biphenyls (PCBs), and polychlorinated furans and dioxins. WTC dust was highly alkaline (pH: 9.0–11.0) (*7*). The deposit of larger particles in the upper respiratory tract might have resulted in persistent upper airway inflammation. Highly irritant, respirable particles are likely to have accounted for lower airway symptoms and clinical findings. Administration of respirable particulate (particles <2.5 μm in diameter) WTC dust to rodents resulted in lower airway hyper-responsiveness (*8*). Thus, the findings in WTC examinees are consistent with current understanding of WTC exposures; however, the persistence of symptoms for >1 year after the 9/11 event is a new finding and requires further study.

The findings in this report are subject to at least three limitations. First, no reliable statistics exist on the size or composition of the exposed worker/volunteer population, so determining participation rates for the screening program is not possible, and generalizations to all WTC-exposed workers should be made with caution. Second, the screened population might overrepresent those most affected; those screened earlier might not be representative of all persons screened with regard to WTC exposures or health outcomes, and persons examined earlier might have had more severe health problems and sought out the program for that reason. However, preliminary analyses of exposure data among all persons examined through January 2, 2004, demonstrate similar patterns of acute and longer-term WTC exposures. Additional analyses of data for the remainder of the cohort will address concerns regarding health outcomes of persons screened later in the program. Finally, because of the absence of pre-9/11 symptom prevalence and pulmonary function tests (PFTs) for these participants, the ability to measure accurately the impact of WTC exposures on responders' health is limited. Because of the absence of an unexposed control group, spirometry data from this sample were compared with those of NHANES III (*3*).

This report underscores the need for comprehensive occupational health assessment and treatment for rescue workers and volunteers as part of all emergency preparedness programs. Guidelines for professional emergency response workers have been developed (*1*). The results described in this report suggest that disaster preparedness also should include 1) planning for rapid provision of suitable respiratory and other protective gear and 2) provision of medical care for first responders and nontraditional responders (e.g., persons from construction trades, utility workers, and other occupational groups).

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Mental Health Status of World Trade Center Rescue and Recovery Workers and Volunteers — New York City, July 2002–August 2004

After the September 11, 2001, attacks on the World Trade Center (WTC), a comprehensive screening program was established to evaluate the physical and mental health of rescue and recovery workers and volunteers. Persons were eligible for this program if they participated in the WTC rescue or recovery efforts and met specific time criteria for exposure to the site. During July 16, 2002–August 6, 2004, the program evaluated 11,768 workers and volunteers. This report summarizes data analyzed from a subset of 1,138 of the 11,768 participants evaluated at the Mount Sinai School of Medicine during July 16–December 31, 2002. On the basis of one or more standardized screening questionnaires, approximately half (51%) of participants met threshold criteria for a clinical mental health evaluation. Continued surveillance is needed to assess the long-term psychological impact of the aftermath of the 9/11 attacks and to determine needs for continued treatment.

The program was approved by an institutional review board, and informed consent was obtained for data aggregation and analyses. Participants were asked to complete standardized, self-administered questionnaires that screened for symptoms of anticipated postdisaster mental health conditions. The questionnaires used were the General Health Questionnaire-28

(GHQ), which identifies general psychiatric symptoms (*1*); Post Traumatic Stress Disorder (PTSD) Symptom Checklist (PCL), which identifies possible cases of PTSD (*2*); Patient Health Questionnaire (PHQ), which identifies panic, generalized anxiety, and depression (*3*); CAGE Questionnaire, which identifies likely alcohol dependence and abuse (*4*); and Sheehan Disability Scale, which measures functioning at home and work (*5*). Participants who met threshold criteria or acknowledged suicidal ideation or substantial disability on any questionnaire were referred for clinical evaluations by mental health professionals on the same day.

