

Building Back Better: Understanding How Health Considerations are Incorporated into Local
Post-Disaster Recovery Implementation

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Abstract

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Using Hurricane Harvey as a case study, this study examines the extent to which communities are aiming to build resilience during the disaster recovery process. We conducted key informant interviews with local health departments (LHDs) and one Office of Emergency Management to determine if and how their communities are incorporating public health considerations into the visioning, planning, implementation, and assessment phases of disaster recovery. Utilizing a combined inductive and deductive approach, we coded and thematically analyzed interview notes and/or transcripts. We found that communities are continuing to miss opportunities to “build back better” and to build resilience through disaster recovery. LHDs would benefit from additional resources, support, and technical assistance designed to facilitate working across sectors and building resilience during recovery.

INTRODUCTION

In 2017, the United States was plagued by a historic number of billion-dollar disasters. These events exacted sizeable impacts on life and property—across all 16 disasters with damages that exceeded one billion dollars, the cost was more than \$300 billion and the disasters claimed 362 lives.¹ Unfortunately, certain types of extreme weather events are only expected to increase in frequency and intensity in the future.^{2,3} Aside from the impacts of increased natural hazard activity in the areas where they occur, it is possible that these events will also impact areas that are not directly affected via future migration out of disaster-prone regions. This migration will pose additional strains onto the areas where disaster refugees settle.⁴

Building Resilience. Given these harsh realities, it is imperative that we strengthen the ability of our communities to minimize the impacts of and cope with future disasters—that is, we must build resilience. While various definitions for community resilience exist, Chandra et al. developed the following definition in the context of national health security: “Community resilience entails the ongoing and developing capacity of the community to account for its vulnerabilities and develop capabilities that aid that community in 1) preventing, withstanding, and mitigating the stress of a health incident; 2) recovering in a way that restores the community to a state of self-sufficiency and at least the same level of health and social functioning after a health incident; and 3) using knowledge from a past response to strengthen the community’s ability to withstand the next health incident.”⁵ Resilience necessitates that communities work together to build robust physical infrastructures, socioeconomic characteristics, population health, education, and natural environments that offer protection during and after disasters.⁶

Fortunately, in recent years, federal agencies have increasingly recognized the importance of community resilience; some have incorporated it into their disaster-related frameworks and grants.⁷ For example, Federal Emergency Management Agency (FEMA) states in the “purpose” section of its National Disaster Recovery Framework that it aims to reduce vulnerabilities and build resilience through recovery.⁸ The Centers for Disease Control and Prevention (CDC) includes community resilience as one of six domains for their Preparedness Capabilities, and the first strategic objective of the National Health Security Strategy is to “build and sustain healthy, resilient communities”.^{9, 10}

Despite abounding frameworks for resilience and the apparent federal support for resilience, prescribing an approach for building resilience has proved to be challenging.¹¹ To address this challenge, Chandra et al. developed eight levers designed to assist communities in building resilience. The levers—and a brief description for each—are:

- 1) Wellness: promote pre-and post-incident population health, including behavioral health;
- 2) Access: ensure access to high-quality health, behavioral health, and social services;
- 3) Education: ensure ongoing information to the public about preparedness, risks, and resources before, during, and after a disaster;
- 4) Engagement: promote participatory decision-making in planning, response, and recovery activities;
- 5) Self-sufficiency: enable and support individuals and communities to assume responsibility for their preparedness;
- 6) Partnership: develop strong partnerships within and between government and nongovernmental organizations;
- 7) Quality: collect, analyze and utilize data on building community resilience; and
- 8) Efficiency: leverage resources for multiple uses and maximum effectiveness.

Resilience and Disaster Recovery. In addition to improving communities’ abilities to withstand and mitigate disasters, these levers provide communities with benefits every day. By targeting actions that can promote everyday population health and resilience, Chandra et al. present levers that can be applied to both pre- and post-disaster contexts.⁵ As recovery experts have noted, disaster recovery yields an opportune time to build resilience due to the influx of

resources into a community post-disaster and the unique chance to invest in and rebuild society for the long-term—to “build back better”.^{12, 13} Although these characteristics of the recovery process position it as a natural candidate for resilience building, barriers exist to doing so. Chief among these barriers is conflict between the desire to reflexively return to pre-disaster conditions and the desire to rebuild in a way that is attentive to equity and health.^{14, 15} This creates a tension between “snapback (essentially restoration of the past) and redevelopment that addresses future needs and vision.”¹⁴ During recovery from previous disasters, communities have largely attempted to build resilience by adopting infrastructure-centric approaches rather than those that focus on people, equity, and addressing the levers of resilience described above.¹² Furthermore, the disaster recovery process is subject to time compression wherein—in some cases, depending on the disaster—an entire community must be redeveloped and rebuilt, services must be restored, and livelihoods must be returned.¹⁶ Time constraints present a significant challenge for building back better, as the process of community development is complex even under ideal circumstances. These barriers constitute significant missed opportunities for building back communities in ways that are more conducive to resilience—ones we can no longer afford to forego with anticipated increases in disaster frequency and intensity.

Fortunately, frameworks have been developed to assist communities in overcoming these barriers and exploiting the natural synergies between the recovery process and building community resilience. One such framework was put forth by the Institute of Medicine (now the National Academy of Medicine (NAM)) in their 2015 report entitled, *Healthy, Resilient, and Sustainable Communities After Disasters* (hereafter, “the NAM report”). The NAM report offers cross-sectoral and sector-specific recommendations on how to build resilience. The report: describes the recovery planning process as similar to the steady state community strategic

planning process; recommends implementing a process for recovery planning similar to that utilized in strategic planning; provides examples of how communities have built resilience through recovery; and calls for research to identify the facilitators and barriers to building resilience during recovery and develop tools to evaluate the impacts recovery activities may have on health. The report also provides a framework for integrating resilience into recovery planning that consists of four phases: developing a vision of a healthy community to guide recovery planning and efforts; utilizing assessments to inform recovery planning; planning for recovery; and implementing the recovery process.¹²

During the visioning phase, the community should engage community stakeholders via a broad-based, inclusive process to develop a vision of a healthy community that can be incorporated into disaster-related planning and implementation. This vision should aim to bolster community health, resilience, and sustainability, and to reduce health inequities. The assessment portion of the strategic planning process should provide insight into the community's current and desired status in terms of health, hazard vulnerability, and other resilience-related factors. The results of these assessments should be shared widely across community stakeholders and should inform disaster recovery priorities, plans, and activities. During the planning phase, various sectors and community stakeholders should work together to incorporate health considerations into planning activities. This approach necessitates that actors from the public health sector participate meaningfully in recovery planning efforts and are able to articulate to other sectors the possible health impacts of recovery decisions and activities. Finally, during the recovery implementation phase, community stakeholders and actors employ a collaborative approach to recovery that is anchored in the vision of a healthy community and promotes the sharing of resources, information, and data. Recovery activities implemented during this phase aim to

improve long-term health and build resilience, and an assessment of implementation informs subsequent recovery activities and decisions. The report holds that after the visioning phase, the assessment, planning, and implementation activities occur in a continuous feedback loop or learning cycle, informing each other and allowing for process improvement and reflection.¹²

Beyond the aforementioned elements, another major component of the NAM report is its recommendation to implement a Health in All Policies (HiAP) approach to recovery. The National Association of County and City Health Officials (NACCHO) describes HiAP as “a change in the systems that determine how decisions are made and implemented by local, state, and federal governments to ensure that policy decisions have neutral or beneficial impacts on health determinants. HiAP emphasizes the need to collaborate across sectors and break down “silos” to achieve common health goals. It is an innovative approach to the processes through which policies, plans, and programs are created and implemented but does not require that health be at the center of every policy, plan, or program.”¹⁷ HiAP has been promulgated by researchers and practitioners alike as a tool for addressing social determinants of health and promoting health equity through decision-making.¹⁸ By strategically applying a HiAP approach during each of the four phases outlined in the NAM report—visioning, assessment, planning, and implementation—communities can build back in ways that build resilience.¹² NACCHO describes local health departments (LHDs) as “natural leaders to implement HiAP at the local level,” and the report similarly recommends that LHDs take the lead in many of the resilience-building recovery activities due to the natural connection between building resilience and their mission of promoting population health.^{12, 17} Thus, we have focused the study at hand on assessing LHDs’ resilience-building efforts after Hurricane Harvey.

Hurricane Harvey. Hurricane Harvey pummeled Southeast Texas from August 25-31, 2017.¹⁹ Making landfall as a category 4 hurricane, Harvey pelted the areas in its path with rainfall of between 4.62 and 56 inches, resulting in a cumulative 33 trillion gallons of water.^{20, 21} Approximately 90 percent of the river forecast points in the affected area reached flood stage, with nearly half of the river forecast points breaking records.²⁰ Harvey displaced more than 30,000 people and wreaked havoc on more than 200,000 homes and businesses, with an estimated cost of \$125 billion—a price tag second only to Hurricane Katrina’s \$161 billion.²² In light of these devastating impacts, Hurricane Harvey presents a timely opportunity to test for operationalization of the NAM report’s recommendations. By exploring the extent to which entities participating in recovery efforts have incorporated health considerations, information, and data into rebuilding Southeast Texas, we can gain a better understanding of the challenges and lessons learned associated with building resilience through recovery, and can better identify the supports and actionable strategies from which LHDs could benefit as they aim to build resilience in their communities.

METHODS

Through semi-structured interviews, the study team elicited information from respondents regarding their recovery planning and implementation processes and activities, as well as their organizations’ roles in recovery. The research team developed the interview guide through an iterative process that involved review and refinement by seven public health practitioners and academics, including those from the University of Washington, the University of Texas School of Public Health, NACCHO, and the Texas Department of State Health Services (DSHS). The interview guide was informed by the NAM report and intended to address the core

elements of the recovery strategic planning framework presented in the report. The University of Washington Institutional Review Board determined the study to be exempt on November 3, 2017.

RECRUITMENT

The study team first identified all of the counties eligible for individual assistance as part of FEMA's Texas Hurricane Harvey Disaster Declaration (DR-4332). Then, we cross-referenced the list of counties with the DSHS list of local public health agencies and identified the counties that did not have a local public health agency according to the DSHS website. For the counties with local health agencies, we performed online searches to obtain contact information for the public health officials listed on the DSHS website. DSHS then reviewed the list to resolve discrepancies between DSHS websites and to provide any contact information that the research team was unable to locate. Finally, we contacted the 26 agencies that remained after these steps. We emailed individuals for whom an email address was available and contacted the other individuals via telephone. In some cases, the county public health officials directed us to other individuals (e.g., preparedness coordinators) to participate in the study. These individuals are described in Table 1. Follow-up was conducted via the same method as the initial contact. The study team received oral consent from all participants prior to beginning the interviews.

DATA COLLECTION

The interviews were mixed mode—in-person and via telephone—with the mode depending on interviewee availability and fieldwork logistics. In-person interviews occurred at the respondent's LHD and at the DSHS office. We audio recorded all but one of the interviews

and the recorded interviews were transcribed verbatim. One interviewee declined to be recorded, so the research team utilized the detailed typed notes taken during the interview in lieu of a transcription. Interviews were conducted in December 2017 and January 2018.

DATA ANALYSIS

We utilized a combined inductive and deductive approach to conduct a thematic analysis of the data. First, we developed *a priori* codes based on the research question and the NAM report framework underpinning the study. Next, we reviewed all of the transcripts, noting additional themes that warranted inclusion as codes. After this step, we drafted a preliminary codebook. We then conducted consensus-building activities wherein two research team members coded one transcript, discussed and adjudicated the results, and refined the codebook accordingly. Finally, one research team member coded the remaining interviews in NVivo for Mac v11.4.3 (QSR International, Australia) and summarized themes across respondents. The level of analysis for this study was the agency rather than the individual interviewee. Throughout this paper, “respondent” refers to the responding agency.

RESULTS

The research team conducted semi-structured interviews with 17 respondents from 10 different organizations—nine LHDs and one Office of Emergency Management—for this study. Of the 26 agencies that were contacted, 10 agreed to participate in an interview. In Table 1, we describe the respondents and their job titles.

Table 1. Number of Respondents by Position

Number of Respondents	Positions
5	Health Department Director

4	Public Health Emergency Preparedness Coordinator
1	Deputy Health Authority
1	Special Assistant to the Health Department Director
1	Emergency Management Coordinator
1	Epidemiologist
1	Public Health Nurse
1	Staff Analyst
1	Communications Staff
1	Purchasing/Finance Staff

In this section, we highlight key themes that emerged during thematic analysis of the interview transcripts and notes. The results are divided into the following sections: recovery visioning and goals; planning; LHD role in recovery; interdisciplinary collaboration; response and short-term recovery implementation; intermediate and long-term recovery implementation; assessments; and challenges and lessons learned.

RECOVERY VISIONING AND GOALS

The NAM report notes that recovery should be “viewed as an opportunity to advance a shared vision of a healthier, more resilient, and sustainable community.”¹² In order to advance this shared vision, a shared vision first must be developed and accepted by the health department, the larger community, and decision-makers. Ideally, the community then utilizes this goal to guide the recovery process, serving as the driving force underpinning the decisions and actions taken to achieve the goal.

Our findings suggest that the visioning phase of recovery is largely absent from the Harvey recovery process. Rather than striving to create a healthy community, respondents most frequently described the chief objective of their recovery processes as returning their community to normal. Respondents noted that recovery discussions revolved around “getting back to normal,” “trying to stabilize” the community, and “restoring [infrastructure] to pre-disaster

condition”. When asked to describe successful recovery in their community, one respondent said “coming back into what we call a steady state.”

