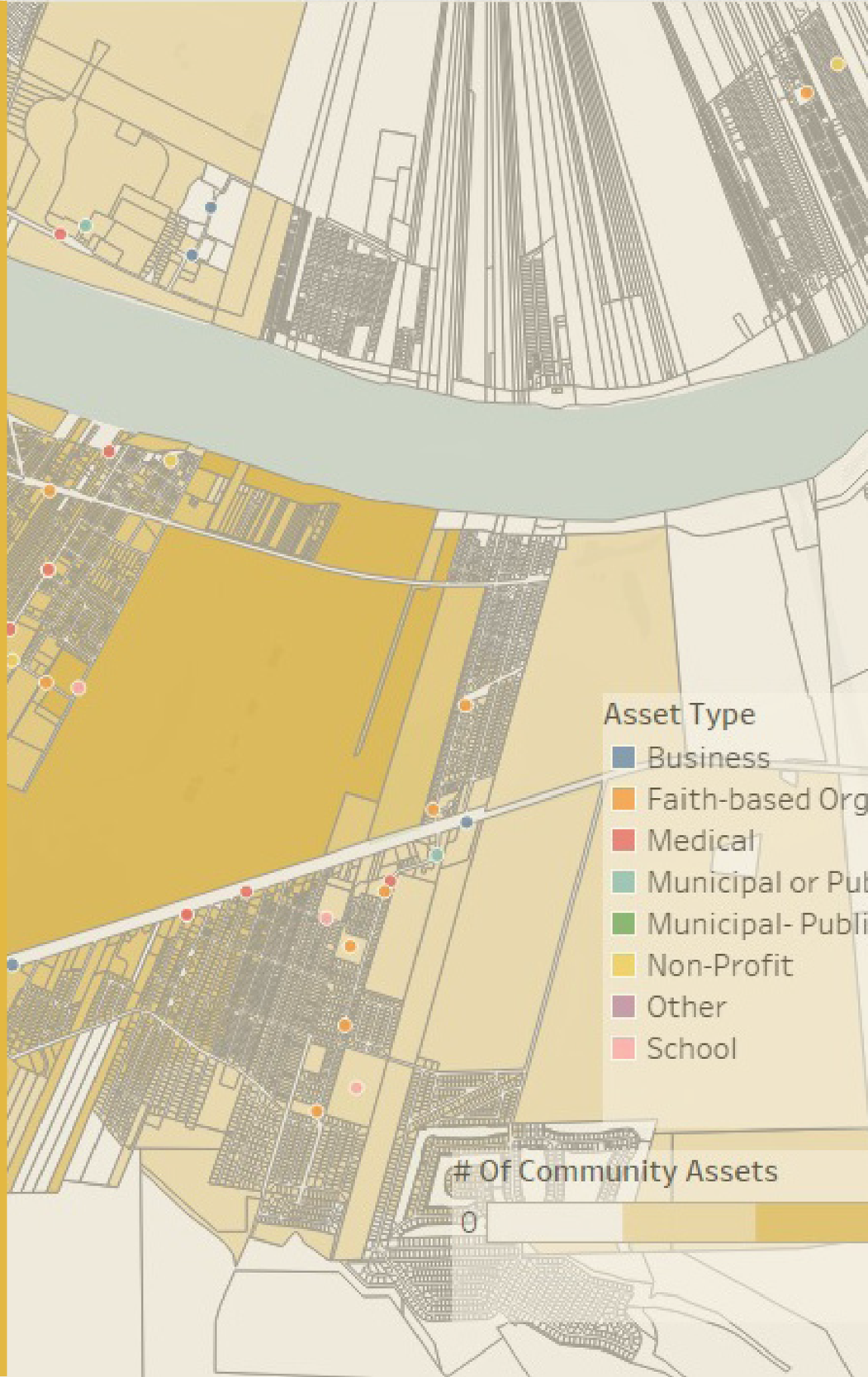
4

working paper series: community assets and networks



Community Assets + Networks for Resiliency

4.1 Introduction

Community networks are the relationships among community members that can result in the provision of support, information, and resources. These networks are established over time, as households are able to remain in place for long periods of time and as community groups or individuals find ways to fill missing needs or resource gaps within a community.