The 1,138 program participants were predominantly male (91%) and non-Hispanic white (58%), with a median age of 41 years (range: 21–74 years). Non-Hispanic blacks and Hispanics accounted for 11% and 15% of the population, respectively. Participants had sustained a median of 966 hours (range: 24–4,080 hours) of exposure (approximately 4 months of 8-hour workdays) to the WTC site. During July 16–December 31, the majority of participants (51%) met criteria for a clinical mental health evaluation on at least one screening questionnaire (Table). Symptoms of depression, panic, and generalized anxiety were each reported by approximately 6% of participants. Nearly 10% reported at least one item on the CAGE Questionnaire. The Sheehan Disability Scale indicated that the top three emotionally related disabilities were problems with social life (15%), work (14%), and home life (13%).

On the PCL, approximately 20% of participants reported symptoms meeting the thresholds for PTSD (*2*). The diagnosis of PTSD requires both a characteristic pattern of symptoms and impaired functioning or substantive clinical distress relative to a qualifying trauma (*6*). Among program participants, sufficient exposure to qualifying traumatic events was assumed and not assessed; however, despite meeting threshold by symptom count on the PCL (*2*), approximately one third (32%) did not meet the criteria for both pattern of symptoms and impaired functioning or substantive clinical distress. Application of the diagnostic criteria reduces the proportion considered to have PTSD from 20% to 13%. Of the 1,138 participants, only 36 (3%) reported accessing mental health services before participating in this program.

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Editorial Note: The direct and protracted nature of the rescue and recovery workers and volunteers' exposure to the aftermath of the 9/11 attacks differentiates these persons from the general population (*7*). These responders are unlike previous populations of rescue workers (*8*) because of the heterogeneity of their occupations (e.g., construction trades, utilities and sanitation workers, and first responders) and the documented health effects of their WTC work. The proportion of those meeting PCL threshold scores (*2*) for posttraumatic stress in the predominantly male sample is approximately four times the 5% reported lifetime prevalence of PTSD in the general male population (*6*). The point prevalences of approximately 6%, respectively, for panic and generalized anxiety symptoms represent a two- to fourfold increase, compared with the 12-month prevalences of 2% and 3%, respectively, reported in the general population (*9*). However, depression was detected at a prevalence of 6%, nearly half the 12-month prevalence of 10% reported in the general population (*9*). The point prevalence of alcohol abuse and dependence of nearly 10% documented by CAGE suggests rates at least as high as the 12-month prevalence of 9.7% reported in the general population (*9*).

TABLE. Mental health screening questionnaire results of World Trade Center rescue and recovery workers and volunteers, by category — New York City, July 16–December 31, 2002

Category	No.	(%)
Referred for routine mental health evaluation*	492	(43.2)
Evaluated for suicidality†	92	(8.0)
Total	584	(51.3)
Total sample	**1,138**	**(100.0)**
Possible reason(s) for referral		
General Health Questionnaire-28 (GHQ)		
Somatic symptoms, anxiety and insomnia, social dysfunction, or severe depression	500	(43.9)
Post Traumatic Stress Disorder (PTSD) Symptom Checklist (PCL)	224	(19.7)
PTSD PCL + met PTSD symptom algorithm	174	(15.3)
PTSD PCL + met PTSD symptom algorithm + functional difficulty on Sheehan Disability Scale	146	(12.8)
Patient Health Questionnaire		
Panic symptoms	66	(5.8)
General anxiety	67	(5.9)
Major depression	64	(5.6)
CAGE Questionnaire	108	(9.5)
Sheehan Disability Scale		
Problem(s) with spouse/partner	52	(4.5)
Problem(s) with children	15	(1.3)
Problem(s) with work	155	(13.5)
Problem(s) with social life	175	(15.3)
Problem(s) with home life	149	(12.9)
Proportion who reported receiving mental health care	36	(3.2)
Total reasons for referral§	**1,575**	

* If exceeds threshold criteria on General Health Questionnaire (GHQ), Post Traumatic Stress Disorder Symptom Checklist, Patient Health Questionnaire (PHQ), or Sheehan Disability Scale.
† If suicidal ideation was indicated on GHQ or PHQ.
§ Total exceeds 1,138 because persons might have had more than one reason for referral.