In general, respondents described undertaking more reactive—rather than proactive—approaches to recovery. Respondents’ recovery processes focused on providing resources and addressing community needs as they were identified, rather than setting overarching community recovery goals and acting to achieve them. Even in cases when respondents anticipated community needs as opposed to reacting to them, their efforts largely focused on hardening critical infrastructure or preventing future short-term health impacts from the storm, rather than aiming to improve long-term community health. For example, two respondents mentioned taking steps to prevent the flu and mold-related health impacts resulting from Harvey.

While the majority of respondents employed reactive approaches to recovery, it is encouraging that one community described attempting to build resilience from future disasters through their recovery efforts. This respondent noted that the goal of their community’s long-term recovery group “is to not only address the needs of this particular disaster, but also, in some way, shape, or form, be able to look at future disasters, and see, at least, if we can put some things in place that might be beneficial.” By adopting a long-term, resilience-based perspective, this community aims to improve its ability to withstand and recover from future disasters.

PLANNING

During the interviews, respondents described the plans and planning processes they utilized for the recovery process. These plans and processes involved both pre-event planning and post-event planning, which we describe separately below.

Pre-Event Planning. All respondents described engaging in some form of pre-event planning. The planning activities respondents cited most commonly were emergency preparedness exercises, drills, and trainings. Most of these activities focused on components of the response and short-term recovery, such as testing the emergency alert system, trainings on Incident Command System (ICS) and National Incident Management System (NIMS), shelter plan drills, and mass vaccination trainings. In addition to exercises, drills, and trainings, respondents also reported engaging in other planning efforts—such as developing written plans or participating in less formalized planning efforts—which also largely focused on response and short-term recovery. These activities included:

- developing plans for: points of distribution, mass care, evacuation for individuals with functional and access needs, mass vaccination, shelter operations, ICS operations, severe weather, and post-event disease surveillance;
- establishing contracts with debris removal services;
- vaccinating responders pre-event; and
- identifying individuals with functional and access needs for evacuation purposes.

Only a couple of respondents described developing plans that focused on intermediate and long-term recovery. As one respondent remarked, “I don't know how much the plan has been set up to guide the recovery effort, because it's really a response plan. It's what are you doing in those immediate 24 hours to a week, 2 weeks out after the event? So it's really sort of that response phase. And that's kind of where the plan begins and ends.”

Most respondents noted that grant funds enabled and/or required them to engage in these pre-event planning activities (e.g., CDC funding for the Public Health Emergency Preparedness (PHEP) cooperative agreement and Cities Readiness Initiative (CRI), hazard mitigation grants), and several noted having a staff member at the LHD whose role was to lead planning efforts. However, respondents did not report leveraging these grants to develop recovery-specific plans.

Post-Event Planning. Only half of the respondents reported having a formalized structure or group responsible for post-event recovery planning. These structures included long-term recovery groups and collaboratives—typically consisting of subgroups around basic needs, case management, public health, mental health, volunteer management, and repair and rebuild—as well as a “virtual ICS” structure and an interdisciplinary group of county agencies convened by the county judge.

The half of respondents without formalized structures for making recovery-related decisions reported simply responding to community needs as they were identified. Several of these respondents noted that their Commissioners’ Courts and/or county judges were responsible for allocating resources towards recovery efforts but did not describe any intentional planning activities undertaken by these entities.

The respondents that reported having formalized structures for post-disaster recovery planning described a more coordinated approach to recovery than those without formalized structures. While most of these respondents reported engaging partners in their recovery decision-making processes, sharing resources across partner organizations, and undertaking a more whole-community approach to recovery, in some cases, their post-event planning processes were fragmented. For instance, respondents reported having long-term recovery groups with different subcommittees, but did not always indicate whether or how these subcommittees looked to exploit natural synergies across their work. While one respondent noted that the intent of their recovery group was to minimize duplication of recovery activities, another described that decisions were typically made “on the fly” and said that partners typically “report out” during meetings rather than have true influence over the direction of each other’s work. Notably, one health department was able to utilize recovery-related technical assistance and recommendations

provided by a national philanthropic organization with recovery experience in planning and structuring their recovery activities.

Additionally, despite these formal recovery planning structures, none of the respondents reported developing written plans post-event to guide recovery or utilizing previously developed, community-wide plans—such as community health assessments, community health improvement plans, or community-level strategic plans—to guide their communities’ recovery efforts. Instead, recovery planning was driven largely by community needs articulated by a variety of sources, including elected officials, social service professionals working in the community, community members themselves, or experiences with previous disasters. As one respondent said, “there's no set plan for it, there's not, but we've been around long enough and operating in disasters here in the county, we kind of know based on the intelligence or information that we're getting from the community, what's the priority.”

LHD ROLE IN RECOVERY

According to the NAM report, the public health sector has a large role in building resilience through recovery. The NAM report designates public health as the lead entity for a host of priority activities and lists public health as primary and/or supporting actor for the priority activities for many other sectors. For example, LHDs may inform community redevelopment planning and provide data and information to other sectors to ensure they consider long-term health impacts of their decisions and actions. These activities are contingent on public health’s meaningful engagement in recovery planning and decision-making. To this end, during the interviews, we asked LHD respondents to describe the role of the health

department in the recovery process, as well as the extent to which the recovery process prioritizes other areas over public health.

The majority of LHD respondents reported being involved in their communities' recovery decision-making processes to some extent. Several LHD respondents provided recommendations and input to facilitate decision-making, such as decisions around aerial mosquito spraying and lifting boil water advisories. Several others reported influencing the direction of recovery in other ways. For instance, one health department helped develop the community's long-term recovery group and sits on the group's executive committee. From that position, the LHD is able to influence the direction of recovery, including subgroups in which the LHD does not participate directly. Other LHDs said that their local government looks to them to make decisions, and that they convey their community's most pressing needs directly to state representatives and request resources. Some LHDs reported assuming leading roles in whole-community recovery efforts, such as leading Neighborhood Restoration Centers and other recovery activities.

While most respondents reported having a "seat at the table", the extent to which their participation was meaningful and influential varied. One respondent remarked that despite the LHD's involvement in decision-making bodies, they struggle to gain support for their positions, having to "consistently remind them that the decisions need to be driven by a citizen's need and really empirical data, and not so much of political fallout, and who's controlling the purse strings." Several health departments' participation in the recovery decision-making processes consisted mainly of participating in health-specific decision-making processes and bodies, thus limiting their impact on community-wide changes beyond the health sector. Additionally, some health departments' involvement focused on updating other stakeholders on their recovery

activities and processes rather than providing feedback or recommendations to impact the direction of recovery.

Nearly half of the respondents reported that public health is only important in certain circumstances, such as outbreaks and other specific emergencies; one respondent described public health as “an afterthought”, while another stated public health is “an outside entity because it never was a part of anything to begin with”. The majority of respondents also mentioned that their county judge plays a significant role in decision-making for their jurisdiction, with respondents describing the judge as the “tsar of the county,” and the individual who “runs everything.” As one respondent stated, “when the judge wants to do something, it’s a lot easier.” Respondents indicated that judges issue disaster declarations, are kept apprised of all response and recovery activities, set the dollar amount for food vouchers, and determine which county agencies will participate in decision-making processes and meetings.

The research team also asked respondents to describe areas that were prioritized over public health. The areas respondents most commonly reported as taking precedence over public health included: basic needs, such as housing, social services, and displacement; police and fire; emergency management; public works; engineering; and politics. One respondent simply stated that public health is “not at the top of the list.”

INTERDISCIPLINARY COLLABORATION

In Table 2, we list the key types of partners with which respondents reported collaborating. This collaboration included working together on elements of response and recovery implementation and planning, as well as on other activities.

Table 2. Key Collaborators and Activities

Partner Organization(s)	Activities
Emergency management	response planning, including shelter plan drills; response implementation, including coordinating mass vaccination clinic; communicating with the public; creating long-term recovery group
Other local government agencies (e.g., law enforcement, mosquito control, Roads and Bridges, county mental health agencies, environmental health, flood agencies, social services, purchasing)	response planning, including developing and sharing list of individuals with functional/access needs and evacuation planning; response implementation, including triaging patients; hotwashes and after-action reviews; recovery planning; recovery implementation, including vector control, providing mental health support to community members, disseminating mental health-related messages, providing data to inform public health recovery purchasing, identifying community needs; resource allocation
Local decision makers (e.g., judge, Commissioner's Court, elected officials)	providing resources; response planning; response implementation; recovery planning and decision-making, including around vector control; recovery implementation; identifying community needs
State and federal partners	response implementation, including evacuation; resource allocation; discussing recovery-related challenges; conducting hotwashes and after-action workshops; sharing information
Schools and academic institutions	response planning, including identifying individuals with functional and access needs; response implementation, including mass vaccination clinics; assessment, including assisting with cot-to-cot surveys in shelters
Community Recovery Group (comprised of private sector, local nonprofits, governmental entities, faith-based organizations, schools, and other entities)	identifying community needs; recovery planning, including attempts to minimize recovery activity duplication; sharing information and resources; hosting community meetings; recovery implementation, including mental health counseling; assessment, including home assessments
Foundations, nonprofits, community-based organizations, and non-governmental organizations (e.g., American Red Cross,	response implementation, including shelter operations; serving as fiduciary agent for recovery group; providing recovery funding; recovery planning, including coordinating recovery collaborative group; recovery implementation, including mold remediation, mold education and outreach, alerting the community of contractor fraud, hosting a pop-up shop for basic needs, case management, providing mental health services, provides home cleanout kits and improvement tools;

United Way, Medical Reserve Corps, legal aid organizations, workforce development programs)	conducting Community Assessment for Public Health Emergency Response (CASPER)
Health care partners (e.g., nursing homes, dialysis centers, hospitals; health care coalitions)	response planning, including assessing health care system readiness and ensuring health care facilities remain open during the disaster; response implementation, including evacuation; providing funding for health-related supplies and equipment

RESPONSE AND SHORT-TERM RECOVERY IMPLEMENTATION

Although we reminded respondents at the outset of the interview—and during the interview, as needed—that the interview was intended to focus on intermediate and long-term recovery, respondents consistently conflated response/short-term recovery and intermediate/long-term recovery. In this section, we describe the response/short-term recovery activities respondents described conducting.

The most commonly reported response/short-term recovery activities undertaken by LHDs included shelter operations and surveillance, as well as administering vaccines to responders and/or community members. Several respondents also reported that health department staff: assisted with evacuation and rescue efforts; connected community members with resources; disseminated alerts and other information about response and short-term recovery activities to the public; and coordinated Strategic National Stockpile and points of distribution materials and logistics. A couple of respondents described managing medical volunteers, including dispatching the Medical Reserve Corps to conduct assessments and coordinating and verifying the credentials of out-of-state health care professionals. Additional activities, reported by only one respondent each included:

- coordinating contracts with debris removal services;
- monitoring employee mental health during the event;
- performing essential public health services in the shelter;
- housing employees from other governmental agencies in the LHD; and
- helping triage patients to the area hospital.

INTERMEDIATE AND LONG-TERM RECOVERY IMPLEMENTATION

In this section, we describe the intermediate and long-term recovery implementation activities reported by respondents. First, we describe the extent to which respondents described utilizing recovery as an opportunity to meet preexisting goals and mitigating health issues through recovery. Then, we turn to descriptions of the recovery activities by sector.

Meeting Preexisting Goals and Mitigating Health Issues. Despite the NAM report's lofty goals of communities utilizing recovery to meet preexisting goals, we found minimal evidence of this through our interviews. Only one respondent reported tying recovery activities to their health department's strategic plan objectives, noting that in tandem with recovery efforts, they were encouraging healthy habits, attempting to address behavioral health issues, and promoting other population health initiatives. However, while the health department aligned its strategic plan to its recovery activities, this connection appeared to be largely internal. They did not describe connecting the community-level strategic plan to their recovery activities and did not mention involving partners or other stakeholders in achieving these goals.

Additionally, the majority of respondents did not describe any actions being undertaken—either by the LHD or by partner organizations—to mitigate their community's extant health issues through recovery. The only example of a community potentially mitigating health issues through recovery was through updating building codes to improve the community's housing. As Hurricane Harvey exposed substandard housing in the respondent's community,

they indicated that their county’s decision-makers (e.g., county judges, Commissioners Courts, elected officials) were debating whether to adopt and enforce stricter building codes to ensure homes are rebuilt to a higher standard.

Public Health and Health Care. Respondents described the public health- and health care-related recovery activities their communities were undertaking. Public health and health care activities focused on restoring and delivering essential public health and health care services.

The most commonly described intermediate and long-term recovery activity related to these areas—reported by over half of the respondents—was health and safety inspections (e.g., at restaurants, schools, and foster homes). Several respondents described their efforts to restore potable water and sanitation, including testing water samples, providing input on when to lift their community’s boil water advisory, restoring sanitation services, ensuring wastewater systems were operational and not overflowing, and checking septic systems. Several respondents also reported that community-based organizations were providing health services to residents, including services targeted to low-income individuals, older adults, and the “medically vulnerable”.

Additionally, several respondents reported conducting vector control, disease surveillance, and outbreak investigations, and administering flu and tetanus vaccines. A couple of respondents reported that their communities provided animal control services—including repatriating animals and tracking strays—and helped with medication assistance. Other public health and health care recovery activities included:

- conducting public information campaigns about the flu;
- coordination of non-governmental organizations to provide health care to at-risk populations;
- restoring LHD business operations;

- having a public and behavioral health group of the long-term recovery group;
- communicating with the public about family planning; and
- deploying mobile clinics to the community to distribute health information.

Mental Health. Only half of the respondents described recovery activities focused on mental and behavioral health. However, the majority of the respondents who described recovery activities related to mental health described mental health as a high priority issue in their recovery efforts—both for the community and for their organization’s employees. For example, one LHD conveyed to the state health commissioner that mental health case management was their community’s most pressing issue, noting that they “wanted to make sure that we weren't putting [mental health] on the back-burner...you can't have a healthy recovery unless you're focused on [mental health].” A couple of respondents acknowledged that mental health is part of holistic recovery, and several noted that their communities had specific groups dedicated to providing mental health services during recovery. Despite this commitment to addressing mental health issues through recovery, several respondents expressed doubts about the success of their mental health programming, citing a lack of resources allocated for mental health services and cultural stigmas associated with seeking mental health services as the rationale for these doubts.

Social Services. Respondents also described the social services being provided by their communities during recovery. The most commonly reported social service offered—reported by half of respondents—was case management. Respondents reported that their communities were offering case management, referring individuals to other services identified by case managers, and connecting people to case managers through their basic needs hotline. A couple of respondents identified case management as one of the subgroups of their long-term recovery groups, while another respondent said there were multiple private organizations offering case management. The organizations providing case management services included these private

organizations, FEMA, the county’s Social Services Department, and other community-based organizations.

Following case management, the next most commonly identified recovery social service was food assistance, described by several respondents. This included the Disaster Special Nutrition Assistance Program (D-SNAP) and other food vouchers. A couple of respondents also described working with Special Nutrition Assistance Programs for Women, Infants, and Children (WIC) to provide baby formula, diapers, and other supplies for young children and their families.

Other social services described by only one participant included:

- establishing an “adopt-a-family” program in which families, community-, and faith-based organizations agreed to provide basic needs for a family;
- community education and outreach describing the social services available;
- a pop-up shop for community members to secure furniture and clothing;
- providing transportation for residents to medical appointments, grocery stores, and other services;
- transitioning individuals into long-term care facilities;
- providing legal assistance; and
- providing workforce development opportunities.

Housing. Although several respondents described residents being displaced as a result of the storm, only a couple of respondents expressed concerns about affordable housing post-Harvey, and there were few mentions of communities making long-term plans to address affordable and healthy housing. One respondent identified ensuring affordable housing and keeping displaced communities together as key goals of their recovery efforts, and another indicated that their community was providing short-term rental assistance for residents. The most commonly reported recovery activity related to housing—reported by nearly all respondents—was providing the community with information, outreach, or supplies to assist with mold remediation. This information and education focused on the adverse health effects of mold exposure and safe mold cleanup instructions, and LHDs either worked with partners to

disseminate mold kits or provided mold kits and cleanup supplies themselves. One health department reported connecting community members to mold remediation services, while another noted that one of their partner organizations trained volunteers to assist with mold remediation. Additionally, one health department said their long-term recovery group was mucking and gutting homes.

Half of the respondents also reported that their communities were working to renovate or repair homes, but none of them described the rebuilding process as having the ultimate goal of increasing resident access to goods or services, increasing the number of structures utilizing green designs, or building social connectedness as described in the NAM report. Rebuilding activities reported centered on rebuilding to the previous state rather than utilizing recovery as an opportunity to influence community redevelopment.

ASSESSMENTS

The NAM report recommends that communities assess their community's health status both before and after a disaster. Communities should integrate community health assessments, hazard identification assessments, and risk assessments into recovery planning by utilizing the data from these assessments to inform the community's recovery goals. After a disaster, a community should continuously conduct impact assessments to identify the damage wrought by the disaster, as well as to identify community health needs and monitor recovery. In this section, we describe the assessments reported by respondents.

Pre-Disaster Assessments. There was only one instance of a health department conducting a pre-disaster community health assessment for the purpose of collecting baseline

data. This LHD reported conducting a Community Assessment for Public Health Emergency Response (CASPER) both pre-event and post-event.

Post-Disaster Assessments. The most common mechanism for assessing the community's status post-disaster was through the collection of anecdotal and informal information about community needs. These informal assessments were reported by more than half of the respondents. Mechanisms for collecting this information included:

- residents contacting the emergency management office, phone bank, or hotline directly to articulate their needs and get connected to resources;
- the LHD collecting information on community needs while conducting Harvey outreach efforts;
- elected officials conveying community needs to the entities conducting recovery activities;
- the LHD identifying needs based on anecdotal information provided by the social services organizations working with the community; or
- the LHD collecting observational data on housing conditions in the community (e.g., the number of individuals living in tents, the number of tarps being utilized as roofs).

Nearly half the respondents reported conducting or relying on data gathered through formalized needs assessments, including conducting a post-Harvey CASPER or other needs assessment or relying on CASPER data collected after a previous disaster. However, respondents did not describe conducting follow-up formalized assessments to identify ongoing community needs or to evaluate their recovery efforts. Several respondents also indicated that their recovery monitoring processes included surveillance of health outcomes that could be related to Harvey, such as respiratory illnesses related to mold exposure, suicides, and infectious diseases. One respondent reported conducting epidemiological investigations in permanent shelters to detect and monitor illness.

Additionally, several respondents reported that they or their partner organizations conducted damage assessments (e.g., assessments other than those conducted to assess community health needs directly). This included: FEMA assessors examining the damage and

reporting to the county the number of homes affected; academic institutions utilizing drones to observe flooding and damage patterns; epidemiological teams “eyeballing” structural damage; the flood administrator identifying damaged homes; and the LHD monitoring hospital repairs and Harvey’s effects on the level of care being provided at the hospitals. Finally, a few respondents reported tracking recovery progress through their structured recovery groups and partners. For instance, two respondents described “report-out” meetings with their partners in which partners described their progress. Another respondent described utilizing the American Red Cross’s Coordinated Assistance Network to track client information and needs across partner organizations.

CHALLENGES AND LESSONS LEARNED

In this section, we detail the challenges and lessons learned respondents described during their interviews.

Resources and Capacity. Nearly all respondents encountered resource-related difficulties. Most commonly, respondents described an overall lack of resources. For example, one respondent described a “watering down of support services that typically will be in place for an adequate amount of time” due to the need to dedicate resources to hurricane response and recovery in Florida and Puerto Rico. These resources included lack of physical resources—such as long-term and functional/access needs shelters—as well as inadequate staff and responder capacity, including having evacuation and rescue teams that were “maximized, stressed out” and a lack of mental health professionals, health inspectors, health care professionals, and staff to conduct shelter surveillance. As such, respondents described learning lessons around the types of

resources they wished they had on hand to aid response and recovery, such as functional and access needs shelters, high water vehicles, and mental health professionals.

Respondents cited small tax bases, the chronic under-funding of public health, and lack of volunteers and resources as undermining their abilities to carry out all of their recovery activities. Half of the respondents described delays in receiving resources, including vaccination clinic supplies, D-SNAP, water, generators, and debris removal services. Respondents identified opportunities for addressing this challenge, including streamlining the processes for requesting resources, developing a guide that describes where and how to procure various resources, and identifying which partner organizations will be able to furnish resources, staff, and services in the event of a disaster.

Respondents also described difficulties procuring medications for their populations, a lack of financial resources for mental health activities, a lack of volunteers, and difficulty identifying funding sources. A couple of respondents described difficulties coordinating resources, and one said that their community needs donations and volunteer coordinators to help address this challenge.

Communication. Nearly all respondents described communication challenges—both with partners and with the public—and identified lessons learned related to the challenges they described.

Partners—Health Care. Several respondents cited a lack of communication with their health care partners as the cause of health care facility closures during Harvey. This included dialysis centers, pharmacies, and other facilities. As a result of these closings, several respondents identified a need to: strengthen their relationships with their health care partners prior to the disaster; more clearly delineate roles and responsibilities with health care facilities;

improve communication; and develop agreements and plans that ensure that these facilities do not close during future disasters.

Partners—Non-Health Care. Respondents also described a lack of longstanding relationships with partners due to staff turnover both at partner organizations and at the LHD. Additionally, a couple of respondents reported that their roles and responsibilities, as well as those of their partners, were not clearly defined prior to the disaster. As one respondent noted, “there was kind of a disconnect between the actual shelter plan of record and what the services that [partner organization] provided in the shelter.” As such, respondents described the need for improved and more frequent discussion with partners to outline the roles, responsibilities, and expectations of partner organizations and health departments alike. Similarly, respondents highlighted the need for better communication with partners around the resources to be provided by each organization, and the need for other agencies to become more familiar with ICS structure and terminology.

The Public. Respondents described difficulties communicating effectively with the public before and after Harvey. Several respondents indicated it was difficult to assess community needs and/or to communicate the resources available for addressing these needs. In particular, one respondent described their lack of alternative communication strategies to reach community members without access to the Internet or cell phones, noting, “no matter how hard we try not everybody is going to call us. Not everybody is going to reach us...we need to find a way to be able to get the word out to our citizens more quickly and more effectively, and to use more methods and not just simply rely on—not everybody has the Internet. So not everybody can get to Facebook. Not everybody has a phone or a cell phone. So we've got to find other ways to be able to get the word out.”

A couple of respondents characterized their community outreach as lacking. Two respondents noted that they should have better prepared the community on maintaining access to their medications, while others identified the need for better public education around: drowning and water safety; mold remediation; transitioning to life after leaving the shelters; public health's role, resources, and services; and functioning without cell phones. A couple of respondents also highlighted the need to improve outreach and communication to specific segments of the population, namely, individuals with functional and access needs, cultural and ethnic minorities, and those with limited English proficiency.

Planning. A majority of respondents also reported insufficient response and recovery planning and identified potential improvements for their planning processes. Respondents described lacking plans for recovery, as well as for specific elements of their response—such as shelter operations, drive through mass vaccination clinics, addressing functional and access needs, and medical waste disposal. Additionally, nearly half of the respondents emphasized the importance of maintaining flexibility when planning for and responding to disasters. Respondents cautioned against becoming too comfortable in responding to specific disasters, as the need to alter plans and staffing could arise depending on the disaster's characteristics. Respondents also described the need to conduct the following activities prior to a disaster: develop a plan for a centralized volunteer check-in center; streamline response decision-making processes; identify individuals with functional and access needs; develop supply checklists and identify resources; plan to shelter medical staff close to recovery centers; and establish processes for credentialing providers. One respondent described being too reliant on “on the fly” messaging and activities due to their lack of a written recovery plan.

Lessons Learned from Prior Disasters. Most respondents described applying lessons learned from prior disasters to their Harvey response and recovery. One respondent noted that their experiences with Hurricane Katrina led them to understand that after big disasters, “communities are never the same...your normal is over with when you're hit with a storm like this.” Several respondents indicated that they had made improvements in their response and recovery capabilities, such as: repairing infrastructure quickly; stockpiling mold remediation supplies; and improving emergency operations center (EOC) functioning and public notification and supply management systems. Prior disasters also helped respondents shape their response and recovery priorities, such as increasing their focus on mental health, quickly restoring drinking water and sanitation, offering an adopt-a-family program, and keeping communities together during rebuilding. One respondent noted that they developed their long-term recovery group as a result of a prior disaster, while another indicated that seeing the success of the Neighborhood Restoration Centers utilized in previous disasters influenced their decision to implement the model in their jurisdiction. Finally, one respondent said that their experience with prior disasters demonstrated that they excelled at response but needed to improve their recovery processes.

Processes for Learning Lessons. Respondents’ communities employed a host of strategies to identify lessons learned from Harvey. The most frequent process for identifying lessons learned was conducting an after-action review or hotwash with partner organizations. A couple of respondents described conducting reviews of their plans and updating them with lessons learned. Respondents also described: reviewing flood data to improve their evacuation plans; asking residents to provide feedback on the government’s performance; and speaking with other states to identify lessons learned.

DISCUSSION

The findings from this study provide valuable insight on the extent to which cross-sectoral and interdisciplinary disaster recovery has been attentive to health, wellbeing, and resilience promotion. The study illuminates barriers and facilitators to leveraging recovery resources to build healthy, sustainable, and resilient communities. Results can inform strategies used by emergency and community planners and responders to better coordinate a cross-sectoral, community-wide disaster recovery that is forward thinking and that enhances community resilience in the long-term.

While the field of long-term recovery has robust conceptual models, high-level documents, as well as academics and thought leaders calling on communities to build back better, this research is not translating to practice.^{11,12,13} Public health practitioners need accessible tools, resources, and technical assistance designed to facilitate the role of LHDs as leaders in long-term recovery and champions of HiAP and building back better. LHDs must collaborate across sectors to develop visions and plans that seek to build long-term health and resilience, they must implement these plans, and they must assess the impact of recovery activities and their progress in meeting their goals and building resilience. Tools, strategies, and assistance that could support LHDs in these endeavors should be developed and widely disseminated.

Despite the NAM report's emphasis on the importance of adopting a vision of a healthy, resilient community to guide recovery efforts, the LHDs we interviewed reported inadequate visioning.¹² Respondents implemented reactive recovery strategies focused on returning the community to "normal" and failed to pursue activities designed to meet preexisting goals,

mitigate health issues, or build resilience through recovery. LHDs also generally responded to community needs as they became aware of them.