From our research and field visits, we learned that these networks become essential sources of support within the local disaster recovery and preparedness context, especially when the presence of federal aid is no longer available or difficult to access. In addition, geographically and socially vulnerable communities still do not receive the adequate support or aid needed for equitable and resilient recovery. Therefore, as emerging disaster management policy and technology continues to evolve, it is imperative that the consideration of community networks and locally-identified assets are included in disaster planning.

This working paper documents our methods for identifying community assets and networks through outreach and participation strategies, data collection, and visualization techniques. This methodology should serve as a guide for future emergency manager training modules. It also creates a foundation for future research in integrating community asset mapping within emerging machine learning damage assessment models to better support a robust and accurate damage assessment tool for recovery.

To ground our work in the realities of disaster recovery, we used St. Charles Parish, Louisiana as a case study. However, our methods are broadly applicable and replicable for other parts of the United States.

4.2 Community Capacity Building Strategies

How might communities identify community networks before a disaster takes place?

ASSET MAPPING

Asset mapping is the process of documenting key services and resources within a community, such as individuals' skills, organizational resources, physical spaces, sacred spaces, protected environmental systems, and local institutions. Through this process, communities can better understand the landscape of organizations, resources, and leadership present within the region. Together, these assets act as networks of support for households both within and outside of a disaster context.

In addition, identifying the variety and density of assets within a community can help to identify geographically or socially vulnerable communities. Asset maps can inform vulnerability analyses that highlight household barriers to efficiently prepare for and recover from a disaster. When the process itself is designed to allow for local community participation, asset mapping can strategically include community leaders who are often left out of the disaster planning process. This can encourage relationship building between community leaders and municipalities. Therefore, asset mapping should be targeted for emergency management and damage assessment training to ensure that resident engagement is equitable and that the prioritization of resource distribution is reflective of community needs.

To better understand how an asset mapping process can be transferable to disaster management training and processes, our team created an asset map for the St. Charles Parish, Louisiana region. Our methodology was informed by field visit observations of resource network structures within Southeastern Louisiana and asset mapping, survey, and vulnerability assessment strategies developed by emergency management organizations, public health institutions, and local municipalities.

The following provides a roadmap for effective asset mapping for disaster management as well as lessons learned. Municipalities and emergency responders can follow these steps to ensure that local leaders can be identified and contacted for participation in neighborhood-level asset mapping workshops.

Methods

The process of asset mapping a community can help identify community organizations and leaders that provide services to households. These relationships and resources can be called upon to better understand a community's needs and shared priorities. This understanding can contribute to the development of more accurate and local informed vulnerability assessments. In addition, the process of asset mapping identifies social infrastructure and places that are valued within a community. These are places that may offer support to individuals both outside of and within the disaster context. Community assets identified through asset mapping should be targeted for emergency management training and prioritized for resource distribution. Finally, this process can also encourage the identification of vulnerable communities that are often left out of the disaster planning process and with whom municipalities might not yet have strong established relationships.

To prepare for this process, municipalities and emergency responders can follow these steps to ensure that local leaders can be identified and contacted for participation in neighborhood-level asset mapping workshops:

1 Complete a preliminary web-based search of local assets

To gain a general understanding of a community's asset landscape, we completed a preliminary search of organizations and essential services. This search was primarily done by searching terms such as "St. Charles nonprofits," "St. Charles community organizations," and "St. Charles churches." These search terms helped us to narrow down assets that were most likely to provide relief and assistance to residents following a disaster. This process informed the creation of six asset categories:

1. Nonprofit Organizations
2. Faith-based Organizations
3. Healthcare Service Providers
4. Schools
5. Businesses
6. Shelters

It was challenging to group assets into these six categories, as some organizations or service providers did not fall perfectly into one category. In addition, we observed that our own categorization may oversimplify the services provided by an organization and that we may have failed to identify key community assets not apparent in a general web search. Therefore, this process should be used to develop a baseline of present services that can guide the following community outreach and communication strategies.

2 Prepare a baseline survey for local distribution

We first completed a search for disaster-specific and general surveying tools. The FEMA Engaging Faith-based and Community Organizations Survey was identified and used as a template to further adapt and respond to the challenges and needs voiced during our field visit to Southeastern Louisiana. The full version of the survey can be found in the appendix to this document.