The findings in this report are subject to at least three limitations. First, no reliable data exist regarding the size of the worker/volunteer responder population; therefore, determining participation rates for the screening program was not possible. Second, persons who participated in the screening might have done so because they experienced (or perceived) greater exposures and/or symptoms; therefore, these results are not generalizable to all responders. Finally, the questionnaires, which had been validated by using psychiatric patients, were applied to nonpsychiatric patients; in addition, certain questionnaires had been validated primarily among women and might not be equally valid in a predominantly male population.

Preliminary findings regarding the possible cases of PTSD among these workers underscore the need for better tools to assess the mental health of responders to a disaster. For example, the popular PCL (*2*) used in this screening program does not conform to established clinical diagnostic criteria for PTSD (*6*) and might provide either over- or underestimates of posttraumatic psychopathology. In addition, the comparatively low rate of postdisaster depression identified by PHQ challenges assumptions about its sensitivity for detecting depression, especially because the proportion appears lower than that documented for the general population.

Approximately half of the participants met preestablished screening criteria for mental health problems. Despite substantial resources directed at the mental health effects of 9/11, only 3% of this population reported having accessed mental health treatment. Project Liberty (*10*), a crisis counseling program funded by the Federal Emergency Management Administration, offered interventions beyond crisis counseling to help persons who experienced persistent and disabling distress. In addition, the Public Safety Workers Program, funded by the Substance Abuse and Mental Health Services Administration, has made limited funds available for the mental health treatment of this specific population through September 30, 2005. The mental health effects observed in this population suggest the need for further mental health screening, follow-up, and access to mental health services for WTC rescue and recovery workers and volunteers.

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Preliminary Results from the World Trade Center Evacuation Study — New York City, 2003

On September 11, 2001, an estimated 13,000–15,000 persons successfully evacuated the two World Trade Center (WTC) towers. Because full-scale evacuations of such buildings are rare, little is known about how readily and rapidly these buildings can be evacuated and what factors serve as facilitators or barriers to the process (*1*). In 2002, the Mailman School of Public Health at Columbia University and CDC initiated The World Trade Center Evacuation Study, a multiyear qualitative and quantitative research study designed to assess factors that affected evacuation of the two WTC towers. This report summarizes qualitative data collected from Phase I of the study, which suggested that improved preparedness at the individual, organizational, and building environmental levels can facilitate rapid evacuation. Completion of Phase II of the study, together with other research efforts, should help workers, management, and local authorities develop and evaluate model emergency preparedness programs for high-rise occupancies.

Qualitative data for Phase I of the WTC study were collected from 56 participants during 2003, approximately 18 months after the events of September 11, 2001. Participants were self-selected into the qualitative study in response to a multimedia recruitment campaign; they consisted of 36 persons who were administered in-depth, semi-structured interviews and 20 who participated in five focus groups. The data collected helped guide development of a detailed study questionnaire for the quantitative Phase II* of the study.

* More information is available at http:\\www.wtcsurvey.cumc.columbia.edu.

The 56 participants ranged in age from 23 to 61 years; the mean and median age was 43 years. A total of 31 (55%) were male; 42 (75%) were white, seven (13%) were black, and one (2%) was Asian. Four (7%) identified themselves as of Hispanic ethnicity. A total of 37 (66%) of the participants were college graduates.

Interview scripts were designed to identify the factors that influenced both the decision-making process, as well as the actual evacuation-related behaviors. Transcripts of the taped responses were read and categorized by two reviewers, with coding themes verified by a third reviewer using a modified Q-sort methodology (*2*). Inter-rater reliability was high, with >95% concordance.

Individual factors. Participants cited four factors that affected their decision to begin evacuating: 1) perceived ability to walk down multiple flights of stairs (i.e., more than 80 for certain persons); 2) experience in evacuation of a WTC tower, including knowledge of stairwell locations and whether individual stairwells led to street level exits; 3) concern over leaving their work areas without the approval of executives or managers; and 4) information regarding what had occurred, what floors were involved, and how to respond. Direct evidence of the magnitude of the event (e.g., observing an aircraft strike a building, smelling fuel, or feeling a building move) caused some persons to leave immediately.

