



Mental health service use by cleanup workers in the aftermath of the Deepwater Horizon oil spill



Sarah R. Lowe^{a, *}, Richard K. Kwok^b, Julianne Payne^c, Lawrence S. Engel^{b, d}, Sandro Galea^e, Dale P. Sandler^b

^a Department of Epidemiology, Columbia University, Mailman School of Public Health, USA

^b Epidemiology Branch, National Institute of Environmental Health Sciences, USA

^c Epidemiology and Public Health Studies, Social & Scientific Systems, Inc., USA

^d Department of Epidemiology, University of North Carolina, Gillings School of Global Public Health, USA

^e Department of Epidemiology, Boston University School of Public Health, USA

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ABSTRACT

High rates of mental health (MH) problems have been documented among disaster relief workers. However, few workers utilize MH services, and predictors of service use among this group remain unexplored. The purpose of this study was to explore associations between predisposing, illness-related, and enabling factors from Andersen's behavioral model of treatment-seeking and patterns of service use among participants who completed at least one full day of cleanup work after the Deepwater Horizon oil spill and participated in home visits for the NIEHS Gulf STUDY ($N = 8931$). Workers reported on MH symptoms and whether they had used counseling or medication for MH problems since the oil spill. Hierarchical logistic regression models explored associations between predictors and counseling and medication use in the full sample, and type of use (counseling only, medication only, both) among participants who used either service. Analyses were replicated for subsamples of participants with and without symptom inventory scores suggestive of probable post-disaster mental illness. Having a pre-spill MH diagnosis, pre-spill service use, more severe post-spill MH symptoms, and healthcare coverage were positively associated with counseling and medication use in the full sample. Among participants who used either service, non-Hispanic Black race, pre-spill counseling, lower depression, and not identifying a personal doctor or healthcare provider were predictive of counseling only, whereas older age, female gender and pre-spill medication were predictive of medication only. The results were generally consistent among participants with and without probable post-disaster mental illness. The results suggest variability in which factors within Andersen's behavioral model are predictive of different patterns of service use among disaster relief workers.

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In the aftermath of disasters, relief workers take on responsibilities that expose them to the wide-ranging consequences of such events and to additional stressors and potentially life-threatening situations (e.g., McCaslin et al., 2005). Therefore, it is not surprising that high rates of mental health (MH) problems, including posttraumatic stress disorder (PTSD) and major depression (MD), have been documented among relief workers (e.g., Biggs et al., 2010; Fullerton et al., 2004). Despite their heightened risk,

few disaster relief workers utilize MH services (Elhai et al., 2006; Fullerton et al., 2004).

Factors associated with disaster relief workers' service use are not well understood. Only two studies to date, both in the aftermath of the September 11, 2001 World Trade Center (WTC) terrorist attacks (9/11), explored predictors of use among this population. Participants in the first study were those who accepted a psychotherapy referral after a psychological screening that was given to all workers deployed to the WTC site (Jayasinghe et al., 2005). The majority (57.5%) did not subsequently use services, and racial/ethnic minority status and higher posttraumatic stress (PTS) were significant predictors of utilization. The second study investigated use among American Red Cross staff members who had

* Corresponding author. Department of Epidemiology, Columbia University, Mailman School of Public Health, 722 West 168th Street, Room 720-F, New York, NY 10032, USA.

E-mail address: srl2143@columbia.edu (S.R. Lowe).

participated in relief work after the attack (Elhai et al., 2006). Among this sample, 10.7% reported service use since the attack, and significant predictors of use included younger age, being divorced or widowed, no previous MH service use, and higher PTS.

Although these two studies provide evidence that demographic characteristics and PTS influence MH service use among disaster relief workers, there is clearly a dearth of literature on this topic. A significant limitation of the extant literature is that the predictors included have not adequately represented the full range of factors from Andersen's (1995) behavioral model of treatment-seeking, an influential model that has shaped much of the thinking in the field. According to this model, service use is influenced by three categories of factors: (1) *predisposing factors*, including demographic characteristics, history of psychiatric symptoms and service use, and the extent and severity of stress exposure; (2) *illness-related factors*, including psychiatric symptom severity; and (3) *enabling factors*, including resources that increase the possibility that services are accessed (e.g., healthcare coverage, knowledge of available services). The model as a whole has received support in the context of traumatic events, including natural disasters, yet there is variation in which characteristics are associated with post-trauma service use across studies (Elhai et al., 2005).

Variation in the strength of predictors from Andersen's behavioral model is likely due to at least four factors. First, the factors driving use are likely to vary based on the population under examination. As far as we are aware, no study has examined associations between predictors representing variability in stress exposure (e.g., the duration of relief work) or any enabling factors and service use among disaster relief workers, and it is therefore unclear whether they apply in this case.