The survey was informed by our research within the study of social networks and communication. With these considerations and the St. Charles Parish context in mind we created a survey that can:

- Identify services provided by local organizations or institutions
- Identify an organization's geographic reach
- Ask if an organization already is involved in disaster response or preparedness
- Ask whether they would be interested in getting involved in disaster response or preparedness
- Ask how organizations communicate to their members or community households
- Ask what other organizations, agencies, or institutions an organization currently communicates with

The data collected from this survey can be used to better understand the resources available within a

community, and to further identify organizations who are essential community leaders within complex and hidden community networks and who may not be identifiable during a general web search.

We began preliminary outreach by contacting organizations identified during the initial asset search via email and phone call. The email introduced our project goals and directed respondents to both an online and printable version of the survey to accommodate for respondents' preference. We also called organizations to provide further context for our work before linking organizations to our survey.

After completing this preliminary outreach for survey distribution, our research team quickly learned that it would be very challenging to obtain survey responses from organizations who we had no previous connections to or relationships with. We received very few survey responses and had challenges reaching organizations by phone. This shows that this step can only be done by a team of locally-based leaders who have large reach within each community.

Local municipal officials or emergency managers who are aware of its historic context and have established trust and relationships within a local community are best equipped to utilize this strategy to recruit a diverse and robust group of local leaders and residents for asset mapping workshops.

3 Prepare for Asset Mapping

In order for asset maps to accurately document community assets that are essential to the community and are valued by diverse populations, it is important that recruitment for asset mapping workshops involves identified local leadership who are trusted within a community and who may have a range of connections with other organizations. For example, our field visit informed our understanding of who these leaders are within the Greater New Orleans context. These organizations ranged from local faith-based organizations, public libraries, food banks, and cultural heritage and preservation organizations, to regional nonprofit organizations such as the local affiliate Red Cross and Habitat for Humanity. Emergency managers, city planners, and other municipal departments must ensure that representatives from these organizations are present during asset mapping workshops.

One of the greatest benefits of producing a community asset map is the capacity building that occurs through the process of asset mapping. Specifically, asset mapping workshops can create the opportunity for community and relationship building between municipalities, emergency managers, and both large and small organizations who provide direct linkages to households.

Therefore, asset mapping workshops can take the form of community events that are not only designed to create these asset databases, but also as events to celebrate a community and its collective identity. Settings that welcome organizations to participate and contribute their local knowledge and expertise can create an environment that encourages equitable participation in this data collection process. Furthermore, this participatory process can also inform disaster preparedness and response strategies that respond to barriers or unique population vulnerabilities, such as language, age, ability, rural connectivity, socio-economic status, historic community disinvestment, and cultural differences.

4 Create Asset Map

Using the information collected in the first step, we created an asset map visualization using ArcGIS Pro and Tableau. (These tools were chosen due to their wide availability to planning professionals.) First, assets were mapped as points, then parcel boundaries were introduced. Using the parcel boundaries, a 1.5 mile buffer was calculated around each parcel. This distance was chosen based on accessible distances for households without access to a car. Once buffer distances were calculated, the number of assets that fell within each buffer was calculated, this analysis was performed with the spatial join tool in ArcGIS Pro. Based on the number of assets available to each household (parcel) we are able to identify low resource access and high resource access households. Image 1 shows this analysis visualized for St. Charles Parish.

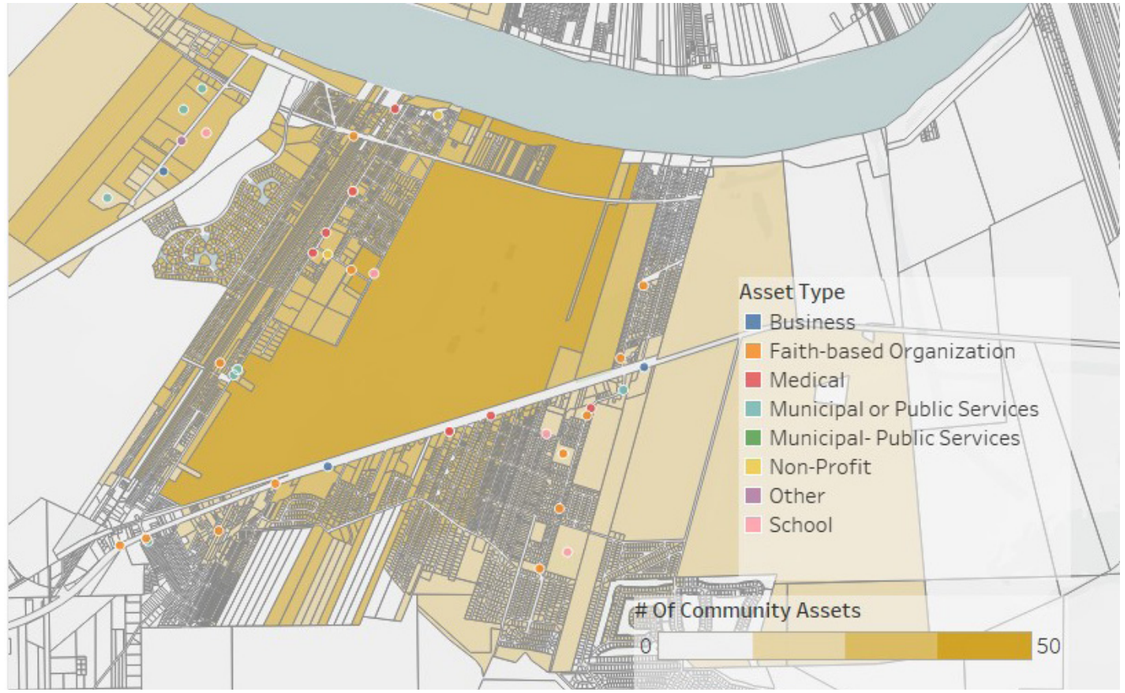


Image 4.1: Map indicating asset accessibility by household. Greater resource density is indicated by dark yellow. Graphic made with ArcGIS Pro and Tableau.

In future iterations of this process, local leaders and municipalities can work in small groups to collectively discuss and identify community assets that can be integrated into a mapping tool for further analysis. Assets can be documented through various techniques, such as providing groups with large-scaled printed maps which participants can use to mark the neighborhoods they serve, specific community spaces that are essential for providing their unique services, and spaces that can be utilized during and immediately after a disaster. These data points can also be collected on digital mapping platforms such as Google Maps if prefered to printed material.

Assets can also be documented through community walking tours that can highlight assets and community needs through first-hand experience. Walking routes can be divided across sections of a community and guided by small local groups. Selected participants can be tasked with documenting highlighted places and dialogue.

Once data has been collected, it can be incorporated into interactive asset maps that can show identified organizations and locations. Ultimately, these asset maps can help visualize the concentration of specific types of resources, where organizations overlap in the services provided, gaps in services offered, and unmet needs within a community. Our research team used Google Maps to perform the preliminary asset search. We also used Google Maps to collect asset addresses and coordinates into a spreadsheet to be later geolocated within ArcGis. This resulted in our own baseline asset map of St. Charles Parish.

4.3 Other Community Analysis Opportunities

Together with community asset mapping, the following processes can help to create a holistic community assessment that can be used by planners and emergency managers to better understand local context and prioritize resources more equitably.

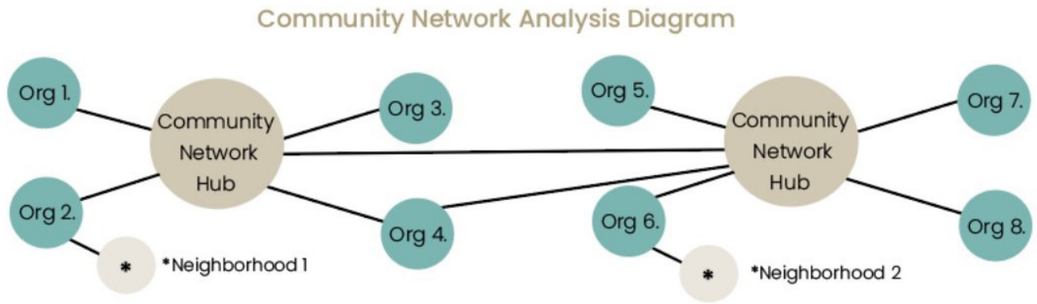


Figure 4.1: Diagram illustrating a network of community assets.