The qualitative data also suggested that, after a decision to evacuate was made, many persons stopped to attend to last-minute activities (e.g., making telephone calls, shutting down computers, or gathering up personal items). Deciding which route to take (e.g., stairs or elevators) might have delayed evacuation progress for others. Progress was reportedly slowed for some persons because of poor physical condition or inadequate footwear (e.g., high-heeled shoes or "flip-flops"). Some persons also delayed their progress to stop and assist others.

Organizational factors. Two major organizational factors affecting evacuation were identified by participants: 1) workplace preparedness planning and training, including evacuation drills (e.g., when drills were held, the majority reported they never actually entered their designated stairwells) and 2) inadequate risk communication. An announcement broadcast in WTC 2 (South Tower) shortly after the first aircraft had struck WTC 1 (North Tower) urged persons to remain in the building and likely led many to return to their work stations.

Building environmental factors. Three major evacuation factors in the WTC building environment were identified as 1) structural damage that blocked egress routes (e.g., debris on stairs or partially collapsed interior walls); 2) heavy congestion on certain stairways, which in some cases caused evacuees to move back upstairs in hopes of switching to a less

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Physical Health Status of World Trade Center Rescue and Recovery Workers and Volunteers — New York City, July 2002–August 2004

In the months after the September 11, 2001, attacks on the World Trade Center (WTC), concerns grew about the health consequences of exposures sustained by persons involved in the rescue and recovery response. In addition to the estimated 10,000 Fire Department of New York (FDNY) personnel, an estimated 30,000 other workers and volunteers potentially were exposed to numerous psychological stressors, environmental toxins, and other physical hazards. These concerns prompted CDC's National Institute for Occupational Safety and Health (NIOSH) to support the WTC Worker and Volunteer Medical Screening Program, which provided free, standardized medical assessments, clinical referrals, and occupational health education for workers and volunteers exposed to hazards during the WTC rescue and recovery effort. During July 16, 2002–August 6, 2004, the program evaluated 11,768 non-FDNY workers and volunteers. This report summarizes data analyzed from a subset of 1,138 of the 11,768 participants evaluated at Mount Sinai School of Medicine during July 16–December 31, 2002. These data indicated that a substantial proportion of participants experienced new-onset or worsened preexisting lower and upper respiratory symptoms, with frequent persistence of symptoms for months after their WTC response work stopped. These findings underscore the need for comprehensive health assessment and treatment for workers and volunteers participating in rescue and recovery efforts.

The clinical program included a single screening evaluation consisting of medical- and exposure-assessment questionnaires, physical examination, pre- and post-bronchodilator (BD) spirometry, complete blood count, blood chemistries, urinalysis, chest radiograph, and mental health screening questionnaires. Participants were recruited through outreach that included community and union meetings, mailings, and articles in the media. Eligibility for the screening program was based on arrival date and duration of exposure to the site* rather than on symptomatology. Institutional review board approval and informed consent were obtained for data aggregation and analyses.

The subset of 1,138 program participants was predominantly male (91%) and non-Hispanic white (58%), with a median age of 41 years (range: 21–74 years). Non-Hispanic blacks and Hispanics accounted for 11% and 15% of the population, respectively. The largest occupational sectors represented in this sample were technical and utilities (25%), law enforcement (21%), and construction (18%). Numerous other occupational groups accounted for the remaining 36%; 89% were union members.

* Minimum of 24 hours working/volunteering during September 11–30, 2001, or >80 hours during September 11–November 30, 2001, either south of Canal Street, the Staten Island landfill, or the barge loading piers. Employees of the Office of the Chief Medical Examiner also were eligible, regardless of hours worked. FDNY and State of New York employees had access to other screening programs and were not eligible for this program.

INSIDE

812 Mental Health Status of World Trade Center Rescue and Recovery Workers and Volunteers — New York City, July 2002–August 2004
815 Preliminary Results from the World Trade Center Evacuation Study — New York City, 2003
817 Investigation of Acute Idiopathic Pulmonary Hemorrhage Among Infants — Massachusetts, December 2002–June 2003
820 Progress Towards Poliomyelitis Eradication — Egypt, 2003–2004
823 West Nile Virus Activity — United States, September 1–7, 2004
824 Notice to Readers

DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION