

*Designing and developing a disaster resource directory:
A case example*

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ABSTRACT

Access to accurate, up-to-date information about resources and services is essential if survivors are to recover following disasters. Emergency managers need information about community resources to effectively plan for the recovery phase. Long-term recovery committees and case managers rely on resource directories to design recovery plans with survivors. This article describes a replicable approach used to swiftly create and maintain an online resource directory for individuals with disabilities following Hurricane Harvey.

Key words: Directory, resource, disaster, disability, recovery

INTRODUCTION

Hurricane Harvey brought insurmountable flooding and devastation during August 2017. As a category 4 hurricane at landfall, it hovered over Texas for 4 days, dropping 40-61 in. of rain¹ across 41.5 thousand square miles of landmass.² More than 122,000 individuals were rescued by local, state, and federal first responders, and approximately 42,000 housed in over 690 temporary shelters.³ In total, Hurricane Harvey displaced nearly 780,000 individuals and resulted in 41 federally declared disaster counties.^{3,4} Within these affected counties resided an estimated total of 861,000 people with disabilities.^{5,6}

One of many tasks following the response phase of a disaster is connecting survivors with essential services. Emergency managers and voluntary agencies must identify available post-disaster resources

and services—even when such resources and services may be scarce.⁷ Rapid assessment and information on available services in a given community is a key.⁸ However, different types of resources become available at different points and phases following a disaster. Most immediately, disaster survivors need food, shelter, medical care, and consumable medical supplies, eg, medications, insulin, and hearing aid batteries. As time passes, new needs emerge, such as mucking out flooded houses, removing debris, transportation, and applying for disaster-related services. Further along the recovery phase, assistance in rebuilding homes or finding new employment becomes more salient.

People with disabilities will need the same resources and services post-disaster as will anyone else affected by disaster.⁹ For example, individuals with disabilities will need to register for disaster assistance, locate housing, and find employment.¹⁰ However, these disaster-related resources must be offered in a manner that is accessible and equitably available. For instance, recovery information must be provided in formats so that people with visual disabilities can read and people with hearing impairments can understand.

In addition, many people with disabilities will require specific disability-related resources and services¹⁰ but often face difficulties obtaining such resources following disasters.¹¹ Finding resources that address disability-related needs post-disaster can be challenging. People with disabilities may need accessible information on transportation,¹² mobility

assistance, and assistance with the needs of guide dogs.¹³ Access to resources such as medical care, durable medical equipment, and medications is essential for individuals with disabilities who also have underlying medical conditions. Some people with disabilities may depend on timely access to dialysis or chemotherapy services; therefore, ensuring continuity of services during and after a disaster is essential.

People with disabilities share a number of socioeconomic factors with other populations disproportionately impacted by disasters. Individuals with disabilities are more likely to live in poverty, have limited health care access, and be unemployed.^{14,15} Some research has found lower-income individuals with disabilities are less likely to be prepared for and respond to disasters.¹⁶ As is the case with other marginalized populations, people with disabilities may be more likely to live in floodplains: neighborhoods with higher proportions of flooded areas during Hurricane Harvey also contained a disproportionate number of people with disabilities living in those same neighborhoods.¹⁷ In addition, households with family members with a disability sometimes exhibit differences in evacuation and sheltering behaviors. Such factors contribute to the disproportionate exposure of people with disabilities to injury, death, and loss of property⁸ in disaster situations. Together, these challenges and barriers also contribute to increased resource needs during the recovery phase of disaster for people with disabilities.¹⁴

Emergency managers and recovery organizations should be cognizant that people with disabilities make up a sizable proportion of almost every community. In any given county in the United States, approximately 26 percent of the residents will have a disability.¹⁸ The percentage may be greater in some communities; for example, those where access to adequate health care are limited or those that attract retirees.¹⁹ “Disability” is classified in numerous ways across different agencies and organizations. The Behavioral Risk Factor Surveillance System (BRFSSO), conducted yearly by the CDC, is the widest health survey administered in the United States on health-related risk behaviors and chronic health conditions.²⁰ The BRFSSO classification reports the percentage of functional disability

types in the general US population as follows: mobility (12.9 percent), cognition (11.4 percent), independent living (7.0 percent), hearing (5.6 percent), vision (4.7 percent), and self-care (3.7 percent).²⁰

These numbers have great utility to emergency planners with respect to disability-related evacuation, sheltering, and communication accommodations required to be in place predisaster as well as indicate resources that will be needed in a community during the recovery phase. For example, knowing that 13 percent of residents in a particular community have a mobility-related disability informs how many accessible buses will be needed for an evacuation, while knowing that over 5 percent of residents are deaf or hard-of-hearing informs the need for interpreters and alternate communication formats in shelters. Again, these percentages will vary from community to community, but the US Census’ American Community Survey provides county-level data on functional disability types and is readily accessed online.

CHALLENGES IN CREATING AND MANAGING DISASTER RESOURCE DIRECTORIES

Disaster resource directories are typically designed to support communities during the response and recovery phases of disaster. Directories need to provide just-in-time information to those who need it most—both to survivors who are recovering and those who support them. Disaster case managers, voluntary organizations, disability service organizations, and others make use of such directories to connect individuals who have experienced disaster to targeted services currently available. However, as noted, available disaster resources change rapidly. Nonprofit agencies and pop-up organizations may make available resources but not have the requisite knowledge or the communication network to connect with other organizations.

Online resource directories help close the gap in access to resources by allowing communities to track resource availability within a single resource directory.²¹ For example, 2-1-1 directories can be found nationwide that connect citizens with services they need via accurate and easy-to-find information. In Texas, 2-1-1 (a program of the Texas Health and

Human Services Commission) has 25 service areas, and each area has a resource manager.²²

Joh et al.¹² reviewed unmet transportation needs via a review of 2-1-1 transportation-related calls during two major hurricanes in Texas. The researchers found that better transportation services for individuals with disabilities were needed, as evidenced by the high percentage of calls for unmet transportation needs. This study highlights the fact that while resources may be available via 2-1-1, unmet needs may still exist. Complicating this is that 2-1-1 Texas is not offered everywhere within the state. Additionally, to have a service listed as a resource in 2-1-1, an organization must be vetted, exist for at least 6-months, and be preregistered. Therefore, a “pop-up” organization will not usually be included in 2-1-1, even if it is a legitimate organization. As such, available local resources may often not be included in 2-1-1.

Similarly, the Coordinated Assistance Network-Recovery (CAN-Recovery) is an online resource database designed to facilitate data sharing and collaboration among disaster recovery organizations.²³ The CAN was developed by several large disaster response charities in partnership with the Federal Emergency Management Agency (FEMA) as part of the National Response Plan and is currently overseen by the American Red Cross. Another platform, the Disaster Agency Response Technology (DART) platform is overseen by National Voluntary Organizations Active in Disaster and likewise includes a multiagency coordinated case management system, in addition to other functions.²⁴ Both CAN-Recovery and DART include resource directories that disaster-related organizations and case managers can access to assist in connecting disaster survivors to resources.

DEVELOPING A DISASTER RESOURCE DIRECTORY

Our purpose was to rapidly create a disaster resource directory of disability-related resources and services available to survivors affected by Hurricane Harvey. We aimed to provide just-in-time information on resources through a searchable online resource guide for emergency managers, long-term recovery committees (LTRCs), disaster case managers, disability-related organizations, disaster-related

organizations, and individuals with disabilities themselves. Central to the efficient distribution of resources is keeping resource databases to date,²¹ so we tracked the process by which these resources were populated and maintained within our directory. Furthermore, we wanted to develop an easily replicated template that could be used to create future directories in response to other disasters.

The development and dissemination of the Resources for Disaster and Disability (REDDy) Directory occurred in five general phases after the landfall of Hurricane Harvey.

Phase I: designing disaster resource directory using existing template

The REDDy Directory used an existing online database as a template, the Directory of Community Resources (DCR), developed by the Center on Disability and Development (CDD) at Texas A&M University.^{25,26} The DCR was designed as a read/write website environment that allowed user-authored content to be contributed from the disability community and disability-related organizations.²⁷ The advantage of the DCR was that it allowed for an up-to-date and sustainable directory through affordances the read/write website provides in allowing the user community to contribute to and edit its content directly. Across the last decade, the DCR has consistently contained between 2,000 and 2,500 separate listings of disability-related resources and services in Texas. These listings are searchable via resource types—eg, housing, education, medical, etc.—age—eg, children or adults—and zip code.

Using existing listings in the DCR enabled CDD staff to contact relevant organizations soon after the landfall of Hurricane Harvey to ascertain if they intended to provide disaster-related resources or knew of other organizations that might do so. In addition, we had a pre-existing list of 17 different agencies and organizations that previously had provided disability-related resources in response to past disasters.²⁸ Eliciting information and referrals from these two sources—both known disaster-provider organizations and a broad array of disability-related organizations—enabled us to compile a preliminary list of 19

organizations, providing resources or services specific to disability-related needs within 2 weeks after Hurricane Harvey made landfall.

Phase II: population of the disaster resource directory

The next step in curating the preliminary listing was to ascertain what specific resources—eg, wheelchairs, hearing aid batteries, and gift cards—and services—eg, mucking and gutting flooded houses, and assistance with FEMA registration—these organizations and agencies were offering. Accurate and up-to-date information is particularly essential for people with disabilities during response efforts.⁸ Specific information was obtained directly from each organization about the disaster-related resources they were offering. The information included the organization’s name, contact information, email address, website link, service

description, resource type, eligibility requirements, ages served, languages accommodated, fee structure, payment types accepted, and nonprofit status. Resources were categorized into 13 different types, for example, housing, employment, transportation, and so on. Using this information, the directory allowed for searches by zip code, keyword, eg, DME, or resource type (Figure 1).

As shown in Figure 1, the REDDy Directory included both an external link to 2-1-1 Texas and an internal link to a “general disaster information” webpage. On the general disaster information webpage, external informational links and governmental services were listed. As these links and services were not specific to disability-related needs, we did not include them in the searchable REDDy Directory. However, we continued to curate this list as the need for general disaster-related services grew to include approximately

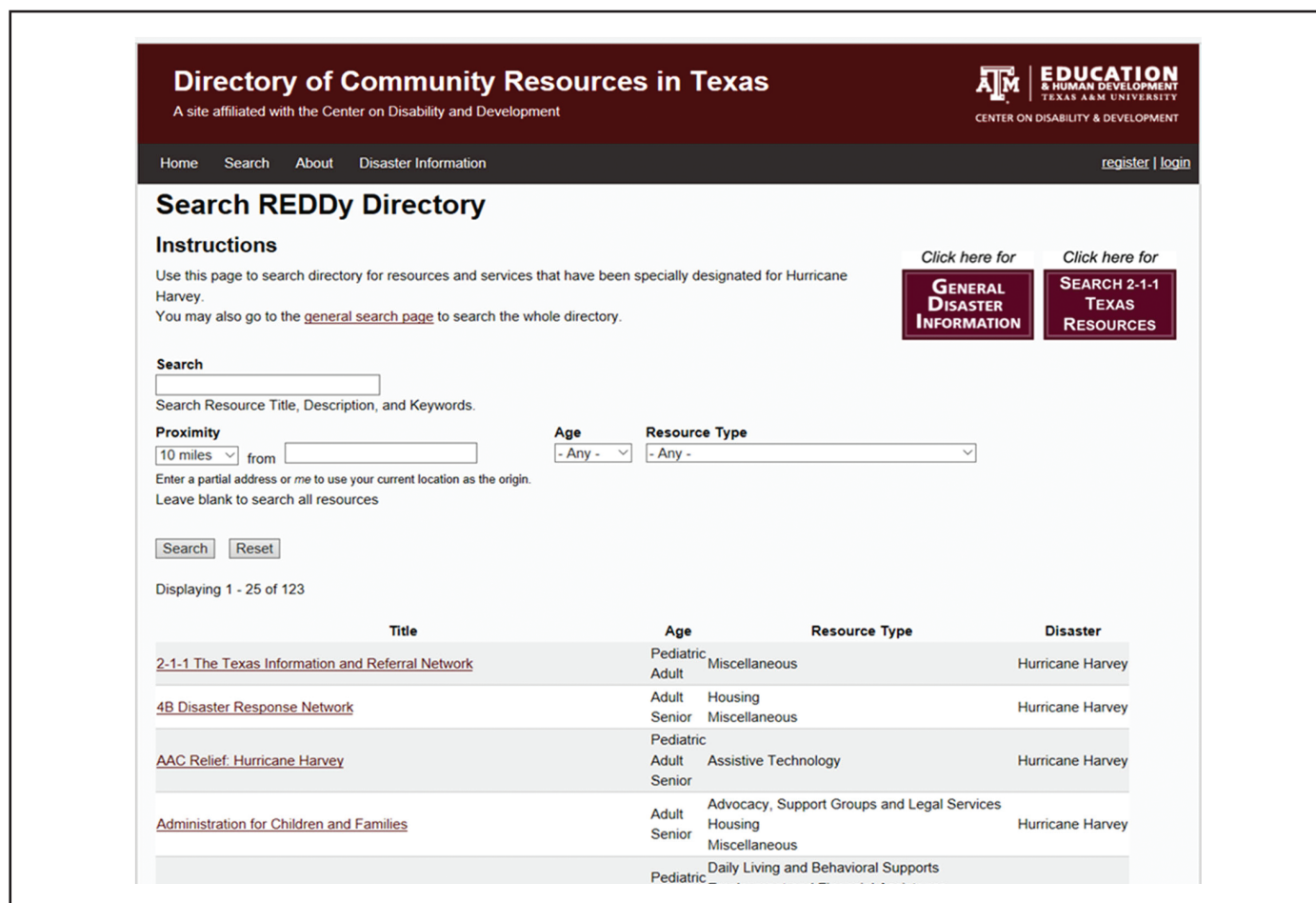


Figure 1 REDDy Directory. From <https://disabilityresources.tamu.edu/search-resources-harvey>.

114 web links to county or city resources, guidebooks, and educational materials on disaster recovery.

Organizations that had resources available were willing to share that information with directory staff. We made sure to provide in the description the relevant details related to limitations or qualifiers, such as limited to specific zip codes, limited to an organization's own members, etc. An estimated 200 hours of dedicated staff time was used to search for, verify, and populate both the directory and the general disaster information webpage over the 6-week period following the landfall of Hurricane Harvey.

Phase III: dissemination of disaster resource directory

Once the REDDy Directory contained 50 curated and complete listings, a description of the directory and its website link were widely disseminated throughout the emergency management community, including LTRCs. Organizations and entities receiving information across the first 6 months included Red Cross shelters and other shelters (123 contacts), Texas Voluntary Organizations Active in Disaster (VOADs) (77), emergency planning committees (60), county offices of emergency management (25), neighborhood restoration centers (18), and LTRCs (11). Given the role that schools and religious organizations play during the disaster recovery phase, we sent emails to school personnel (3,595), schools (311), and churches (263) in the impacted areas. We also sent information to organizations listed in the REDDy Directory (93) and the over 2,000 listed organizations in the DCR during the month of October. This widespread dissemination also contributed to entry development as some organizations and agencies then contacted us with additional available resources.

Effective communication is essential in connecting people with disabilities to needed services.⁸ Thus, materials were delivered in multimodal formats through several dissemination channels to provide access to the widest variety of targeted users, particularly people with disabilities.²⁹ Both print and web-based materials were used. In addition, novel dissemination products were developed, including (1) plastic rulers with the REDDy Directory website URL and tips for emergency preparedness, (2) hand

sanitizer bottles with the REDDy Directory website URL, and (3) information designed for an insert for church bulletins.

These items were broadly distributed via mail and social media at meetings, at disaster-related conferences, such as the Texas Emergency Management Conference, and disaster case managers. During the first year of implementation of the directory, approximately 10,980 emails about the REDDy Directory were sent to organizations, notices were posted on over 70 Facebook pages of local offices of emergency management, and over 1,100 letters were mailed with dissemination materials to disability- and emergency management-related organizations and agencies.

Phase IV: tracking emerging resources

After the initial release of the REDDy Directory, a continuous effort was needed to identify newly emerging disaster-related resources and services for people with disabilities. Most searches consisted of disaster-related organizations conducted via the internet, but many disaster-related organizations were additionally contacted directly via email or phone. Emergency management and VOAD phone conferences were attended regularly to discover what new resources might be available. At the outset, most initial services and resources included food, clothing provisions, and rebuilding. Several services, such as home rebuilding and medical equipment, specifically targeted individuals with disabilities, seniors, or veterans. Searches for disability-related resources continued on a daily basis for approximately 3 months and occurred at least biweekly thereafter. General disaster information listings on the internal link were checked every week. When organizations sent information directly to staff, these resources were added immediately to either the REDDy Directory or the list of general disaster resources. Listings were removed from both the REDDy Directory and the general resource list once they no longer contained resources relevant to Hurricane Harvey.

Phase V: maintenance and evolution of the resource directory

Resources and services listed in the directory continued to be checked regularly throughout the first

year following the disaster. Approximately 15 hours a week during the first 6 months were solely dedicated to updating resource listings, then approximately 5 hours a week in the months that followed. A staff member was responsible for calling organizations to ascertain the resources they were providing, checking organization websites, and requesting updates from organizations. Once an organization no longer provided resources, the organization's Directory entry was removed. Maintenance included continuously validating the accuracy of the resource listings, updating resource entries, contacting organizations to update their entries, and deleting resource entries when necessary.

As time following the landfall of Hurricane Harvey lengthened, the REDDy Directory continued to evolve. The types and numbers of resources and services offered changed following the initial response and transitioned into the recovery phase. The highest number of resources and services listed at any one point in time was 132. Given that the number of resources added and deleted to the directory fluctuated, the cumulative total number of resources listed across 11 months was 178. At the end of August 2018, 1 full year after Hurricane Harvey made landfall, 123 listings remained in the directory. The number of resources and services continued to decline as more time passed. At the end of August 2020, 3 full years following Hurricane Harvey, 81 listings remained in the Directory.

As shown in Table 1, the largest number of organizations provided housing-related resources or services ($n = 28$), which is not surprising as a large proportion of survivors from Hurricane Harvey, including individuals with disabilities, experienced damage to, or loss of their homes.¹⁷ Numerous organizations ($n = 22$) provided daily living and behavioral services, reflecting the need of many people with disabilities for in-home personal assistants or behavioral supports. Case management, a frequent need of all disaster survivors, and advocacy services comprised another service frequently offered by organizations ($n = 16$). A number of organizations provided multiple categories of resources ($n = 15$), typically both housing and employment resources. While most disaster survivors

Table 1. Types of disability-related resources and services listed in the REDDy Directory

Resource type	Number of organizations
Advocacy, support, and legal	1
Assistive technology	5
Case management/referral services	16
Communication	1
Daily living and behavioral	22
Elementary and secondary education	8
Employment and financial	12
Health and medical	8
Housing	28
Mobility and transportation	2
Multiple services	15
Post-secondary education	1
Psychological and counseling	13
Total number of organizations	132

will need case management services, advocacy services supporting the rights of people with disabilities were provided by a number of organizations post-disaster.

Usage of the directory

The numbers and types of resources accessed in the directory also changed post-disaster. Figure 2 shows an increase in the number of users and user sessions across 6 months (with a drop during the holiday month of December) after its first release in October 2017. After 7 months, the number of users and sessions began to decrease. Over the 10-month period after its release, the REDDy Directory averaged 2,146 users and 2,354 sessions per month. However, the Directory continued to be accessed frequently a full 3 years after Hurricane Harvey struck—an average of 333 users and 346 sessions each month—indicating that disaster directories can have extended longevity of use as the recovery process can take years.

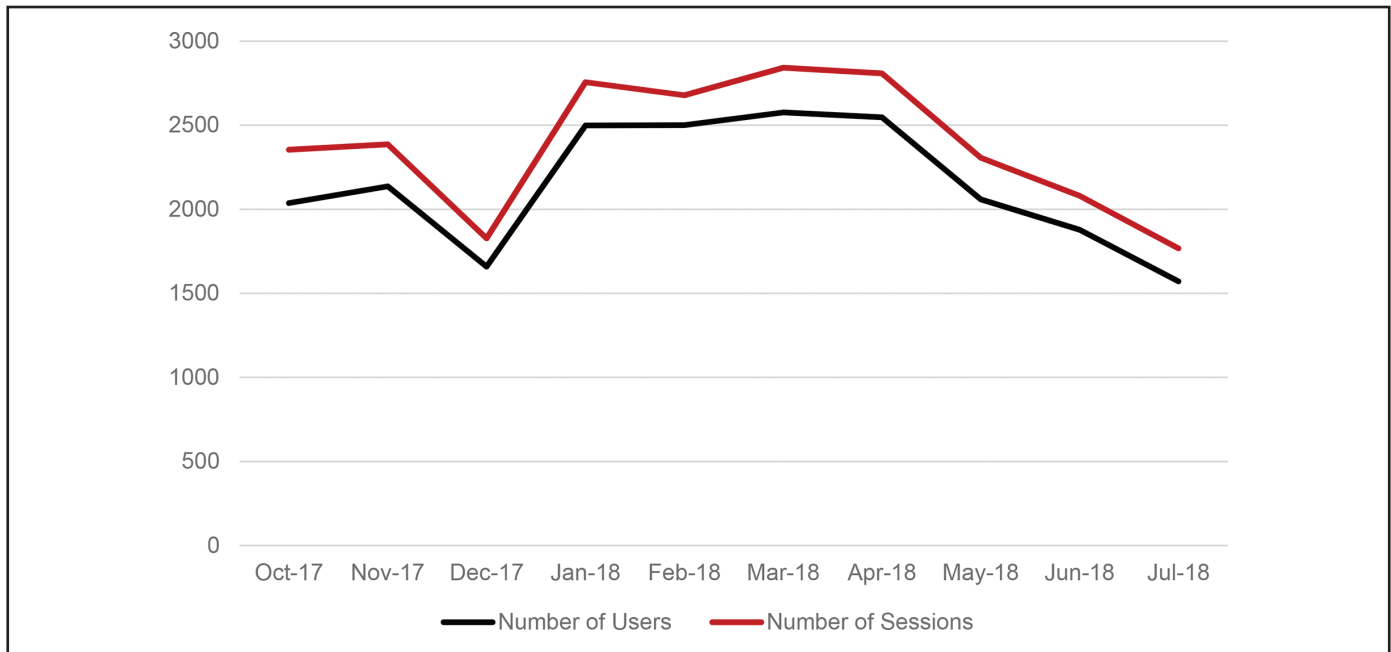


Figure 2. Usage of REDDy Directory across time.

A user evaluation was conducted 24 months after the directory was launched. Twenty-five users, three identifying as having a disability, who had been introduced to the REDDy Directory during a training seminar provided feedback through an online survey. Those responding to the survey were professionals/paraprofessionals (36 percent), disaster case managers (27 percent), family members/caregivers of people with disabilities (11 percent), general public/community members (11 percent), legislators/policymakers (2 percent), and student/trainee/intern/postdocs (2 percent). Sixty-four percent of these users indicated searching the REDDy Directory two to five times after first being introduced to the directory, whereas 36 percent of users indicated searching the REDDy Directory only once. Of the listings searched, the top three were (1) health and medical services; (2) advocacy support and legal services, or (3) all resources. Over 90 percent of these 25 users agreed the REDDy Directory was helpful and contained resources they needed.

DISCUSSION

During the recovery phase of disaster, resources and services are essential in supporting survivors,⁹

especially those from vulnerable populations. Research recommends that planning and recovery efforts focus on getting needed resources to those most vulnerable to aid recovery from disaster.¹¹ Online resource directories allow emergency managers to track resource availability,²¹ and directories allow disaster case managers to connect survivors with needed resources. Detailed here is a replicable model for rapidly creating, maintaining, and disseminating an accurate, up-to-date online disaster resource directory. Templated on a pre-existing directory, the REDDy Directory was considered established once a robust number of resources were listed. The REDDy model utilized a five-phase process to (1) design the directory, (2) populate it with resources and services, (3) disseminate, (4) track emergent resources, and (5) maintain and evolve the directory. The following are considerations and potential applications for other organizations or agencies aiming to design and maintain a disaster resource directory.

Management and maintenance

Focused personnel time and effort are essential to establish and maintain a high-quality disaster resource directory. The directory described here

required approximately 40 hours/week of dedicated staff time during the first 2 months, and an average of 35 hours each week for 6 months thereafter. Understandably, during the midst of the disaster response phase, organizations typically have limited time and capacity to contribute to directory updates. Therefore, a dedicated staff person will need to assume responsibility for outreach efforts to obtain the most current and accurate information and then make needed directory updates on their behalf. These efforts ensure correct information is readily available to potential users of the directory.

Fluctuating directory resources and services

The type, availability, and number of disaster-related resources and services frequently fluctuate post-disaster and change as new needs emerge. This fluctuation can result in challenges to database creation and maintenance. Thus, time-intensive and expeditious work to investigate and catalog time-limited resources (often in short supply) is essential during the first month to aid emergency managers and VOADs who urgently need to be aware of the resources as they serve and support survivors.⁷

In addition, various services and resources become available across different phases of the disaster. An organization seeking to maintain a directory such as the REDDY Directory might anticipate the need to monitor for changes in resources to match survivors' changing needs. This progression might shift from provisions of basic needs, to mucking and gutting services, to rebuilding supports. An ongoing effort is needed to ensure (1) posted resources remain available and (2) newly available resources are cataloged. One year post-disaster, directory organizers could anticipate that resources would be quite limited and new resources would seldom be added.

Directories and marginalized communities

Organizations often are not aware of the resource needs of socially vulnerable populations, such as the case here of people with disabilities. Thus, locating information about disaster resources and services for some groups can be particularly difficult. Individuals with disabilities often experience hard-to-address

needs that go beyond the scope of services provided by many organizations. For example, individuals with disabilities may need resources such as durable medical equipment—eg, walkers and wheelchairs—financial assistance, career advising, legal advice, and case management. Typically, these resources are available for only a short period of time and run out quickly. Furthermore, individuals with disabilities can experience barriers such as a lack of access to technology, difficulty navigating technology, and lack of access to the internet.³⁰ Such factors compound the issue of getting limited resources to those vulnerable populations with the highest needs.

We developed a disability-related resource directory to address the high-level of need survivors with disabilities typically experience post-disaster. However, it should be noted that marginalized groups need the same disaster-related resources as needed by all survivors. For example, all disaster survivors require basic resources such as food, clothing, and housing repairs. Thus, we acknowledge the tension between providing services to “the whole community” and focusing on high-need, vulnerable populations. This reality likely extends to creating specialized directories that focus on other specific populations as well, including linguistically diverse survivors, homeless families, and children.

Admittedly, many resources and services needed by survivors with disabilities are resources that all survivors of disaster need. However, the REDDY Directory served to bridge available disability-related resources and disaster-related resources to support individuals with a disability and those who served them following a disaster. The REDDY also served to bridge the disability community to support in the community such as schools, churches, and disaster-related organizations, eg, Catholic Charities and LTRCs.

User interactions with the directory

Several factors affected how users interacted with this disaster resource directory. During the Hurricane Harvey recovery, some disaster case managers came from other states and thus had less familiarity with resources available within the state. Many disaster case managers and emergency responders needed

additional training on the characteristics and needs of individuals with disabilities, in addition to disability-specific resources that were available. As part of another project at our center, we provided training and education on disability- and disaster-related considerations to recovery personnel. Within these training sessions, we included an overview of how to access and navigate the REDDy Directory, as well as types of resources available to populations with disabilities.

Updated resource and service information can facilitate decreased time needed to recover following a disaster. Decreasing the wait time for individuals to connect with resources provides not only instrumental support but also emotional support. Project staff sought out to encourage LTRCs to include people with disabilities and disability organizations to increase knowledge about the resource needs of individuals with disabilities following a disaster. Research shows that there is a lack of collaboration among organizations that support people with disabilities and those who plan for and manage emergencies.¹³ By including representatives of diverse groups in LTRCs, the aim is to shorten the time between the need for a service and the receipt of necessary resources.

Timely creation of disaster resource directories

Rapid creation of this resource directory was facilitated through pre-existing knowledge of organizations that had provided disaster-related resources and services in the past. In the case of our Directory, we built upon knowledge of disability organizations and disaster organizations that had previously provided resources. Other organizations or jurisdictions wishing to quickly establish a disaster-related resource directory can do so by creating a listing of relative organizations before a disaster occurs. The REDDy template is available for use in other states and regions. It is an inexpensive, simple, intuitive template with broad categorical labels to populate and organize resources. The template and a user's guide will be shared upon request.

We propose that a disaster resource directory should be a standard component of every emergency manager's office. Directories should be kept to date regularly so that they are immediately available in

a disaster situation. To do this, organizations and states should consider the amount of time they plan to maintain a disaster resource directory. Timeframes for the use of a directory depend upon the magnitude of the disaster and the expected recovery time. As funding for organizations changes, resources available also change. Therefore, updating a directory bimonthly for 2-4 years post-disaster is recommended to ensure individuals impacted by a natural disaster receive accurate and relevant information regarding the resources and services they require.

Online directories should be made available in an accessible format and, depending on the location of the disaster, in other languages. With lessons learned, future implementations of the Directory include a Spanish version of the Directory and the REDDy Directory handouts. Other implementations that occurred through Project ReDiscovery included teaming up with disaster relief organizations to distribute information to individuals directly, as well as training case managers, VOADs, LTRCs, first responders, and disability and disaster-related organizations on how to use the REDDy Directory.

Finally, dedicated staff and focus are needed toward creating, maintaining, and ensuring the accuracy of a disaster resource directory that spans across organizational structures responding to a disaster. Many VOADs and other organizations have internal databases used to track resources. However, gathering information across these organizations and governmental agencies requires focus and time dedicated to the task. In the case of the REDDy Directory, to make the directory useful in addition to functional, we needed to ensure that individuals, case managers, city officials, disability-related organizations, and disaster-related organizations knew about the Directory. Dissemination of the disaster Directory needed to be purposefully wide-ranging. Providing quick, widespread dissemination of disaster resource directories may decrease the time survivors spend looking for supports.

CONCLUSION

Information about available resources and services is essential to successful recovery efforts

following disasters and other emergencies. However, resource availability fluctuates following a disaster; thus, information about resources also changes rapidly. Populations requiring more intense or unique recovery supports, such as individuals with disabilities, particularly need timely access to information about disaster-related resources. However, disaster resource directories require dedicated personnel and focus to function effectively, and these activities must take place simultaneously while an emergency is unfolding. Emergency managers, case managers, and disaster survivors need resource directories that are accurate and continuously updated. The REDDY Directory is one model designed to rapidly generate and effectively maintain a directory of resources following a large-scale disaster.

LIMITATIONS AND SUGGESTIONS FOR FUTURE EVALUATION

Additional study is needed to further evaluate the REDDY Directory usage during additional disasters by individuals with disabilities, disaster case managers, emergency managers, disability-related organizations, and volunteer organizations active in disaster. Review of usage data in different types of disasters would be beneficial as well, ie, winter storms, pandemics, fires, etc. Furthermore, additional study is needed to gauge user perception of the effectiveness of the Directory in meeting individual recovery needs.

ACKNOWLEDGMENTS

The REDDY Directory was jointly funded by the Association of University Centers on Disability and the Administration on Intellectual and Developmental Disabilities through grants to Dr. Laura M. Stough and Dr. Amy Sharp. Additionally, the CDD at Texas A&M University and the Texas Center on Disability Studies at the University of Texas at Austin additionally provided support. The authors would also like to acknowledge the following Texas A&M University students and staff who made valuable contributions to this project: Tanya Baker, Jonathan Hall, Stephanie Ingram, Megan Kresse, Karina Reyes-Rodriguez, and Arlen Strader.

The collaboration of researchers, website developers and designers, accessibility officers, study participants, staff, and students has been essential to the development of both the DCR and the REDDY Directories. We also acknowledge the valuable contributions of Dr. Nic Wings-Yanez from the University of Texas and Dr. Patricia Lynch from Texas A&M University; their efforts have assisted in supporting further access that individuals with disabilities have to resources and services in the State of Texas.

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