COMMUNITY NETWORK ANALYSIS

Community network analysis is the process of identifying the relationships found within a community and exploring how these relationships can be leveraged to better streamline resource distribution and communication strategies before, during, and after a disaster takes place. Community network analyses can be further expanded to understand how these smaller networks connect to larger networks at the city level, and even larger networks at the regional level. By identifying larger organizations who have many relationships with smaller organizations, emergency managers can create a better picture of resource and communication streams that reach even the smallest of neighborhoods.

During our field visit, communication among organizations was one of the greatest challenges for community organizations who were not fully aware of the resources available or of other organizations participating in similar forms of outreach. Community networks can be generated by identifying community organizations who are able to reach many organizations as community hubs. Networks connecting these community hubs to smaller organizations and to other community hubs can further identify which organizations can be called upon for large-scale emergency communications strategies. Asset mapping and survey distribution similar to the methods described in previous sections can be an initial step towards understanding who communicates with whom both within and outside of the disaster context.

Methods

The following process recommendations should be understood as happening parallel to the asset mapping process. The two processes complement each other and accomplish similar goals.

1 Utilize the baseline survey completed during the asset mapping process

The surveys distributed during the initial asset mapping phase can not only serve the purpose of creating an inclusive and participatory approach to asset mapping, but can also collect data that can be used for the creation of community network analyses and visualizations. Outreach surveys should include questions that can help describe an organization's reach (number of households or organizations served) and connectedness within a community and surrounding region. Questions geared towards understanding methods of communication, frequency of contact among community organizations, and geographic reach can inform how multiple networks can be incorporated into disaster planning and response strategies. Refer to the appendix for the complete survey.

2 Network Visulization

Following the distribution of surveys and collection of survey results, local networks of community organizations can be visualized to better comprehend the complexity of relationships existing in a community. Our team recommends the use of Gephi, a free and open-source network analysis tool, to visualize survey results.

The combination of questions asked in our organizational capacity survey allow us to get an indication not only of an organization's resource capacity and breadth of services offered, but also its connections and relationships with other local, regional, and national organizations. The questions on cross-organization communication are particularly useful for determining network analysis measures such as node centrality and network density. These network measures provide an indication to emergency managers about the importance and impact of a particular organization within a community. This information can be used to prioritize resource distribution to these organizations which can be passed on to smaller organizations and households that they support. This dynamic of organizational relationships is represented in the diagram on the previous page.

ENHANCING THE SOCIAL VULNERABILITY INDEX (SVI)

Asset mapping and community network data can be utilized within social vulnerability analysis through two modes. The first is using the asset mapping process to also identify communities or neighborhoods who are especially vulnerable during expected and unexpected disasters and who are not receiving prioritization during immediate and long term recovery periods. The second mode is using asset maps that have been visualized using GIS mapping tools, such as ArcGIS, to create datasets that can be used to analyze and visualize vulnerable communities.

To identify socially vulnerable communities found within St. Charles Parish, our team connected our asset map of services and organizations to an improved social vulnerability index (rSVI) to compare patterns of vulnerability identified by the rSVI with the community assets identified during the asset mapping process. For more information on vulnerability assessments, refer to rSVI the working paper.

Combining asset mapping, network analysis, and social vulnerability assessments opens opportunities to develop more holistic assessments of communities and their capacity to recover from disasters. In addition, the participatory nature of asset mapping can further contextualize community vulnerabilities through community-informed assessments of needs. This may lead to the development of disaster recovery plans that target specific community needs, rather than those informed by general definitions of vulnerability. This approach enables emergency managers to extend beyond traditional damage based assessments and consider additional social variables that are able to produce more equitable outcomes for communities impacted by disaster.

4.4 Applications for Emerging Technologies

In addition to complementing the processes needed for accurate and equitable community network and vulnerability analyses, opportunities presented by the asset mapping process can also contribute to emerging technologies within the disaster management sector.

For example, machine learning is currently being explored as a tool for more efficient and rapid damage assessment processes. Machine learning can utilize photo captured imagery to train computer software to identify and predict visual patterns. (For more information on emerging planning technologies, see Book 1, Chapter 3 and Book 2 Chapter 2.)

When combined with GIS data, a geographic layer can be added to these predictions. Within the disaster response context, a machine learning model can be trained to identify damage and connect this data to specific neighborhoods. This can inform at rapid speed which areas have been impacted by a disaster at various levels of severity and which areas should be prioritized for disaster aid.

This process, however, can result in emergency response that focuses solely on structural damage imagery which can miscategorize damage severity. This can also remove damage assessment from the surrounding local context that greatly informs household needs. It is this problem of context disconnect that participatory community asset maps and social vulnerability maps can address.

Future research can explore how machine learning models can combine data from image capture, locations, and geolocated social vulnerabilities to make rapid damage assessment and the prioritization of aid distribution as holistic and equitable as possible.

4.5 Conclusions

Our research team has outlined the importance of community analysis within the disaster management context as well as strategies and opportunities for integration within existing and emerging disaster vulnerability and damage assessment tools.

This working paper provides methodology for conducting asset mapping processes that are informed by existing community networks, local assets, and resource gaps. By taking the time to collect this data in a way that complements the importance of community building and capacity analysis, emergency managers and planners can better assess how best to plan for disasters and how best to respond when a disaster takes place.

Although these strategies focus primarily on pre-disaster preparedness, the information and knowledge sharing that occurs through these strategies ultimately informs how a community is able to mobilize disaster plans, communicate with local and regional service providers, and stay resilient during immediate and long term recovery periods. Therefore, funding opportunities at the local, state, and federal level should aim to provide support and training for local disaster response teams, especially those who are responsible for disaster management within geographically or infrastructurally disconnected communities to perform community asset and network analysis and vulnerability assessments.

Finally, as technology continues to evolve within the fields of urban and regional planning and disaster management, it will be important that social determinants of disaster vulnerability and historic context are acknowledged to inform technology-based data assessment methodologies.

Additional Resources:

National Equity Atlas. (2022). Policy Link, USC Equity Research Institute https://nationalequityatlas.org/our-work/community/arts-culture/plan

Healthy City.(2012) A Community Research Lab Toolkit. A Community Research Lab Tool Kit. https://communityscience.com/wp-content/uploads/2021/04/Asset-MappingToolkit.pdf

UCLA Center for Health Policy Research (http://healthpolicy.ucla.edu/programs/health-data/trainings/documents/tw_cba20.pdf)

https://www-tandfonline-com.proxy.lib.umich.edu/doi/

FEMA (2018) Engaging Faith-based and Community Organizations Planning Considerations for Emergency Managers (https://www.fema.gov/sites/default/files/2020-07/engaging-faith-based-and-community-organizations.pdf)

FEMA (2011), A Whole Community Approach to Emergency Management: Principles, Themes, and Pathways For Action. 1-24. (https://www.fema.gov/sites/default/files/2020-07/whole_community_dec2011__2.pdf)

Mitcham, D.; Taylor, M.; Harris, C. Utilizing Social Media for Information Dispersal during Local Disasters: The Communication Hub Framework for Local Emergency Management. Int. J. Environ. Res. Public Health 2021, 18, 10784. https:// doi.org/10.3390/ijerph182010784

APPENDIX

Organizational Capacity Survey

The goal of this survey is to indicate your organization's capacity for responding to disasters and to help determine how the National Disaster Preparedness Center (NDPTC) may best assist you in emergency management efforts. Additionally, this survey will help the NDPTC understand social networks in your community and how your organization works with its partners to best serve your community.

If you have any questions about this survey or how your answers will be used, please contact the University of Michigan researchers at capstonew22@umich.edu.

