Original Research

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Total Worker Health® Employer Preparedness: A Proposed Model and Survey of Human Resource Managers' Perceptions

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Abstract

Objective: Recent disasters have demonstrated gaps in employers' preparedness to protect employees and promote their well-being in the face of disruptive events. Our objective was to develop a useful strategy for advancing comprehensive employer preparedness and to assess employer preparedness in a sample of employers.

Methods: A *Total Worker Health* Employer Preparedness Model was developed to include seven domains: planning, human resources policies, hazard reduction, training, staffing, communications, and resources for resilience. A Survey and scoring Index based upon the Model were administered to human resources professionals in the northeast United States.

Results: Seventy-six responded, representing diverse employment sectors. The mean Index score was 8.8 (out of 23), which is a moderate level of preparedness. Nine scored over 15, indicating greater preparedness. Thirteen scored 0. Employers were most prepared for severe weather events and least prepared for acts of violence. There were no significant differences by sector, size, or reach, although the health-care sector reported higher scores.

Conclusions: This unique attempt to assess TWH Employer Preparedness can serve as the basis of important further study that strengthens the empirical basis of the construct. Additionally, the Model, Survey, and Index can assist employers in advancing their preparedness for all hazards.

Crises, such as pandemics, severe weather events, wildfires, acts of terrorism, and chemical spills, pose multi-dimensional challenges to employers and employees. Disaster-related hazards include heat, chemical exposure, fire, infectious agents, and dangerous driving conditions arising in and beyond the workplace. In addition to the direct physical effects of the disaster on employee health, safety, and well-being, employees may also face grief and stress, extended hours of work, damaged homes and vehicles, and the need to care for family members.[1] During the coronavirus disease 2019 (COVID-19) pandemic, many workers and their diverse workplaces have been experiencing extreme work/life balance challenges as well as infection risks from bi-directional virus exposure and transmission between the community and the workplace.[2,3] Even the best-prepared employers have faced unanticipated demands as they have attempted to adapt to the crisis, incentivize work, and maintain safe workplaces.

Previous crises have also drawn attention to employers' role in preparedness for disruptive events. For example, the September 11th terrorist attacks led to new efforts to protect emergency response workers, including long after the event.[4–6] The protection of health-care workers gained renewed attention during the COVID-19 crisis, but its importance had been demonstrated during the Ebola threat several years before.[7–9] In addition to employer preparedness actions spurred by these events, government agencies have invested in planning, training, personal protective equipment (PPE), protocols, medical surveillance, and specialized mental health services for disaster response workers, including for contract workers and day laborers who are drawn to impacted areas.[10–13]

While these events raised awareness regarding all-hazard preparedness, and the need for protection of the frontline workforce, the COVID-19 crisis still overwhelmed a wide range of employers. This included health-care employers who faced shortages of PPE, staff, and respite for the dramatic mental health challenges faced by essential employees.[14–16] A 2014 survey conducted by the Staples Corporation found that half of employees surveyed did not believe that their employers were prepared for emergencies.[17] In Iowa, while 86% of employers surveyed reported that they had emergency plans in place, less than half reported any human resources (HR)-related preparedness, such as leave policies.[18] Even while we are still under threat, the COVID-19 crisis has propelled to the forefront the need for preparedness planning that keeps employees safe and able (and willing) to work through disruptions. Such preparation is also necessary for public health protection and economic continuity.[19–21]

One reason for the employer "preparedness gap," is the largely voluntary nature of most employer emergency preparedness activities. Additionally, emergency preparedness

traditionally focuses on the important goals of immediate life safety, communication with emergency responders, and business continuity[22,23] and less on domains related to employee well-being during an extended crisis. For example, the US Occupational Safety and Health Administration's (OSHA) safety standards related to emergency preparedness, such as 29 CFR 1910.38(a) and 29 CFR 1926.35, require written Emergency Action Plans when certain other standards, such as the Process Safety Management standard, apply; this includes a small slice of US workplaces. The minimum requirements of these plans are fairly narrow: procedures for reporting emergencies, evacuation, and for safety of rescue and critical operations employees. As a result, most workplaces may not have basic emergency action plans, and those plans are unlikely to cover important worker well-being domains. However, the HR profession has developed some guidance aimed at assisting employers.[17,24]

To enhance employer preparedness to protect workers and promote their well-being in the face of disasters, a comprehensive model of "employer preparedness" was developed in line with the principles and domains of *Total Worker Health*® (TWH)[1]. This article describes the model and a small study based on upon it. The study surveyed perceptions of employer preparedness as described in the model among a sample of HR managers in the Northeast US. TWH is a comprehensive construct incorporating health and safety at work, and the promotion of employee health and well-being in the context of social determinants of health.[25] TWH evolved in response to the need to address the growing burden of chronic disease in working populations and a desire to integrate efforts to promote employee health behavior changes with worker protection from workplace hazards.[26] In drawing attention to the full range of determinants of worker well-being, from exposure to chemical hazards to access to healthy food, TWH facilitates the destruction of organizational silos that prevent an integrated and comprehensive approach to worker well-being.

The TWH orientation can be especially helpful for guiding efforts to promote worker well-being in the face of emergencies and disasters. Emergencies and disasters impact individuals as workers, family members, and residents of communities.[27,28] Work is both a venue and a system that organizes time, purpose, and resources. Work disruptions and demands during disasters and emergencies can stress individuals coping with other disrupted venues and systems that support their daily lives.[29] On the other hand, employers can provide critical resources, including a sense of "normality," while their employees adjust to such profound events. While this expansive perspective introduces new complexities, it recognizes the fundamental reality that boundaries between "occupational health" and "community health" are ordinarily blurry and, perhaps, especially so during emergencies and disasters. Thus, the TWH perspective supports development of comprehensive and effective employer preparedness to protect workers and promote their well-being in the face of disruptive events.

Methods

Development of the Model

The proposed model of TWH Employer Preparedness was developed from examination of TWH as described by the National

Institute for Occupational Safety and Health (NIOSH) TWH program and the work of the Centers of Excellence for TWH in light of the goals of promoting health and well-being during and following disasters.[30] These interpretations are then condensed into a model and framework with illustrative examples to propose a flexible and comprehensive approach that employers can operationalize to advance their preparedness. Another useful conceptual model presented by NIOSH is the TWH Hierarchy of Controls. In the worker protection model of the Hierarchy of Controls, elimination of hazards at the source is prioritized over "downstream" strategies. The inverted triangle emphasizes that deeper prevention is more reliable than strategies that depend exclusively upon either PPE or workers adapting their behaviors to avoid hazards according to instructions. These conceptual frameworks are adapted into a model of TWH Employer Preparedness as described in the Results section.

Table 1 highlights the core components of NIOSH's TWH domains and provides examples of TWH issues that have particular relevance for Employer Preparedness. (A fuller interpretation of the cross-over of these domains with Employer Preparedness can be found in the Supplementary Materials). In the TWH Hierarchy, (Figure 1a) new elements are added to the worker protection framework to include upstream organizational interventions to alter the work environment to promote health through policies, practices, physical design of the work that eliminates threats to health and facilitates well-being. Figure 1b provides specific examples of Employer Preparedness interventions at each level of the Hierarchy. For example, to eliminate hazards that might result in a disaster, employers can undertake toxics use reduction[2], improve building safety and security, and renovate equipment. Training and Personal Protection are further down the TWH Employer Preparedness Hierarchy, but also essential. It is the totality of these actions that contributes to comprehensive worker protection and wellbeing. However, the emphasis on upstream and "engineered" preparedness promotes investment in comprehensive, preventive, and dependable strategies that can mitigate the risks of disasters.

Development of the Survey and Index

Based upon the proposed domains of the TWH Employer Preparedness Model, a survey instrument and scoring index was developed to assess Employer Preparedness in a sample of employers (Table 2). The instrument was designed to assess HR professionals' perspectives on their company or agency's preparedness (available as Supplementary Materials). The purpose of the Index was to enable an efficient composite score that could suggest a comparable "level" of TWH Employer Preparedness. The survey included questions in each of the 7 TWH Employer Preparedness domains. The survey structure included demographic questions, closed-ended Likert scaled questions, and some open-ended response questions to allow participants to comment freely on the topic. The questions were reviewed for content validity and clarity by staff of the project partner: the Northeast Human Resources Association (NEHRA), the largest professional association of HR professionals in the Northeastern United States.

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[1]Total Worker Health® is a registered trademark of the U.S. Department of Health and Human Services (HHS). Use of the term by the author does not imply endorsement by HHS, the Centers for Disease Control and Prevention, or the National Institute for Occupational Safety and Health.

[2]For relevance see the Massachusetts Office of Technical Assistance video regarding Chemical Safety and Climate Change Resilience: https://www.youtube.com/watch?v=JrDfIDFi5AE

Table 1. Employer preparedness and Total Worker Health

TWH domain	TWH issues with particular relevance for employer preparedness
Control of Hazards and Exposures	Chemical exposure
	Safety risks
	Risk assessment and risk management
Organization of Work	Fatigue and stress prevention
	Safe staffing
	Overtime management
	Flexible work arrangements
	Adequate meal and rest breaks
Built Environment Supports	Access to healthy, affordable food options
	Universal design
Leadership	Commitment to safety, health, and well-being
	Meaningful work and engagement
	Worker recognition and respect
Compensation and Benefits	Adequate wages and prevention of wage theft
	Paid time off
	Disability insurance
	Affordable, comprehensive health care
Community Supports	Safe and clean environment
	Family access to health care and well-being resources
Changing Workforce Demographics	Aging workforce and older workers
	Vulnerable worker populations
	Workers with disabilities
Policy Issues	Family and medical leave
	Bullying, violence, harassment, and discrimination
New Employment Patterns	Contracting and subcontracting
	Precarious and contingent employment
	Telecommuting
	Multi-employer worksites
	Financial and job security

Survey Participants

NEHRA's Director of Partnerships sent an email to the 2000 listed members of the association inviting them to take the 20-min, 40-question on-line survey in the spring of 2018. The link to the survey was provided in 3 direct emails to the membership as a whole and mentioned in a newsletter. No identifiers were collected in the survey. The survey was open for 4 wk. To boost participation, those who completed the survey were offered the opportunity to enter a drawing to win an Apple iPad®. Human subjects' participation in the research was approved by the University of Massachusetts Lowell Institutional Review Board. Informed consent for participation was obtained by means of the first question of the survey; negative consent ended the survey.

Data Analysis

Data analysis included calculation of frequencies of participant characteristics and responses, assignment of a TWH Employer Preparedness Score using the Index shown in Table 2, and statistical analysis to test associations between respondent characteristics and TWH Employer Preparedness Scores. The TWH Employer Preparedness Index facilitates a score of each respondent

on a scale from 0 to 23 using their responses to a selected list of questions from the survey. Scores were categorically assigned as follows: a score of zero defined "No Preparedness," a score between 0 and 7 as "Low," 8-15 as "Moderate," and greater than 15 as "High." TWH Preparedness scores as a continuous variable were used to perform Student t-test and to calculate confidence intervals to determine if certain sectors scored as more or less prepared than the sample generally. Additionally, analysis of variance (ANOVA) estimates tested the relationship between scores and employer characteristics such as size (as measured by number of employees) and reach (eg, global vs local).

Results

Total Worker Health Employer Preparedness Model

The process described above in the methods resulted in a proposed model of 7 domains of Employer Preparedness with examples of elements of those domains as shown in Figure 2. Examples of action steps for each of these domains are listed in Table 3 and some sample policies are listed in Table 4. In keeping with the Hierarchy of Controls and a prevention-orientation, the model includes both hazard reduction in anticipation of emergencies as well as plans for emergency response and return to functioning. It is comprehensive of worker well-being including physical, social, economic, and psychological well-being. In brief, the domains and elements are described below:

Planning

Devoting staff time and other resources to an ongoing Employer Preparedness planning processes is, perhaps, the most essential of employer preparedness actions. It is an expression of management commitment to Employer Preparedness and a commitment to employee participation in preparedness planning. A temporary task force might establish the basis of Employer Preparedness, however, the dynamics of Employer Preparedness require an ongoing and iterative process that constantly improves with feedback from experience with events and drills. Models for planning include the US Centers for Disease Control and Prevention's Building Resilience Against Climate Effects (BRACE) process, which can guide entities through an assessment of potential threats and a cyclical process of addressing them.[31] This process can be used for all hazards.

If it is not possible to establish a committee exclusively for developing TWH Employer Preparedness, a health and safety, health promotion, or other committee could include TWH Employer Preparedness in their regular agendas. Additionally, many employers have initiated some emergency planning, but these processes may not include HR representatives, nor the comprehensive concerns of worker well-being. Thus, the Planning domain includes *Cyclical Planning Infrastructure with HR Integration* as an essential element. It is the basis of all other domains and elements.

To conduct their work effectively, committee members may need training, as many of the topics of Employer Preparedness are new. This committee can then take up an agenda that includes developing *Best Practice Plans for All Hazards* guided by industry standards, recommendations from the Red Cross, National Safety Council, or government agencies, such as the Federal Emergency Management Administration. The committee can: assess compliance with relevant *OSHA Requirements,* such as means of egress and preventive maintenance schedules; Paying particular attention
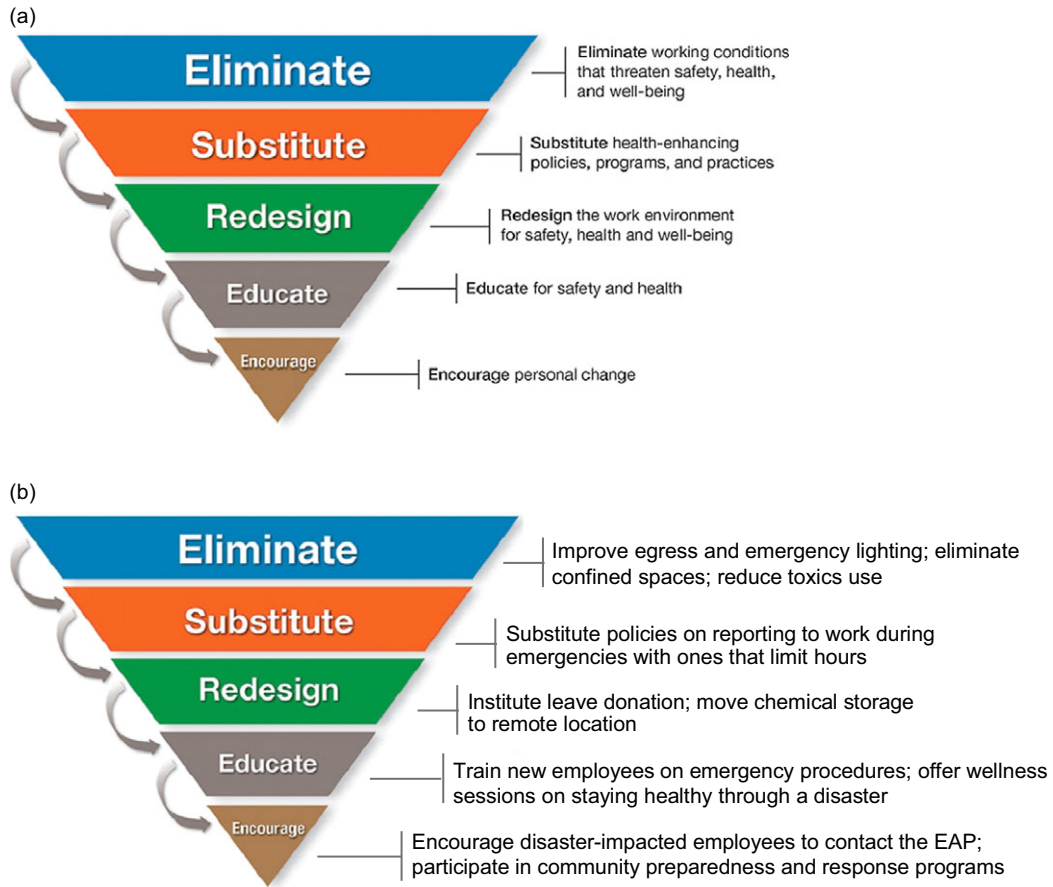
Figure 1. A, Hierarchy of controls applied to TWH. B, Examples of hierarchy of controls applied to TWH and employer preparedness.

Figure 2. Domains of the TWH Employer Preparedness Model.

to *Planning Equity* focuses planning efforts on the needs of employees who are disabled, older, temporary/contract, and others who may need special attention, such as employees with limited English-language skills.

Human Resources Policies

The HR Policies domain includes policies related to *Pay and Benefits* during and following events that may shut down the employer or may compromise operations. These pay and benefits policies should consider situations in which employees are unable to report to work, either due to direct impacts, or because they followed evacuation orders. Additional "hazard/disaster pay" for employees who work as essential personnel when other personnel have been dismissed or evacuated may be necessary. Manageable *Shifts* and designated work-rest periods for personnel working during or following disasters when the employer maybe short-staffed are essential for sustaining employees through these events and preventing accidents and other ill-effects from exhaustion and over-whelm. Committees will need to consider these issues under a range of potential scenarios.

The committee should consider disaster-related *Leave* policies. These could include the establishment of leave banks for employees who may not be able to report to work. A leave bank allows employees to "donate" unused personal days to a leave bank that can be accessed by employees who need to attend to disaster-related matters, such as destruction of their homes or personal property or to family members who are impacted by a disaster, even in another part of the country or world. Some staff may be called upon as emergency *Volunteers*, including as rescue workers, during and following a disaster. These volunteers may be unable to report to work because they are occupied with community response. Policies might include recognizing and paying these employees for their community service and sponsoring volunteer,

Table 2. TWH Employer Preparedness Index

	Possible points			Possible points
Domain 1: Planning		**8**	**Domain 5: Communication**	**1**
Preparedness for Specific Disasters	3[a]		Communication	1
Action Plan	2[b]		**Domain 6: HR EP Policies**	**4**
Inclusive Planning	1		Pay When Operations Down	1
Plan elements	2[c]		Pay for Impacted Employee	1
Domain 2: Staffing		**1**	Leave Bank	1
Staffing	1		Benefits	1
Domain 3: Hazard Reduction		**2**	**Domain 7: Resilience Support**	**2**
OSHA requirements	1		Employee Assistance Program	1
Supplies and Personal Protective Equipment	1		Recovery Resources	1
Domain 4: Preparedness Training		**5**	**Total Possible Points**	**23**
Personal Preparedness Training	1			
H&S Training	3[d]			
Drills	1			

[a]Very Prepared for any 5 = 3; Moderately or Somewhat Prepared for any 5 = 2; Unprepared for any 5 = 0; Other = 1.
[b]Fully developed = 2; Moderately or Somewhat = 1; Not developed = 0.
[c]Ten or more = 2; 5 to 9 = 1; 4 or fewer = 0.
[d]Five or more = 3; 3 or 4 = 2; 1 or 2 = 1; 0 = 0.

Table 3. TWH Employer Preparedness Model

Planning	HR policies
OSHA requirements • Best Practice Plans • Cyclical Planning Infrastructure w HR Integration • Planning Equity	Pay • Benefits • Leave • Shifts • Volunteering
Staffing	**Communications**
Supporting Essential Personnel • Remote Operations • Re-entry protocols • Post-disaster supports	Before, During, After • Internal • External
Hazard reduction	**Training**
PPE supplies • Building safety • Chemical process safety • Operations/staffing • Preventive maintenance and renewal • Violence prevention and personnel policies	Awareness • Frontline supervisor training • New hires/temp personnel training • Personal, family, and community preparedness • Drills and exercises
Resources for resilience	
Employee assistance and recovery support • Social support and connections • Flexibility and cross training • Internal resources • External resources	

Table 4. Sample of potential TWH Employer Preparedness Policies

Domain	Component	Sample policy
Planning	Cyclical Planning with HR Integration	"HR staff shall be invited to participate on a quarterly basis in the Emergency Preparedness Planning Committee monthly meetings."
HR Policies	Work Shifts	"Employees shall not work more than 12 hours consecutively and shall have 24 hours off when they reach 65 hours."
Staffing	Supporting Essential Personnel	"Catering services shall be engaged to provide regular hot meals for essential personnel during emergencies."
Communications	Internal Communications (within company/agency)	"Redundant communications modalities shall be established to ensure timely, reliable, and accurate communications with employees regarding emergencies."
Hazard Reduction	Chemical/Process Safety	"Back up power systems shall be installed and regularly maintained to insure ventilation to chemical storage areas in the event of power failure."
Training	Drills and Exercises	"Emergency response exercises shall be conducted with the Company Emergency Response Team and regional emergency responders on a periodic basis and when conditions change to necessitate new training."
Resources for Resilience	EAPs and Recovery Support	"Contracted EAP services shall include professionals trained in disaster response mental health treatment."

fundraising, and support activities that help the employers' communities recuperate.

Staffing

The Staffing domain overlaps with HR policies but focuses particularly on the who, what, when, and where of employment through emergencies and disasters. Business continuity planning is a core component of emergency planning; the Staffing domain focuses continuity planning on the well-being of employees. Thus, the element of *Supporting Essential Personnel* refers to the special needs of those working when others are not and includes planning for meals, transportation, housing, child/elder care, and emotional support for these individuals. *Post-Disaster Continuity Supports* refers to arrangements for telecommuting, transportation, flexible schedules, and temporary staffing. If a disaster means that the employer must establish *Remote Operations*, the needs of personnel who are relocated or working from home will be considered. Finally, following a disaster that impacts an employer's operations, employees will be anxious to know about retrieving personal belongings or equipment necessary for remote work, or gaining access to the facilities, generally. The answers to these questions should be guided by *Re-entry Protocols* that ensure employee safety.

Communications

Communications refers to both external and internal communications and span the timeframes of *before, during, and following* an emergency or disaster. External communications will be with federal, state, and local emergency response and regulatory agencies, and the media. Such communication is often mandated in emergency action plans and standards. For example, employers with hazardous chemicals must establish advance communications with fire departments and Hazardous Material response teams. Internal communications will include risk communication, training opportunities, employer policies and protocols, take-home materials, and alert systems. Many employers have established mobile phone alert systems, but building alarms are also necessary as well as employee training about how to react to the alarm. Finally, post-disaster, employers will need to establish communication portals that share information with employees who may be without power or who may have left the area.

Training

Training is a core component of Employer Preparedness and includes many levels including *Awareness level* for all employees for all hazards, *Frontline supervisor training*, *Training for trainers* of other employees or Employer Preparedness committee members, and training aimed at new employees during *Orientation* or for Temporary employees. "Sit-down" training needs to be complemented by *Drills and Exercises* that facilitate learning from simulated disaster scenarios. These drills generally integrate involvement of community emergency responders. Employee well-being will also be supported by programs aimed at promoting *Personal, Family, and Community Preparedness* and raise the profile of the employers' preparedness in their host communities.

Hazard Reduction

Committees should prioritize the identification of opportunities to prevent or minimize disasters. This would include attention to *Building safety*, toxics use reduction and *Chemical Process Safety* to minimize hazardous materials, and *Preventive maintenance*

and renewal of vulnerable equipment. Adequate *Staffing* plans are necessary to ensure that critical *Operations* can proceed during emergencies and disaster response. *Violence prevention and personnel policies* should be revisited and security equipment and protocols put in place. While not hazard reduction, the risks of serious impacts maybe reduced if the employer ensures that adequate emergency supplies and *PPE* are on hand or available in supply chains and in good shape for potential emergencies.