Second, the specific context of the traumatic event is likely to influence the drivers of use among a given population. In the current study, we focus on cleanup workers after the Deepwater Horizon oil spill. The Deepwater Horizon drilling rig exploded on April 20, 2010 and led to the release of approximately 5 million barrels of crude oil into the Gulf of Mexico before being capped on July 15, 2010 – the largest-ever oil spill in U.S. waters (Ramseur, 2010). Cleanup workers were exposed to oil and petroleum products, dispersant chemicals, smoke from burning oil, odors and vapors, heat stress, and visible damage to wildlife, and shoreline and below-the-surface ecosystems, but unlike disaster relief workers in the aftermath of 9/11, were not exposed to mass human mortality and suffering directly linked to the disaster (Shultz et al., 2014). It is unclear whether the results of studies focusing on relief workers after 9/11 would generalize to the Deepwater Horizon oil spill context, given this variation in exposure, as well as differences in the geographic and cultural contexts in which the disasters took place.

Third, drivers of service use are likely to vary based on the type of service offered. Among MH service users, there could be systematic differences among those who use counseling services, psychotropic medication, or both. In this vein, descriptive analysis of data from a nationally representative sample of adults in the United States showed increasing proportions of participants using both counseling and medication, and decreasing proportions using medication only, as the level of depressive symptoms increased (Wittayanukorn, Qian and Hansen, 2014). An improved understanding of the factors that influence different patterns of use is important given evidence that some conditions (e.g., PTS, chronic depression) are more effectively alleviated through a combination of psychotherapy and medication than either service alone (e.g., Craighead & Dunlop; Schneier et al., 2012).

Fourth, predictors of use might vary by the presence of absence of mental illness. Jayasinghe et al. (2005) found that race/ethnic minority status was significantly associated with MH service use only among those exceeding a cut-off for probable PTSD, providing

support for this possibility among disaster relief workers. Evidence of predictors specific to workers with probable mental illness would inform efforts to increase use among the most severely affected workers. Alternatively, those specific to those without probable mental illness could provide insight into which workers might be receiving services despite not having a significant need for them.

1. Current study

The purpose of this study was to explore predictors of MH service use among persons who completed at least one full day of cleanup work in the aftermath of the Deepwater Horizon oil spill. As part of the \$7.8 billion settlement between BP and individuals and business affected by the spill, \$36 million was devoted toward meeting MH needs in affected communities (Levin, 2012). Despite this substantial investment, MH service use in the aftermath of the spill has remained unexplored. We investigated predisposing illness-related, and enabling factors from Andersen's behavioral model. We explored associations between these predictors and counseling and medication use in the full sample, and use of counseling only, medication only, or both services in the subsample of participants using either service. We then replicated the analyses with participants with and without a probable MH diagnosis after the spill.

2. Method

2.1. Participants and procedures

Data were from the NIEHS Gulf Long-Term Follow-Up Study (GuLF STUDY), a prospective cohort study of cleanup workers from the Deepwater Horizon oil spill. Working from multiple lists of persons involved in the cleanup effort, 58,923 individuals who were presumed eligible (age 21 or over and capable of completing an interview in English, Spanish, or Vietnamese) and had reasonably good contact information were identified. A total of 32,608 participants (55% of potentially eligible participants; 90% of those contacted and confirmed to be eligible) completed a Telephone Enrollment Survey between March 2011 and March 2013 that assessed details of the participant's cleanup work, if any, as well as demographic and lifestyle factors, and medical history and symptoms. Participants were classified as workers if they participated in one full day cleanup work. Interviews averaged 30 min, except for Vietnamese-speaking participants who completed an abbreviated Telephone Enrollment Survey.

A subsample of 24,275 English- or Spanish-speaking participants residing in Gulf states was invited to participate in a Home Visit for collection of biological samples, clinical assessments, and additional questionnaire data collection, including structured mental health indices and items assessing mental health service use. Although 17,833 (73.5%) initially agreed to participate, 11,193 (62.3%), including 8931 cleanup workers, completed a Home Visit between May 2011 and May 2013. Relative to the larger sample, Home Visit participants reported significantly lower socioeconomic status, more health problems, and were more likely to be racial/ethnic minorities.

The Institutional Review Board of the National Institute of Environmental Health Sciences approved the study procedures, and participants provided verbal consent in the Telephone Enrollment Survey and written consent in the Home Visit. Missing data for variables of interest ranged from .0% to 16.8%, with an average missing rate of 2.3% ($SD = 3.5\%$). Multiple imputation was used to handle missing data. Five complete datasets were imputed in Amelia 2.0 (Honaker et al., 2008), and the results represent the average of the five analyses, with Rubin's (1987) correction of

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