

Resilience in the Aftermath of The Gulf Of Mexico Oil Spill: An Academic-Community Partnership to Improve Health Education, Social Support, Access to Care, and Disaster Preparedness

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ABSTRACT 299522:

The Gulf of Mexico oil spill affords a unique opportunity to examine resilience from a transdisciplinary, systems perspective. In 2011, the National Research Council (NRC) in its publication “Building Community Disaster Resilience through Private-Public Collaboration” recommended research that results in quantitative risk and outcome markers, projects which strengthen community resilience, and to document best practices. Although the ecological impacts of oil spills are widely studied, the full picture displaying the impact on population health is a lesser-explored area. Disasters, both natural and technological, can result in both short-term and long-term stressors. Tulane University Transdisciplinary Research Consortium for Gulf Resilience on Women’s Health (GROWH) and the Gulf Region Health Outreach Program (GRHOP) community engagement and community health navigation projects are examples of evidence-based interventions using trained community health workers (CHWs) to address NRCs recommendations by 1) assessing adherence to prenatal care and postpartum and infant health outcomes, 2) building bridges between health systems and communities – working to improve the relevance, acceptability, and accessibility of health services, 3) increasing access to occupational and environmental health specialists, and 4) improving the ability of Gulf Coast communities to withstand and recover from a disaster.

GROWH is an NIH-funded research consortium examining adverse reproductive outcomes post-oil spill. Pregnant women have been identified as one of the most vulnerable subpopulations in the aftermath of the oil spill. An intervention study within GROWH targets first-time underserved pregnant women to determine the effectiveness of integrating mobile technology-enabled CHWs as a resilience strategy to collect field-based health data, facilitate health education messaging, blast disaster text messaging alerts and reminders, and conduct person-to-person communication. GRHOP, a Deepwater Horizon Medical Benefits Class Action legal settlement supported effort (Deepwater Horizon Court-Supervised Settlement Program, 2013), is an evidence-based, sustainable community resilience program. GRHOP targets vulnerable communities living in a 17 county/parish region across Louisiana, Mississippi, Alabama, and Florida and deploys a public health systems approach to strengthen core disaster preparedness, response, and recovery capabilities by focusing on primary care, environmental health and behavioral health. A leading Environmental Health Capacity and Literacy Program within the GRHOP portfolio focuses on establishing a regional environmental medicine specialty network, supplementing health professions education, and creating a cadre of trained CHWs functioning as environmental health navigators.

The GROWH and GRHOP projects demonstrate that connecting participants with trusted community health navigators decreases susceptibility to poor health outcomes and improves access and utilization of community assets.

INTRODUCTION:

Communities living on our country's Gulf Coast have faced decades of interdependent challenges directly affecting their individual health and that of their communities: limited preparedness against disasters and the impact of those disasters on physical and mental health well-being; persistent health disparities specifically related to chronic health conditions such as cancer and asthma in addition to birth outcomes such as preterm birth and low birth weight; and historical environmental contamination exacerbated by the aftermath of disasters- both natural and technological including the 2010 Gulf Of Mexico oil spill . While progress has been made in documenting those challenges, the solutions to date have employed narrow, "silo-driven" research designs, lacked a community-based participatory approach, and failed to produce sustainable ecological, system-driven solutions to mitigate impacts on vulnerable members of coastal communities.

Failure to identify and proactively address community concerns can profoundly influence the response and recovery from technological disasters. Collaborative, sustainable interventions such as disaster response actions require upfront and thorough engagement of both ecosystem- and health partners. For example, while significant progress in disaster preparedness has been made both nationally and on the Gulf Coast, gaps in community collaboration *pre-event* hamper community engagement and ultimately successful response *post-event*. Locally, such concerns often span both health and ecosystem issues and can range from access to care to diminished revenues of seafood markets. Community-Academic partnerships play an important role as transdisciplinary conveners, anchors of sustainable problem solving, and informed and trusted risk communicators. This paper describes how community-academic partnerships engage DWH-affected communities in the development, implementation and evaluation of research and public health interventions.

The strength in collaborating with community members within University settings can be made greater when they work as part of an academic team in defined roles (i.e. community advisory board members, community health navigators, and community engagement coordinators) in each step of the program design process. Post Hurricanes Katrina and Rita, community engagement became a prerequisite for collaborative success as exemplified by the Head Off Environmental Health Asthma in Louisiana study. (Chulada et al., 2012)

The Transdisciplinary Research Consortium for Gulf Resilience on Women's Health (GROWH) and the Gulf Region Health Outreach Program (GRHOP) Environmental Health Capacity and Literacy Project adhere more closely to the principles of *community-based*, rather than *community-placed* participatory research (CBPR) and patient navigation. (Goldstein, Osofsky, & Lichtveld, 2011)

The GROWH Consortium is supported through a grant awarded by the National Institutes of Health (NIH) National Institute of Environmental Health Sciences (NIEHS). NIEHS developed the request for proposals in partnership with other NIH Centers and Institutes in response to the Deep Water Horizon (DWH) disaster. Examining population risk was a key priority for people living along the Gulf Coast; however, at the time not all community-based organizations had the research and public health program implementation capacity to become fully engaged. Realizing the needs of communities to be more strongly embedded into research programs, NIEHS purposefully built in a Community Outreach and Dissemination Core in its Consortium structure. Conform the principles of CBPR, the GROWH consortium used an upstream approach to inform its research design around three community health concerns: the health of babies born in the aftermath of the oil spill, seafood safety, and air pollution. Therefore, the unique hallmark of the GROWH consortium is that the deliberate focus on pregnant women and women of reproductive age is supported both by science (IOM 2010) and community concerns.

GRHOP, created through a court-administered Settlement, addresses the persistent tension between science and service. While research is designed to facilitate scientific inquiry and through a CBPR approach addresses community health concerns, the provision of services is typically excluded from the scope work. GRHOP fills that void through evidence-based capacity building. The GRHOP Environmental Health Capacity and Literacy Project is illustrative of this overarching goal advancing environmental health literacy of communities and their health providers while embedding CHWs in the most vulnerable parishes and counties.

METHODS:

Community engagement

Community engagement has become a common feature of federal and foundation-funded public health research globally, specifically as it plays an important role in CBPR. The GROWH and GRHOP projects utilize the community advisory board (CAB) model as a mechanism for engagement in scientific research, implementation science, and program evaluation. Although a proven mechanism for some to engage communities early and foster a more substantial partnership, the CAB model has been widely criticized for its limitations to entrust its members with substantial power to influence the research agenda. (Quinn, 2004) The GROWH and GRHOP CAB model represents a collaborative approach that equitably involves all partners in

the design process – from defining the research theme to shaping the outreach and research translation and dissemination components, recognizing the unique strengths that each member brings. (Norris et al., 2007)

Adding more depth to community engagement and to streamline the availability of public health expertise to stakeholders across regions where environmental hazards have created public health risks, the Crescent Region Collaborative (CRC) Coalition was developed. The CRC Coalition is informed by the CAB and led by a community advocate who has been working with Southeast Louisiana communities for over a decade. The Coalition is a safe-place for community-based organizations, community members, and CHWs to join in monthly conversation and link resources to address a specific community concern.

The Coalition expanded its scope by adopting the Collaborative Problem-Solving Model which creates a “one-stop-shop” for both research and communities from diverse disciplines and interest to target assets on a specific, complex issue (Lasker & Weiss 2003). The CAB and CRC Coalition work synergistically to facilitate research partnerships, identify vulnerabilities, and deploy community capital to improve health and wellness. [Figure 1]. The establishment of an inclusive process has been vital to CRC’s progress in developing long-term, sustainable, partnerships, innovative evaluation tools and techniques, and a community-centered coalition for technical support.

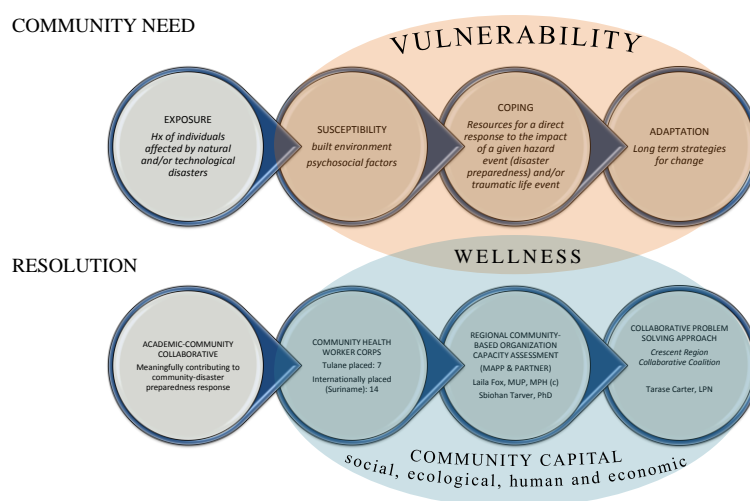


FIGURE 1 . Leveraging community-academic partnerships to strengthen Gulf Coast environmental health

CHW and patient navigation model in an academic setting

To further boost the community engagement portfolio, a CHW Corps was established in 2011 to further support GROWH’s Community Outreach and Dissemination Core and the CBPR research project titled, *Building Community Resilience through Disaster Mobile Health*. The CHW Corps was later expanded through GRHOP to provide training and placement opportunities across the Gulf Coast states of Louisiana, Mississippi, Alabama, and Florida.

CHW Training

The vulnerability of location along the Gulf Coast poses a significant challenge to the region's capacity to eliminate health disparities and draft a sustainable community-based workforce. Although there remains a paucity of published research exploring how the training of CHWs embedded into academic research strengthens public health interventions and affects

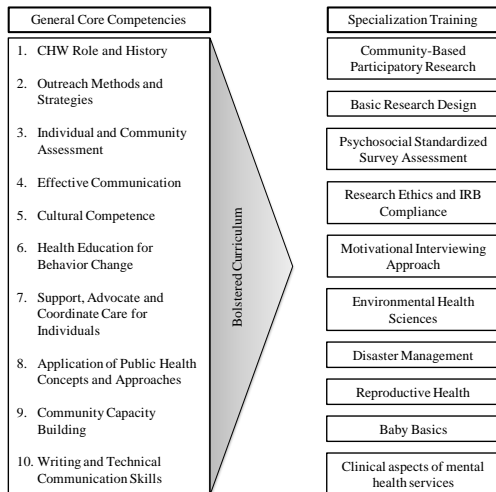


FIGURE 2 – Holistic training approach to addressing environmental stressors on reproductive health

health outcomes, there is an abundance of literature expressing the need for a national set of core competencies. Realizing that unclear role definitions could compromise the quality of participant interactions, provision of services, and data collection resulting in poor outcomes and compromised programmatic expenditures, the academic team built a competency-based training program 2011-2013 [Figure 2]. (Balcaza, 2011 and Ruiz et al., 2012) A multi-disciplinary team of investigators developed competency standards and a logic model-driven approach for strengthening specialization in environmental sciences, reproductive health, and overall health-related quality of life. Using established CHW fundamentals and an existing adult-

learning approach as the foundation, core competencies and specialty modules were conceptualized to address sustainable participation in active Gulf Coast public health intervention programs.

Tulane University placed CHW Corps

The Tulane Center for Gulf Coast Environmental Health Research, Leadership and Strategic Initiatives maintains a CHW Corps supported through domestic and international research, including the GROWH and GRHOP projects. The CHW Corps is a genuine part of the Tulane academic team. The 21 CHWs employed in the research setting are full-time and part-time University staff receiving full medical benefits and serve a greater role than only bolstering health promoting actions and fostering community advocacy in their respective target regions. The GROWH and GRHOP CHWs serve as research assistants in the field – recruiting research participants, consenting subjects, and collecting research data. Additionally, the CHWs are trained disaster navigators and link at-risk individuals to needed resources and services, supplement social support systems, and often times serve as the only mode of social support for vulnerable Gulf Coast women and their families. The Tulane CHWs were referred for employment by their communities and as a requirement for our programs had to have a demonstrated passion and drive to navigate the fragmented healthcare system with their clients.

“Building Resilience through Disaster Mobile Health”, one of projects under the GROWH Consortium, is an illustrative example of capitalizing on the exponential growth of the smartphone and mobile-only internet use. Text health messaging platforms have extensively been used internationally to deliver healthcare and support CHW programs and domestically it is an emerging tool to improve health outcomes. About 1.5 trillion text messages were sent in 2009, up from 1.5 trillion in 2008 and 363 billion in 2007, according to the wireless trade

association CTIA. (CTIA, 2012) Pew Internet data suggest that minorities tend to text message more than their white counterparts: 50% of Hispanics and 47% of African Americans who own cell phones report texting on a typical day, compared with 40% of whites. (Pew Research Center, 2013) In 2011, Tulane investigators seized the unique opportunity to deliver health education messages, assess health status in real time, and monitor disaster preparedness June - November. Novel in application to the Gulf Coast, the CHW Corps are equipped with iPad technology and a text-messaging platform hosted by Educational Message Services, Inc. (Educational Message Services, Inc., 2013)

A day in the life of a Tulane CHW in the context of the aforementioned study, means that 237 Women, Infant, and Children (WIC)-eligible women from study cohorts 1 and 2, across six Southeast Louisiana parishes benefit from expanded access and use of reproductive health services, and from health promotion messages advancing their knowledge about pregnancy, birth and child development. The CHWs provide informal counseling and social support remotely and face-to-face to women from 12 weeks of pregnancy to 6 months postpartum [Tables 1-3].

TABLE 1 – Socio-demographic characteristics: Enabling variables from GROWH Consortium Project 3 Cohort 1

Enabling variables (personal, family, community resources)	Baseline No. (%)
Annual family income	
<\$20,000	74 (77.9%)
\$20,000 - \$29,999	14 (14.7%)
≥ \$30,000	7 (7.4%)
Health Insurance	
Uninsured	20 (21.5%)
Private or employer-based	12 (12.9%)
Medicaid/Bayou Health Plan	58 (62.4%)
Medicare	3 (3.2%)

TABLE 2 – Demographic characteristics: Predisposing variables of risk from GROWH Consortium Project 3 Cohort 1

Predisposing variables of risk	Baseline Mean (SD) or No. (%)
Age	
<25 years old	59 (61.5%)
25-29	25 (36%)
30-34	7 (7.3%)
35-39	5 (5.2%)
Race	
African American	59 (67%)
White	24 (27.3%)
Asian	3 (3.4%)
American Indian	1 (1.1%)
Native Hawaiian/Pacific Islander	1 (1.1%)
Ethnicity	
Latino	10 (10.5%)
Non-Latino	85 (89.5%)
Education	
< High school	17 (17.7%)
High school diploma or equivalent	55 (57.3%)
> High school	24 (25%)
Marital Status	
Married	13 (13.7%)
Living with Partner	24 (25.3%)
Separated	5 (5.3%)
Never married	53 (55.8%)
Place of residence	
Orleans	30 (31.3%)
Jefferson	44 (45.8%)
Terrebonne	3 (3.1%)
Lafourche	11 (11.5%)
St. Bernard	1 (1%)

Plaquemines	6 (6.3%)
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TABLE 3 – Need factors associated with Cohort 1 WIC-eligible women across race

Need variables (Perceived health status)	Baseline Mean (SD)			Score Range
	Overall (N=96)	Blacks (N=59)	Whites (N=25)	
SEE				
Ethnic Identity	3.57 (.67)	3.72 (.67)	3.29 (.66)	1-5
Perceived Discrimination	3.0 (.75)	3.17 (.71)	2.46 (.73)	1-5
Mainstream Comfort	3.68 (.62)	3.63 (.53)	3.98 (.62)	1-5
Social Affiliation	2.51 (.83)	2.49 (.78)	2.48 (.88)	1-5
PANAS				
General Positive Affect	33.14 (8.44)	34.98 (8.35)	29.87 (8.06)	10-50
General Negative Affect	17.19 (6.90)	16.79 (6.95)	17.32 (6.31)	10-50
POMS				
Tension-Anxiety	7.85 (6.32)	7.14 (5.87)	9.35 (7.20)	0-36
Depression	5.04 (6.91)	4.90 (6.76)	5.22 (6.32)	0-60
Anger-Hostility	4.80 (6.78)	4.69 (6.63)	4.32 (6.32)	0-48
LOT-R				
Overall Score	16.62 (4.40)	17.51 (4.23)	14.91 (4.71)	0-24

By design, many Gulf Coast federally qualified health centers function as patient-centered medical homes, a central location promoting a holistic approach to addressing an individual's health care needs. The GRHOP program provides a unique opportunity to embed trained CHWs in these patient-centered medical homes and high functioning community organizations in 17 counties and parishes in Louisiana, Mississippi, Alabama, and Florida. At present, as a result of a competitive process, 16 full-time and part-time CHWs have been placed. To assure sustainability, trainees are respected local leaders with a track record of engagement within their community and, once trained are expected to be placed within their respective community as embedded asset builders and connectors. Therefore, to optimize matching community needs and assets, placement is determined by local organizations. As additional sustainability parameters, the program has as core features support for supervision and benchmarking performance through a grantee-tailored evaluation instrument. (Lichtveld & Arosemena, 2013)

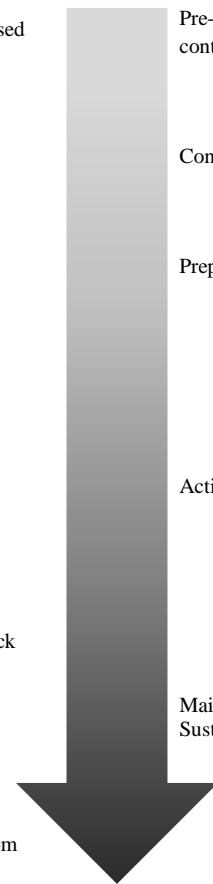
Standardized process and outcome evaluation tools

The trans-theoretical model linking each stage of change with specific benchmarks or indicators guides the evaluation framework utilized for community engagement and the Tulane CHW program. [Table 4]. (Prochaska & DiClemente, 1983) The CRC Coalition and CHW Corps drive community change with the common goal to help each member/participant move from their current stage to a more advanced stage in the model, with the outcome that they adopt a specific behavior (Action) and are able to maintain that change in behavior (Maintenance). Using the Stages of Change Model improves the sustainability and continued conceptualization of public interventions by recognizing differences in receptiveness and ability to change behaviors based on an individual's stage of readiness. This model provides a stepped approach to describe individual progression along a change continuum - pre-contemplation, contemplation, preparation, action, and maintenance. (Beal, 1964)

Employing the evaluation framework presented below effectively requires deliberate upfront investment, especially in the context of disaster management. Community readiness is greater than that of the sum of its members and is influenced by the extent to which it adheres to cultural norms, coherence and values. The framework's indicators serve as a roadmap to measure the "state of readiness" of a community's partnerships and its leaders such as the CHWs. Bolstering readiness in the preparedness phase not only accelerates response actions, but also serves as an invaluable foundation for disaster recovery and community resilience. This is especially pertinent in health disparate, disaster-prone populations where differences in risk perception between communities and responders affect sustainable risk reduction strategies.

TABLE 4 – Evaluation Framework for community engagement

Adhering Principle	Indicator	
Inclusion	<ul style="list-style-type: none"> • Opportunity for a diverse range of values and perspectives to be freely expressed and heard. • CHWs and coalition members representative of the population. • Appropriate and equitable opportunity for all to participate. 	Pre-contemplation
Influence	<ul style="list-style-type: none"> • People have input in how they participate. • Policies and services reflect their involvement, and their impact is apparent. • Eligible community members consent to participate in research. 	Contemplation
Capacity Building	<ul style="list-style-type: none"> • Address barriers. • Build capacity and confidence of people to participate meaningfully. • Develop confidence in the process and the value of their participation. • Generate a shared sense of ownership and commitment to the process and outcome. • Adequately resource indigenous peoples and the poor and marginalized to participate meaningfully in the broader community. • Ensure that Community Advisory Board, Crescent Region Collaborative coalition members, CHWs, and research participants have a stake in the outcome and benefit equitably as a result of being involved. • Research participants are compliant and adhere to the protocol. 	Preparation
Sustainable Decisions	<ul style="list-style-type: none"> • Recognize and communicate the needs, interests and values of all partners. • Decision makers find the output useful and are armed with the necessary community feedback. • Collecting and utilizing CHW-participant and CRC Coalition member feedback to improve community engagement effectiveness. <ul style="list-style-type: none"> — Scale To Assess the Therapeutic Relationship (STAR) (McGuire-Snieckus, McCabe, Catty, Hansson, & Priebe, 2007) — Monthly Coalition Knowledge Survey - Assessing the retention of information on target issues. — Program to Analyze, Record, and Track Networks to Enhance Relationships (PARTNER) (Varda, 2013) • More cohesive and informed academic institutions and communities result from the process. 	Action
		Maintenance/Sustainability



DISCUSSION:

The prevailing attitude of Southeast Louisiana communities toward the issues surrounding the 2010 DWH oil spill was one of helplessness. Therefore, it was important for the public health frontline to transform attitudes to ones of responsibility and empowerment. (Goldstein, Osofsky, & Lichtveld, 2011) Local resources remained scarce in 2010 and the levels of readiness to act varied widely. The DWH oil spill increased public awareness of the threat of a technological disaster striking the region, and the need to establish collaborative partnerships at the community level in between events so that both local and national response teams can be

seamlessly integrated when an incident occurs. (Wells et al., 2013) Engaging with community leaders and responders early in the design process for example by participating in regional community forums allowed investigators to build intervention strategies matched to what they perceived as Southeast Louisiana’s stage of readiness to change. Planning for technological disasters including oil spills also requires taking into account key gaps in communication, infrastructure, and resources to avoid limiting surge capacity during the response phase and potentially hamper the availability of sustained community assets critical especially during prolonged recovery.

The success of post-disaster community engagement or interventions significantly depends on a community’s readiness. Previous research targeting Gulf Coast communities in Texas, Louisiana, Mississippi, Alabama, and Florida), identified seven factors influencing readiness: 1) density of pre-disaster populations, 2) levels of isolation vs. proximity to large metropolitan area, 3) extent of local infrastructure strength, 4) robustness of local economy, 5) availability of public transportation, 6) consistent access to health and basic services, 7) special population needs addressed. High scores on these variables indicate higher probability of community and individual recovery. Study participants also identified the roles and functions of a disaster navigator and wide-ranging community priority of needs [Figure 3]. These needs led to the development of a community-driven curriculum that addressed the wide variability of readiness among affected Gulf Coast communities post Hurricanes Katrina and Rita, and in the immediate aftermath of the Gulf of Mexico Oil Spill. For example, while the community in Bayou La Batre still indicated basic critical infrastructure needs, in New Orleans the fear that the area’s unique culture would erode was among the top priorities.

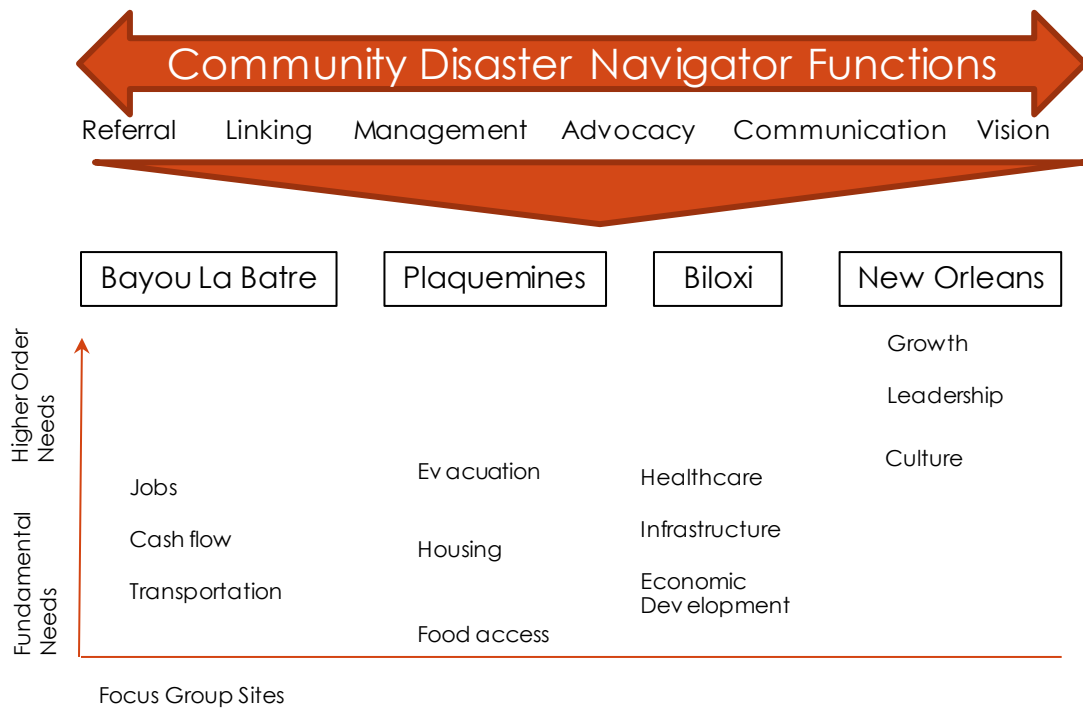


FIGURE 3 – Disaster navigator functions and community priority needs

IMPLICATIONS:

The GROWH and GRHOP projects demonstrate that placing a higher priority on community engagement and connecting participants with trusted CHWs can help to fill a crucial need in providing physical and psychosocial health support and positive social interaction aimed at decreasing susceptibility to poor health outcomes. The core competency-based CHW training framework is intended to be applied in various settings, focused on any level of learner. The framework is designed to be implemented across broad public health research approaches that address a multitude of knowledge, skills and abilities spanning environmental health sciences, maternal and child health, health-related quality of life and health care coordination and communication.

Community-Academic Partnerships can serve as unique vehicles to maximize the integration of the oil spill response workforce and other disaster response professionals into all levels of the disaster management at the community level. We offer a four pronged- action plan: 1) a common training strategy; 2) engagement at the earliest possible time; 3) measuring performance; and 4) deploying a holistic transdisciplinary approach.

A common training strategy

Adult pedagogical strategies point to team-based learning using real world scenarios. While this model is widely used in the armed services and increasingly in disaster preparedness education in schools of public health - joint training of CHWs and oil spill responders would create this ready team. (Association of Schools of Public Health, 2013) In this way, the community-anchored lay disaster management workforce can serve as a natural partner for responders navigating not only a community's assets, but also forecasting barriers to trust and collaboration. Disaster navigators can also facilitate risk communication and post-disaster risk reduction strategies. However, just like other well-functioning response teams, action teams of disaster navigators, oil spill responders, decision makers, scientists, and project managers cannot be established "in the moment", but must have worked together in between events.