While the recovery process should be responsive to and informed by community needs, the approach of allowing short-term needs to guide recovery priorities minimizes the ability to implement a coordinated, HiAP approach due to its reactive nature. Without concrete recovery goals that focus on addressing the determinants of long-term health, it is unlikely that communities will have the coordinated approach and community-wide buy-in necessary to build resilience long-term. It is essential that LHDs and their partners have pre-identified priorities and that their recovery activities are not driven exclusively by political or public pressures to return to pre-disaster condition.^{12,16} Disaster recovery is challenging due to the limited resources and need to rebuild the infrastructural, economic, and social fabric of communities in the wake of a devastating event. Naturally, community members' immediate needs can dominate the recovery conversation and direction. While public health certainly has a role in addressing these immediate needs, these needs should not eclipse long-term community health needs and goals that have been developed for the community previously (e.g., those identified through comprehensive or strategic planning processes).^{12,13} The NAM report recommends that LHDs leverage products developed as part of their public health accreditation efforts—such as community health assessments or community health improvement plans—to prioritize and plan long-term recovery efforts.¹² For example, communities might prioritize the restoration or addition of a new grocery store to areas that were previously designated as food deserts, might adopt and enforce stricture building codes in areas with substandard housing, or might add green space to an area that was previously identified as having low levels of physical activity.¹² However, this approach necessitates that LHDs have the capacity and resources to develop non-

disaster specific documents. Unfortunately, this is not always the case, as NACCHO's 2016 National Profile of LHDs found that LHD staff capacity and the average per capita revenue LHDs receive from local, state, and clinical sources have declined since 2008.²³ With limited resources and staff, LHDs need better support to develop the aforementioned documents, and strategies must be developed to assist LHDs in utilizing the priorities and goals outlined in these documents to derive a healthy community vision that can guide recovery.

Our research also suggests that disaster training and planning neglects intermediate and long-term recovery, and instead emphasizes the response and short-term recovery phases of disaster management. A carefully considered plan developed in conjunction with community partners can help minimize a community's reflex to focus on immediate and short-term needs. Recovery planning tools exist, such as FEMA's *Pre-Disaster Recovery Planning Guide for Local Governments* and the American Planning Association's *Planning for Post-Disaster Recovery and Reconstruction* and *Planning for Post-Disaster Recovery: Next Generation*.^{24, 25, 26} However, based on our findings, we believe that LHDs are not necessarily aware of these tools and may not have the resources or time to apply them. We recommend that efforts to increase awareness of extant tools be undertaken, and that communities with robust recovery plans developed through interdisciplinary, collaborative efforts share their plans and strategies for inclusive planning broadly. Brief planning documents or templates derived from extant recovery planning guidance documents could help distill these documents into more digestible formats, and trainings on the planning guidance and strategies could also be developed to assist LHDs in developing recovery plans.

Beyond developing written plans, the LHDs with which we spoke largely lacked mechanisms for conducting long-term recovery planning. While we observed some successful

examples of long-term recovery planning processes—such as those involving long-term recovery groups—some respondents reported disjointed recovery processes characterized by a hodgepodge of resources and groups, and others indicated the subgroups of these recovery planning structures largely worked in silos. Furthermore, while some respondents reported being “at the table” for recovery-related decision-making, it is possible that some LHDs were not invited to participate in community-wide long-term recovery planning efforts and were thus unaware of community recovery efforts from which they were excluded. LHDs need tools to help them advocate for their inclusion and meaningful participation in these groups and demonstrate their value in an environment with so many competing interests. In particular, these tools should be designed to help LHDs convince elected officials and other community decision makers that their expertise in population health and work with vulnerable populations can help build resilience and better prepare the community to withstand and recover from future disasters. LHDs must also be made aware of successful examples of interdisciplinary recovery structures designed to facilitate a HiAP approach, minimize the duplication of recovery efforts, and combine resources for a community-wide, synergistic effect focused on long-term resilience building. Promising structures for enacting these strategies include long-term recovery groups, such as those reported by respondents, and health care coalitions that interface with actors outside of the health sector. For example, one respondent from our study noted that in addition to serving on the health-related subgroup of their long-term recovery group, they were involved in the development of the long-term recovery group and have a role on the group’s executive committee. This role on the executive committee enables the LHD to influence the priorities and direction of their community’s recovery efforts.

Successful long-term recovery that is attentive to resilience requires a collaborative, interdisciplinary approach to recovery planning.¹² However, respondents described the challenges they experienced working with partners, including those in the health care sector. If public health is struggling to partner with traditional partners such as health care, it is possible that LHDs are missing opportunities to collaborate with nontraditional partners (e.g., transportation, housing) that have substantial impacts on the social determinants of health. As such, it is imperative that LHDs begin working across sectors pre-disaster to identify partners and build the strong relationships and trust necessary for a successful collaborative recovery. Strategies to identify essential recovery partners and to build and strengthen cross-sectoral relationships would be beneficial, and tools to assist LHDs in demonstrating their value and securing wide-ranging and inclusive community stakeholder representation on long-term recovery groups would also serve communities well. In addition to long-term recovery groups, health care coalitions are extant structures that can serve as vehicles for organizing and facilitating interdisciplinary collaboration during recovery, as these coalitions are skilled in and charged with collaborative decision-making and planning, resource-pooling and coordination, and information-sharing.^{27, 28} Additionally, health care coalitions have an interest in building community resilience and are thus natural candidates to promote a whole-community, systems approach to recovery.^{28, 29} LHDs should leverage existing health care coalitions as mechanisms for applying a HiAP approach to recovery.

We also observed that LHDs frequently conflated response and recovery, and their recovery implementation activities focused on response and short-term recovery rather than intermediate and long-term recovery. This conflation limits LHDs' abilities to understand their role in recovery and the impact that their agency could have on their community's long-term

health and resilience. LHDs would benefit from better education for their agencies and their partners on the types of activities that they should be undertaking beyond the response phase. Additionally, recovery trainings should be developed and LHDs should be encouraged to integrate recovery scenarios into their preparedness trainings and exercises.

Our findings indicate that LHDs are not conducting or utilizing data from assessments in the way envisioned by the NAM report (i.e., to monitor recovery progress and evaluate the impact and effectiveness of recovery strategies on community health and well-being).¹² We observed recovery processes that were not data-driven—most LHDs relied on data collected through informal mechanisms to inform recovery goals and did not report monitoring recovery progress or evaluating recovery decisions. LHDs rarely utilized previously collected data on their community’s health status to inform recovery decisions. The use of data from a previously conducted assessment was only reported by one LHD. Moreover, the LHDs that conducted health needs assessments failed to conduct follow-up assessments, making it difficult to monitor progress and evaluate their performance. This lack of follow-up assessment also impedes the identification of needs that emerge later in the recovery process—such as those related to mental health—thus focusing recovery efforts on immediate and short-term needs. This lack of data-driven recovery may be closely tied to the resource and staff capacity challenges reported by nearly all respondents. There is a potential for LHDs to leverage their epidemiology divisions or collaborate with academic partners, as these entities possess the methodological expertise and understanding of baseline community health conditions to facilitate the collection, analysis, and monitoring of baseline and recovery-related community health data. LHDs would also benefit from additional technical assistance and tools designed to build these data collection and analysis capacities among staff and divisions without formal epidemiology training.

