATIONS

The convenience sample of this study limits the amount of information that can be drawn from the data collected. Convenience sampling gathers participants based on accessibility and often leads to biased results because of the lack of randomization of the sample.¹⁶

Eleven of the 30 participants in the survey received their 40-hour HAZWOPER training from the Deep South Center for Environmental Justice, which gives unequal weight on this one particular training course administered by this organization. Furthermore, the use of only two community organizations limits the sample to those in New Orleans and Bayou La Batre who are involved with these two organizations. In order to draw more conclusive information about the training courses, a study with a randomized sample needs to be conducted.

Furthermore, no power analysis can be conducted with a sample size that is unrepresentative of the total cleanup worker population. Approximately 23 of the 30 participants in the questionnaire underwent the 40-hour HAZWOPER training. More participants who took the 4-hour BP training course are needed to gather information surrounding the worker response to that training course. The small sample size of seven participants who took the 4-hour BP course is not adequate to draw any conclusions about this group of workers. With a total cleanup worker population of approximately 150,000, the sample size needs to increase in order to draw more conclusive findings.

Language barriers and cultural differences with the Vietnamese community place a further limitation on the results of this study. Inaccurate or misleading translations during the administration of the questionnaire can skew the results of the findings. Lack of technical understanding or vocabulary from the translators at Boat People SOS also contributes to inaccurate responses. The group setting in which the questionnaire was administered also affects the workers' responses to the questions. In the future, questionnaires translated into Vietnamese for the literate workers and individual attention for the illiterate workers would assure more accurate responses. Furthermore, according to the staff at Boat People SOS, this particular community lacks exposure to surveys and questionnaires. For many of the participants in this group, this was the first questionnaire they have ever taken. With increased exposure and awareness of how surveys function, these participants will be able to give more detailed and accurate feedback.

IMPLICATIONS

Despite these limitations, this study provides valuable insight and information on the emergency response training courses and materials during the Oil Spill. While no conclusive findings can be drawn from this study, the questionnaire does test the waters on issues that may be of importance. Acting as a pilot for a more complete training evaluation process that NIEHS will conduct in upcoming months, this study highlights several issues that must be taken into account and studied further, including language barriers among some worker populations, the use of multilingual training materials, and the differences between the standard 40-hour HAZWOPER course and the 4-hour BP course.

Based on the responses from this study, issues of language barriers are prominent in the training process. Non-native English speakers in training sessions scored less than native English speakers in the knowledge-based section of the questionnaire regardless of which training course they took. This result could be attributed to inaccurate understanding or translation of the questions into Vietnamese or simply a reflection of lack of knowledge or misunderstandings from the training course. The cause for the discrepancy between the populations of native English speakers and non-native English speakers must be further analyzed in order to better the cleanup worker training process.

The pocket-sized Oil Spill Cleanup Guide proved to be particularly useful to the non-native English speakers. This can be attributed to the fact that this was the only training material that was offered in languages other than English. For non-native English speakers who do not have a proficient understanding of English, this Guide was their only source of information on how to handle hazardous material, how to protect themselves, and how to use equipment and perform field work. Because of the translation of the Oil Spill Cleanup Guide into other languages, workers who did not fully understand the training courses taught in English could have been able to obtain knowledge through use of the booklet. The usefulness of the Oil Spill Cleanup Guide for non-native English speakers needs to be studied in greater detail so that future emergency response operations can begin to provide translated materials for non-native English speakers if it enables them to better understand and perform their jobs.

While this study did not point to any striking discrepancies between taking the 40-hour HAZWOPER training course and the 4-hour BP training course, this sample also did not

include a large enough number of participants who had only taken the 4-hour BP course. Only seven of the participants fell into this category, with five of them being non-native English speakers and two native English speakers. In order to fully assess the differences between the two courses, a larger sample of 4-hour BP training participants is needed. Worker evaluations between the 40-hour training course and the 4-hour training course need to be studied further with a representative sample.

Furthermore, through conducting this small-scale questionnaire, valuable information about the study population was discovered. Many of the workers do not have a permanent home address or reliable access to phone or Internet, posing a challenge in reaching the cleanup worker population. In order to conduct a study with a randomized and representative sample, a mixture of methods must be adopted to reach the participant population. The use of community groups proved to work effectively in gathering eligible participants willing to give feedback. Community-based research is useful and effective especially for the hard-to-reach populations. Furthermore, this initial contact with the Vietnamese community has illustrated the diversity of the study population. Some of these community members are illiterate, some are literate only in Vietnamese, and others are literate only in English. In order to best meet the needs of this population, questionnaires developed should be translated into Vietnamese of a certain reading level for the Vietnamese-literate segment of the group. Furthermore, given that many of the Vietnamese community have never participated in a survey or questionnaire, more time needs to be allotted at the beginning of the administration in order to fully explain the process, the goals, and the participant rights.

Through the creation, administration, and analysis of the questionnaire and results, helpful information has been gathered and salient issues highlighted. This information can then improve and support more complete studies of the emergency response training. Through the lessons learned in disasters such as the Deepwater Horizon Oil Spill, the emergency response process can improve and address the current challenges facing response efforts.

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APPENDIX

APPENDIX A: QUESTIONNAIRE

Gulf Oil Spill Training Questionnaire

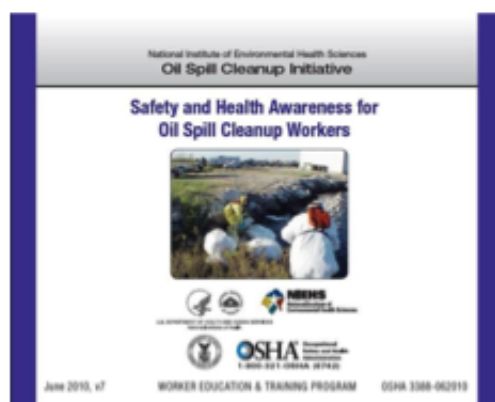
This questionnaire is created as part of a research project at the University of North Carolina at Chapel Hill and in partnership with the National Institute of Environmental Health Sciences (NIEHS) to gather feedback from cleanup workers surrounding the oil spill cleanup training sessions and materials.

The questionnaire has 3 sections: Section 1 asks for general training course feedback with a few questions about the pocket-sized oil spill cleanup booklet (pictured below), Section 2 asks knowledge based questions, and Section 3 asks about the frequency of activities performed in the field. The survey should take between 20 to 35 minutes. Please answer the questions honestly and to the best of your ability. Your participation is completely voluntary, and you may discontinue at any time. All of your responses will be kept anonymous and confidential.

With the feedback gathered from this questionnaire, future training sessions can be improved and modified to fit the interests and needs of the cleanup workers. After the data analysis, a summary of the findings will be made available and taken into consideration in future training sessions. For further questions or concerns, please contact NIEHS or Jing Zhang:

Jing Zhang
jzhang89@email.unc.edu
(919) 619-5298

Thank you very much for your time and feedback.



Training Course Information	
1. When did you receive your training?	___/___/_____
2. What training did you receive?	<input type="radio"/> 40-hour HAZWOPER <input type="radio"/> 4-hour Oil Spill Cleanup
3. Is English your first language?	<input type="radio"/> Yes <input type="radio"/> No

Section 2: Knowledge

Select True or False or check all that apply.

14. After working in the field, you should always wash your hands before eating or smoking.	<input type="radio"/> True <input type="radio"/> False
15. It is important to apply sun block when working in the field.	<input type="radio"/> True <input type="radio"/> False
16. When working close to the water, wearing a lifejacket is optional.	<input type="radio"/> True <input type="radio"/> False
17. Your clothes, shoes, and tools are not contaminated after coming into contact with poisonous plants.	<input type="radio"/> True <input type="radio"/> False
18. It is appropriate to drink large amounts of alcohol before a day of working in the field.	<input type="radio"/> True <input type="radio"/> False
19. You do not need to be decontaminated if you do not see any contamination on yourself.	<input type="radio"/> True <input type="radio"/> False
20. Check all of the forms of personal protection equipment worn on your head and face.	<input type="radio"/> Tyvek Suit <input type="radio"/> Hard Hat <input type="radio"/> Personal Floatation Device <input type="radio"/> Gloves <input type="radio"/> Safety Footwear <input type="radio"/> Safety Glasses <input type="radio"/> Face Shields <input type="radio"/> Ear Plugs
21. Check all of the ways to prevent heat stress.	<input type="radio"/> Using Cooling fans or air-conditioning <input type="radio"/> Rest regularly <input type="radio"/> Drink alcohol & caffeinated drinks regularly <input type="radio"/> Drink water regularly <input type="radio"/> Wear dark colored, tight-fitting clothes

Section 3: Performance in the Field

Use the following frequency scale:

NS – Not Sure ① Never ② Almost Never ③ Occasionally ④ Sometimes ⑤ Usually ⑥ Almost Always ⑦ Always

22. The potential hazards and risks of cleanup activities were made clear to me in the field.	NS ① ② ③ ④ ⑤ ⑥ ⑦
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23. I found the “Buddy System” useful in my work in the field.	NS ① ② ③ ④ ⑤ ⑥ ⑦
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24. I wore Personal Protective Equipment when working in the field.	NS ① ② ③ ④ ⑤ ⑥ ⑦
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25. My supervisor or coordinator was helpful and provided answers and solutions to my questions and concerns.	NS ① ② ③ ④ ⑤ ⑥ ⑦
---	------------------

26. I reported an incident or injury while working in the field.	NS ① ② ③ ④ ⑤ ⑥ ⑦
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27. If you reported an incident or injury, please elaborate on the events of the incident or injury.

- | | |
|--|---|
| 28. Check all of the following that you experienced when working in the field. | <ul style="list-style-type: none"> <input type="checkbox"/> Sun Burn <input type="checkbox"/> Heat Stress <input type="checkbox"/> Heat Stroke <input type="checkbox"/> Trench Foot <input type="checkbox"/> Puncture Wounds <input type="checkbox"/> Work Boat Hazards <input type="checkbox"/> Wind Burn |
|--|---|

29. Please include any additional comments or experiences in the field that you would like to share.