Resources for Resilience

Resilience means the ability to get through, bounce back from, and integrate lessons from serious disruptive events into preparedness planning. Factors that contribute to resilience include interpersonal connection, flexibility, and adequate supports that acknowledge the full impacts of disruptive events. Employers can help develop a resilient workplace by providing access to *Employee Assistance Programs* and other *Recovery Support* services such as social work, advocacy, and mental health that are keyed into the needs of employees impacted by disasters. Employers can anticipate that a workforce that is *Flexible and Cross-trained* to do a variety of tasks and in different sectors of operations will support continuity through challenges and help employees feel less helpless. Studies of disasters suggest that *Social Support and Connections* are critical to help people survive disasters. Employers can promote these connections through various programs and activities. Employer sponsorship of *Internal resources* such as on-site recovery assistance with basic necessities and assistance with filing insurance claims, as well as links to *External Resources* such as the American Red Cross and disaster assistance programs are also critical.

This model is not prescriptive. Rather, it suggests processes and policy areas for employers to use in tailoring preparedness to their workplaces. For example, the "Planning" domain does not dictate which hazards should be the subject of employers' preparedness planning, but instead suggests that they establish a diverse committee, including HR and front-line staff, that engages in cyclical planning processes. Under HR Policies, the model suggests that employers establish disaster and emergency-related pay policies but does not specify what they should be. Indeed, in unionized workplaces, some of these issues will be subject to collective bargaining agreements. A much lengthier list of planning areas could be included, but this model trusts that dedicated committees can determine critical preparation through their planning processes.

Survey Results

Seventy-six HR professionals participated in the survey. Eighty percent of participants ($n = 61$) had job titles suggesting they were "decision-makers" in their HR departments, including HR Director. As shown in Table 5, almost half ($n = 35$) worked for private, for-profit employers; another third ($n = 24$) worked in the nonprofit sector. Respondents worked for diverse sectors that were representative of employers in the northeast US including government, manufacturing, business services, health care, and construction. No one sector dominated. Employers of the respondents were also well-distributed in size with almost half ($n = 33$) in the 100- to 500-employee category and one-quarter ($n = 17$) with fewer than 100 employees. Larger numbers of employees ($n = 18$) made up the remaining quarter. The geographic reach of the companies or agencies for which the respondents worked was generally greater than the northeast; 24 were global companies. However, almost one-fifth ($n = 13$) were companies with local scope.

Table 5. Characteristics of participants

Employer category	n	%
Private sector, for-profit	35	49
Private sector, non-profit	24	33
Public sector	11	15
Independent contractor/consultant	2	3
Employer sector		
Social services/government	13	18
Manufacturing/technology	13	18
Business services/telecomm	12	17
Health care	10	14
Education	9	13
Finance, insurance, real estate	7	10
Sales	5	7
Construction/engineering	3	4
Employer size		
100-500 employees	33	49
<100 employees	17	25
>1000 employees	10	15
501-1000 employees	8	12
Employer geographic reach		
Global	24	34
North America	14	20
Local	13	19
Regional (Northeast)	12	17
State	7	10

Table 6 presents survey results in the TWH Employer Preparedness domains. The first questions related to the *Planning* domain. Most (81% percent, $n = 52$ out of 64 responding) reported that they had at least some participation in emergency-related planning at their companies/agencies, with 13% reporting a lot of involvement. Forty-nine percent ($n = 31$) reported that their employers' overall emergency-related plans were either moderately or fully developed. Participants were asked if their company's or agency's emergency action plans accounted for the needs of disabled staff—a measure of inclusiveness and equity in planning. Almost half ($n = 30$) reported that their employer did this either very or moderately well. More than one-third reported that their employers' plans did not account for staff members who were considered disabled or they did not know if they did.

From the list of specific emergency hazards, such as hurricanes and active shooters, participants were asked to indicate their perception of their employer's preparedness for each hazard from Very to Not Prepared and Don't Know. Sixteen percent ($n = 10$) ranked themselves as very prepared for 5 or more hazards, while around the same percentage said that they were unprepared for 5 or more hazards ($n = 9$). The majority thought that they were moderately prepared for 5 or more hazards ($n = 36$). Winter storms, hurricanes, and extreme heat were the most common emergency/disastrous potential hazards planned for by these respondents' employers (data not shown). The hazards that appeared to have the least preparation were active shooters, acts of terrorism, and infectious disease outbreaks.

Respondents answered if any of 12 TWH Employer Preparedness-specific elements were included in the company or agency's emergency action plans. The most common TWH Employer Preparedness elements in the plans were guidelines for closing and opening facilities and for telecommuting. Fewer than 10% of respondents reported the following elements in their emergency action plans: access to medical and mental health services, temporary and contract employees, additional pay, meals, temporary housing, transportation assistance, and child care and/or elder care.

In the *Staffing* domain respondents were asked about the degree of development of their employers' staffing plan following an emergency or disaster. One-third ($n = 21$) reported that either there was no plan, or they did not know if there was, and the remaining two-thirds were divided between either "plan in development" or "plan in place." In the *Hazard Reduction* domain, respondents were asked to assess their employer's degree of meeting OSHA emergency preparedness requirements. A majority reported that their employer was meeting these requirements either very or moderately well ($n = 36$). With regard to their confidence that their workplace had emergency-related ppe and other supplies, few reported a high degree of preparedness ($n = 4$). The Index's *Communication* domain question was: Do you have a way to communicate with employees during or after an emergency? Three quarters said yes ($n = 47$).

Three questions were included in the Index related to the *Training* domain. Approximately one-fifth ($n = 12$) reported that their company or agency offered personal disaster preparedness training. Just under a third ($n = 18$) reported that their companies or agencies conducted drills beyond fire drills. Many respondents reported that their company or agency included emergency preparedness topics in health and safety training, although it was as common for there to be no trainings as for there to be many trainings (more than 3). General emergency preparedness and training on extreme weather were training the topics mentioned most often. For hazard-specific preparedness training, violence/active shooters and heatwaves were least likely to be mentioned as training topics.

The *HR Policies* domain included 4 questions related to compensation and benefits following a disaster. In the case where an employer is closed due to a disaster, one-third of respondents ($n = 19$) reported that full-time employees would be paid, and 19% ($n = 32$) said that they were unsure. Disaster-impacted employees who could not report to work would be able to take leave in half of the respondents' companies or agencies ($n = 28$). Eighteen percent ($n = 11$) of respondents said that they had a "leave bank" that would allow employees to donate leave for disaster-impacted co-workers. Almost two-thirds ($n = 39$) of respondents said that employees at their workplaces would be able to continue to receive benefits following a disaster that impacted the employer.

The *Resilience Support* domain was represented by 2 questions in the Index. The first asked if their employer had an Employee Assistance Program that could be called upon for supporting employees impacted by a disaster. The second asked if they offered, or would offer, mental health or other resources to their employees in the event of a disaster. Almost 75% ($n = 43$) indicated their EAPs were on-call for disaster-related support, and approximately half ($n = 28$) said that they could offer other resources to their employees.

Each respondent was scored from 0 to 21 on the TWH Employer Preparedness Index as described in Table 2. Thirteen received a 0 score, 22 a Low score (0-7), 32 a Moderate score (8-14), and 9 scored above 15, indicating a High score. The mean score was 8.8, which would rank as a Moderate level of preparedness. Student t-tests found no significant differences between different types of respondents. However, health-care sector respondents

Table 6. Perspectives on TWH Employer Preparedness among human resources staff

Planning domain					
*Hazards preparedness**	*n*	*%*	Plans account for disabled staff?	*n*	*%*
Very prepared 5+	10	16			
Moderately prepared 5+	36	58	Very well	4	6
Unprepared 5+	9	15	Moderately well	26	41
Mixed	7	11	Somewhat well	12	19
Development stage of company/agency's plan?			Not well	12	19
Fully developed	13	21	Don't know	9	14
Moderately developed	18	29	*Number of elements in the plan?*		
Somewhat developed	17	27	10+ elements	2	3
Not developed	13	21	5 to 9 elements	13	17
Don't know	2	3	<=4 elements	61	80
Elements included in the plan			*Elements included in the plan, con't*		
Closing/opening policies	33	20	Additional pay	7	4
Telecommute	29	17	Meals	7	4
Access to closed facilities	19	11	Temporary housing	5	3
Flex-time	19	11	Transportation help	4	2
Off-site facilities	16	10	Child care / Elder care	2	1
Medical/mental health	13	8	Other	2	1
Temporary employees	11	7			
Staffing domain			**Communication domain**		
Plan status			*Way to communicate?*		
In development	21	33	Yes	47	75
Plan in place	21	33	No	9	14
No plan	19	30	Don't know	7	11
Don't know	2	3			
Hazard reduction domain					
Meeting OSHA requirements?			*Emergency PPE and other supplies?*		
Very well	21	33	Very well	4	7
Moderately well	15	24	Moderately well	13	22
Somewhat well	9	14	Somewhat well	16	28
Not well	2	3	Not well	18	31
Not applicable	6	10	Don't know	7	12
Don't know	10	16			
Training domain					
Personal preparedness?			*H&S training covering disaster topics*		
Yes	12	21	5+ HS trainings	12	16
No	39	67	3 or 4 HS trainings	17	22
Don't know	7	12	1 or 2 HS trainings	20	26
			No HS trainings	27	36
Exercises and drills?					
Yes	18	31			
No	36	62			
Don't know	4	7			
H&S training disaster topics			*H&S training disaster topics, con't*		
Emergency response, general	40	25	Hazardous incident	20	13
Fire/explosions	30	19	Infectious disease	15	9
Extreme weather	26	16	Active shooters/violence	14	9
			Heat waves	13	8
HR policies domain					
Employees are paid if closed?			*Leave bank?*		
Yes	19	32	Yes	11	18
No	29	48	No	47	78
Don't know	12	20	Don't know	2	3

(*Continued*)

Table 6. (*Continued*)

HR policies domain					
Disaster leave?			*Benefits continue?*		
Yes	28	47	Yes	39	65
No	23	39	No	12	20
Don't know	8	14	Don't know	9	15
Resilience support					
Disaster assistance EAP?			*Recovery resources?*		
Yes	43	73	Yes	28	47
No	12	20	No	24	41
Don't know	4	7	Don't know	7	12

and those working for companies/agencies with more than 100 employees had, on average, higher scores. Company/agency reach was not a predictor of greater preparedness scores.

Discussion

This study is a first attempt to explore the concept of TWH Employer Preparedness for all hazards. In the face of many pressing "regular" demands, employers may need guidance to advance their capabilities for protecting their employees and promoting their well-being through potential emergencies and disasters. The proposed TWH Employer Preparedness model is broadly comprehensive, while allowing for flexible adaptation through a systematic process that results in a relevant set of policies and plans that improve with experience. This process draws upon the characteristics, preferences, and resources of the employer and workforce to create an appropriate baseline strategy to protect employee well-being through emergencies and disasters.

The model is complemented by a novel assessment of TWH Employer Preparedness in a sample of northeast US employers. The comprehensive domains of the model would suggest a long and detailed survey instrument. However, a streamlined instrument and index were designed to facilitate efficient and feasible research with busy subjects. Analysis of the responses suggests that employers may have many elements of preparedness in place; however, a significant number may have very low levels of preparedness, and almost all have room to expand their TWH Employer Preparedness. There were not significant differences between types of employers and their level of preparedness, although it is likely that health care and organizations with greater than 100 employees have more developed TWH Employer Preparedness.

These northeastern US respondents indicated that employers are better prepared for storms than for acts of violence. Many employers have emergency plans, but the plans may not focus sufficiently on issues related to TWH. Respondents to the survey suggested that policies and practices that might minimize work-life conflicts, such as emergency child care or elder care, may not be developed in most employers' action plans. While some employers are diligent in their preparedness-related training, responses here indicated that employers should expand these activities, particularly in providing personal preparedness training for employees.

The strengths of this study include the introduction of an important conceptual framework in response to an obvious public health need. The survey operationalized the TWH Employer Preparedness Model as a tool of assessing employer preparedness to protect employees and promote their well-being in the face of multiple and diverse potential disasters. This model was effectively integrated in a survey instrument that was comprehensive of the domains, yet easily completed in 20 min. The survey can be used with or without the Index to provide specific and comprehensive assessment of Employer Preparedness. While open-ended responses were not formally analyzed, some suggested that the survey stimulated novel thinking about these issues and may have initiated preparedness activities. Finally, the partnership with NEHRA was beneficial to both parties and has resulted in continued collaboration.

The major limitation of this conceptual effort is its novelty. The domains are rigorously theoretically grounded but lack a strong empirical basis due to the limited research in this area. There were no standard assessment questions nor method of comparing responses. Thus, the Model and the Index are proposals based upon the best judgement of their creator and should be modified through collaborative efforts to improve them.

The survey's principal limitation was the low response rate and number of responses. Email invitations to a large membership list may not be an effective means of encouraging participation in such a survey.[32] Efforts to increase participation might include attendance at professional conferences where in-person solicitation may yield greater results. The survey was only open for 4 wk; it is also possible that a longer period of open survey time is necessary. An additional limitation is the lack of validation of both the survey and the Index. The categorization of TWH Employer Preparedness scores as "High," "Medium," and "Low," was similarly based on numerical categories instead of validated empirical constructs. Further research is planned to strengthen the objective basis of TWH Employer Preparedness assessment.

Conclusions

Significant effort has been applied to the development of public health preparedness to address the emergency medical care needs of disaster-impacted individuals and to ensure adequate infrastructure for nonroutine events.[33] However, as the COVID-19 crisis has revealed, employers face numerous challenges in protecting their workers and helping them balance the challenges of a disaster that impacted their workplaces, communities, and homes.[15,16,34] Many potential impacts can be avoided by attention to risk assessment and prevention in a comprehensive planning context where the 7 domains of TWH Employer Preparedness are considered by multi-disciplinary teams that include employees themselves, occupational health professionals, and HR representatives.[26,35] This study and the accompanying framework can renew and focus

attention on the well-being of workers, and support employers in promoting TWH under all circumstances through a systematic approach. The groundwork presented here reinforces the urgency of employer preparedness planning activities and removes a significant barrier to commencing them—that of how to begin.

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