Organization Information

Name of Organization: _____

Organization Address:_____

Organization Tel. #: (____)_____ **Organization Email**:_____

Web URL: _____

Facebook: Y / N **Twitter:** Y / N, **username:@**_____

What kind of organization are you? (e.g., Faith-Based, Community, etc):

_____

How many people do you serve?:_____ **Number of Permanent Staff:**_____

Does your organization have a Disaster or Emergency Plan in place?: Y / N

Services Provided and Organization Capacities

Which of the following services do you offer on a daily basis?
(check all that apply)

Child Care	☐	Shelter (long term)	☐
Elderly Services	☐	Shelter (temporary)	☐
Disability Services	☐	Case Management	☐
Counseling	☐	Goods/resource distribution	☐
Food Pantry/Kitchen	☐	Community Center	☐
Medical Services	☐	Legal services	☐
Transportation Assistance	☐	Information Sharing and/or Accessibility Services	☐
Other: _____		Other: _____	

Is access to services provided restricted to certain members only?: Y / N

Are services provided during major disasters or emergencies? Y / N
If yes, explain: _____

Does your organization use volunteers?: Y / N
If yes, how many volunteers can your organization support? _____

Facility Capacities

The following questions are intended to assess your community's capacity to respond to a disaster event. Please answer the following questions assuming a major disaster scenario. Answer the questions from the perspective of your organization's response to this scenario.

In the scenario described above, is your facility able to store goods and/or non-perishable items (ex: canned food, water, batteries, household supplies, toiletries)**?** Y / N

Is your facility equipped with a generator or able to generate energy?: Y / N

How many people could your facility shelter in the event of a disaster/emergency?

_____

Does your facility have access to reliable internet connection or able to make phone calls ? Y / N

Communication + Organization Relationships

How does your organization typically communicate with the people or organizations your serve: (check all that apply)

☐ Social Media (facebook, twitter, tiktok, etc)

☐ Email

☐ Phone (including text messaging)

☐ Mail

☐ Other: _____

Does your organization have a communication system (ex: short range radio, automated messaging, sirens) in place for disaster response? Y / N

If yes, what type of system do you have?

_____

Who does your system reach? *(check all that apply)*

☐ Individuals receiving services only

☐ Employees

☐ All residents

☐ Other organizations

☐ Other_____

In the column on the left, list the organizations with whom you communicate the most. On the right, indicate how frequently you communicate with them.

_____	○ Daily ○ Weekly ○ Monthly ○ Yearly
_____	○ Daily ○ Weekly ○ Monthly ○ Yearly

_____	○ Daily ○ Weekly ○ Monthly ○ Yearly
_____	○ Daily ○ Weekly ○ Monthly ○ Yearly
_____	○ Daily ○ Weekly ○ Monthly ○ Yearly
_____	○ Daily ○ Weekly ○ Monthly ○ Yearly

On the left, list the organizations that have the greatest impact on your service mission. On the right indicate on a scale of 1 to 5, 1 being not at all impactful and 5 being extremely impactful, how impactful are these partnerships to providing your services?

_____	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
_____	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
_____	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
_____	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
_____	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
_____	○ 1 ○ 2 ○ 3 ○ 4 ○ 5

During a disaster, how frequently do you communicate with the following groups/individuals about disaster preparedness, response, and recovery?

Local/municipal emergency managers	○Daily ○Weekly ○Monthly ○Quarterly ○Never
FEMA	○Daily ○Weekly ○Monthly ○Quarterly ○Never
Local Non-profits/community organizations	○Daily ○Weekly ○Monthly ○Quarterly ○ Never
National Non-profits (i.e. Red Cross)	○Daily ○Weekly ○Monthly ○Quarterly ○ Never
Local or county health departments	○Daily ○Weekly ○Monthly ○Quarterly ○Never
Insurance Company representatives	○Daily ○Weekly ○Monthly ○Quarterly ○Never
Other: _____	○Daily ○Weekly ○Monthly ○Quarterly ○Never

Contact Information

Please provide contact information should we need to follow-up about your responses to this survey.

Name:_____ **Email:** _____

Phone number:

RISING ABOVE THE DELUGE

COMMUNITY ASSETS AND NETWORKS FOR RESILIENCY

about this project

This project is a joint effort by students and faculty within the Master of Urban and Regional Planning program at the University of Michigan and the National Disaster Preparedness Training Center (NDPTC) as a Capstone project for the Winter 2022 semester.

A key focus of the University of Michigan team is to work in a manner that promotes the values of equity, uplifting local voices, transparency and honesty. As a result, the outcomes of this capstone aim to speak to both our collaborators at the NDPTC and the local communities impacted by disasters across the United States. Our responsibilities as researchers will also include the implementation and/or recommendation of innovative solutions to issues surrounding machine learning, damage assessments, prioritization determinations, and social infrastructure networks.

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