Teams who work together must train together beforehand. The most efficient strategy to enhance knowledge and skills and foster effective, collaborative disaster navigator/oil spill responders capacity is to expand the core competencies aimed at training navigators to include response functions. While it is neither the intent to turn disaster navigators into professional oil responders nor to transform the oil response workforce into day to day disaster navigators, training of both groups using one integrated set of core competencies will create a common knowledge platform from which they can operate within their respective scope of practice.

Engagement at the earliest possible time

On the Gulf Coast, responders especially those from outside the region are often experienced as "helicopter agents" dropping in to tell communities what to do. This approach violates every principle of community engagement and CBPR. (Isreal et al., 2010) A more intense sharing experience is proposed by Wells et al: "One potential model is community-partnered participatory research (CPPR), a manualized form of community-based participatory research that emphasizes power sharing and 2-way knowledge exchange following principles of community engagement to support authentic partnerships." (Wells et al., 2013) CPPR's proven

efficacy in support of post-Katrina mental health recovery fostered the development of pre-disaster community resilience programs and now serves as guidance for advancing disaster preparedness and readiness by emphasizing not only joint training of community health navigators national and regional responder training and networking opportunities. (Wells et al., 2013)

Measuring performance

The evaluation framework presented in Table 4 is illustrative of the importance of measuring the “health” of community partnerships both at the individual and community levels. Documenting responders’ knowledge gain or skill set acquisition only post-training is a “snapshot” improvement and no assurance for sustained performance when functioning in a system mode which is required for an effective team-driven disaster response. Combining oil spill response readiness with community readiness may be the best platform for preparedness. Deploying a holistic transdisciplinary approach is supported through competency-based, transdisciplinary training. This approach is important to integrate oil spill responders with CHWs serving as disaster navigators. Mapping knowledge gaps of both target audiences is a reasonable first step.

CONCLUSION:

Community engagement in research requires a transdisciplinary rather than silo-driven approach. Communities, especially those living on the disaster prone Gulf Coast possess sophisticated assets making them worthy of inclusion as a full, integrated partner at the onset of any research or capacity building project. Community-Academic partnerships, even those with a track record of longtime trust, will perish void of built-in deliverables benefiting communities in a demonstrable and above all measurable fashion.

Although the ecological impacts of oil spills are widely studied, the full picture displaying the impact on population health is a lesser-explored area. Public health researchers are now seeing the value of engaging in community-academic partnerships to administer community assessments that will help characterize the psychosocial implications of oil-spill disasters. (Buttke et al., 2012; Grattan et al., 2011; Morris, Grattan, Mayer, & Blackburn, 2013) Supplementing a CHW training curriculum with learning modules focused on optimizing the principles of patient navigation and survey assessments can serve two areas for growth to mobilize a CHW Corps to assist in recovery – 1) improving social support to diminish psychosocial distress, increase connections to needed resources, and better the dissemination of accurate health information targeting oil-spill affected communities with increased strain and 2) allowing for trusted community members to be the first on the ground with a pre-established, off-the-shelf toolkit of standardized surveys to characterize the population affected at baseline and help their academic partners rapidly tailor and implement evidence-based public interventions. (Freeman, 2013 and Arosemena, Fox, & Lichtveld, 2013)

Future efforts will focus on CHW professional development, transitioning them from partners to leaders in research. Activities critical to accomplish this transition include grant writing based on their own collected data, publication of such data as lead authors, expanding

their knowledge about asset mapping and geospatial tools, and facilitating their participation in conferences as presenters.

The CHW model has flexibility and rigor to extend beyond the traditional health disciplines. For example, oil spill responders can potentially be deployed more effectively and efficiently if they were not only knowledgeable about their own discipline but also regarding the community's needs. This shared knowledge regarding community assets and needs is not only mutually beneficial but also synergistically integrates community, disaster navigator, and oil spill responder capacity.

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