Additional research is necessary to assess the extent to which LHDs are building back better in the wake of different types of hazards and disasters. As Hurricane Harvey was primarily a flooding event, future research should examine whether wind events, wildfires, tornados, and other types of disasters are more or less likely to prompt communities to build back better. Similarly, future research should look outside of Texas for examples of building back better, as the Texas public health structure is unique and might yield different implications for building back better. For example, in Texas, the county judges serve as gatekeepers and have the authority to determine recovery resources and activities within their jurisdictions. LHDs in states with less concentrated political power at the county level may have a different role and influence in their community's long-term recovery planning and implementation. Finally, the design of this study did not enable us to gather a comprehensive picture of the recovery efforts underway in each community. The agencies we interviewed are one actor in their community, and as a result, our understanding of post-Harvey recovery in these communities is the result of a single agency's perspective. Additional research should be conducted with individuals outside of the health sector to assess the extent to which health considerations are reflected in communities' recovery goals or activities.

LIMITATIONS

While we attempted to minimize as many limitations as possible through our study design, in this section we describe the limitations that we were unable to address. First and foremost, the findings from this study are contextual insights from a qualitative case study conducted in Southeast Texas and should be interpreted as such. While they are not generalizable to Texas as a whole, to other states or regions, or to communities that have experienced other

types of disasters, the insights we gleaned can be applied in other communities and hold important implications for policy and research. Second, we conducted the interviews approximately three months post-Harvey, at a time when recovery was still ongoing in some communities. As such, we were unable to capture the breadth and depth of all of the long-term recovery efforts for the communities we interviewed, and the ability of respondents to discuss lessons learned from the recovery period as a whole was limited. Finally, in many cases, we only interviewed one individual from each agency, meaning that the findings are not necessarily a comprehensive reflective of the agency's perceptions or of their recovery planning or implementation activities as a whole. It is possible that discussions with other staff at the same agencies would have yielded different insights about the recovery process.

CONCLUSION

The opportunity to build back better through disaster recovery has been well described. However, the findings from this study suggest that LHDs currently lack the resources, strategies, tools, and other supports necessitated by a HiAP approach to recovery. Without these supports, it is likely that our communities will continue to miss opportunities to build back better and improve our ability to mitigate and cope with future disasters. This study indicates that LHDs would benefit from technical assistance, support, and resources designed to facilitate their ability to work across sectors and incorporate public health considerations into disaster recovery planning and implementation.

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APPENDIX A: KEY INFORMANT INTERVIEW GUIDE

1. Can you please describe your role at the health department?
 - a. How long have you been in your current role?
 - b. How long have you been at the health department?
 - c. What are your responsibilities related to disasters preparedness, response or recovery?
 - d. Is there anyone else that is knowledgeable about disaster recovery at the health department that you think we should also talk to?
2. Can you please describe the population your health department/authority is responsible for?
3. Can you give us a sense of the scale and damage that Harvey caused in your county?
 - a. How extensive was this damage?
PROMPT: Structural damage? Flooding? Loss of power? Loss of other utilities (water-sewer-gas)? Road blockage preventing access to help, services, shelter, etc.?
4. Has your health department/authority or county used any plans or frameworks developed prior to Harvey to inform your Harvey-related recovery efforts?
PROMPT: recovery framework, community health improvement plan, comprehensive emergency management plan, recovery framework plan, community-wide strategic plan?
 - a. Are there other plans or resources that you wish you had on hand to help guide recovery?

- b. Was public health incorporated into the overall goals or objectives of the recovery planning process? If so, how?

PROMPT: does your recovery plan strive to build a healthy community?

We will now discuss your ongoing Harvey recovery process.

5. Can you tell us if and how your county is using disaster recovery planning and implementation to create a healthy community?

PRMOPT: prioritization of restoring public health services; transportation agency including a grocery store or behavioral health clinic on a public transportation route that has been modified to accommodate displaced populations or inaccessible areas; increasing access to parks or sidewalks to promote physical activity

- a. If yes, how?
- b. If no, why not?

The next couple of questions relate to the extent public health considerations are reflected in the goals and objectives of your county's recovery process.

6. Are public health considerations reflected in the goals and objectives for your county's recovery process? If so, how? If not, what are the goals and objectives for your county's recovery process?
 - a. Did your health authority/department contribute in developing overarching goals or objectives for the recovery process?

I'll now ask about your health department's (or authority's) involvement in the post-disaster recovery process.

7. Is your health department/authority involved in a health-specific or interdisciplinary planning committee? Please describe.

- a. Did this group come together after Harvey, or was it a previously established planning group?
 - b. If health-specific: how often does this group interface with other sectors to discuss recovery?
 - c. How have partnerships changed, if at all, since Hurricane Harvey?
8. Are you aware of any recovery planning meetings, groups, or processes that the health department/authority is not included in? Please describe.

PROMPT: disaster recovery teams or advisory groups

- a. For each group/process: Are representatives from other health organizations, such as hospitals, are a part of those meetings, groups, or processes?
 - b. Are you aware of any ways that public health considerations are being considered by these disaster recovery teams? Please describe.
9. Since Hurricane Harvey, what types of activities have been undertaken/led by the health sector, including public health and health care, to help the county recover?
10. Are there any recovery activities that are being led by non-health sectors that might have public health impacts?

PROMPT: transportation planning, determining which green spaces to restore, determining which fire departments or other community resources to prioritize reopening, determining which grocery stores to re-open.

- a. Have you had the opportunity to inform these efforts being led by non-health sectors or to provide them with guidance, information, or input about how those activities might impact public health?
 - i. If yes, how?

- ii. If no, why not?
 - iii. What would make the process easier?
 - b. How do non-health sectors take actions to protect or improve public health in their recovery priorities and decisions?
- 11. What resources are available to for these health-promoting disaster recovery activities?

PROMPT: Restate disaster recovery activities the informant described in Q10

- a. Are they adequate?
- 12. Are other topics or areas that are being prioritized over public health? Why?
- 13. Are there committees or groups of stakeholders that oversee the implementation of your county's recovery process?
 - a. Which of these groups were in place prior to Harvey?
 - b. Are these groups authorized to make major recovery-related decisions? If yes, please describe parameters of authority.
 - c. What is the make-up of these groups? Which sectors are represented (i.e., health, non-health)?
 - i. Are these the same people that serve on the interdisciplinary planning committee you described before?
 - ii. How effective would you say implementation oversight groups are in integrating public health objectives into recovery decisions and processes? Please describe.
- 14. From your perspective at the health department/authority, what would successful "community recovery" look like in your county?
 - a. How are you measuring it?

- b. Are you monitoring it over time?
15. Have you learned anything from your recovery experience that could facilitate incorporating public health considerations into recovery from future disasters?
16. Is there any other information you would like to provide?

We're offering a copy of Eric Klinenberg's book, Heat Wave to interviewees. Would you like a copy of the book? And if so, what address can we send it to?