

COME HELL OR HIGH WATER:
Disparities in Health During Coastal Storms

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Abstract

In order to look at how conceptualizations of disaster cause our institutions to change over time, this project examines the changes in the disaster management policies and practices of the United States of America in Gulf Coast states during the time between Hurricane Katrina in 2005 and Hurricane Harvey in 2017. Within vulnerable coastal communities, there are even more vulnerable populations that have further barriers to safety when it comes to storms. After Hurricane Katrina hit, there was an outcry pinpointing the ways in which these marginalized communities were far more affected by the storm and even proposed some concrete measures for government to utilize in order to help these communities during future disaster events. This led me to the question: How has the way we address unequal health burdens of minority communities during hurricane disasters in the Gulf Coast changed since Hurricane Katrina? Therefore, this study focuses on the general understanding of disaster by the public, the spatial arrangement of marginalized populations in Houston relative to hazards and resources, the lived experience of these people during Hurricane Harvey, and the new statutes passed by the government in the years following Hurricane Katrina to conclude that we as a society continue to tackle the symptoms of disaster without actually addressing the root causes.

Introduction

100s of millions of people are affected by natural disasters each year (Baker 2009). That is a neutral statistic, but *disaster* comes with many connotations and understandings. Our modern english word *disaster* comes from the Middle French *désastre*, which in turn came from the old Italian *disastro*. The Italians took it from the Greek prefix *-dis*, meaning bad or a negating force, and the base *-aster*, which means star. Therefore, *disaster* quite literally means “bad star” or an “ill-fated event happening under the malignant influence of an unlucky planet” (“Disaster | Origin and Meaning of Disaster by Online Etymology Dictionary” n.d.).

People have long viewed natural disasters as whims of the fates or “acts of God”, punishing all those in their paths (Fothergill and Peek 2003). After the 1755 Lisbon disaster, the famous French Enlightenment thinker, Voltaire, wrote an epic poem lamenting the atrocities of nature while struggling to reconcile the existence of an omnipotent, beneficent God with an event of such mass human suffering. Voltaire questioned whether or not the disaster was some kind of divine punishment meant to curtail sin, but he refuted his own hypothesis, saying “Was then more vice in fallen Lisbon found / Than Paris, where voluptuous joys abound?” (Voltaire 2005, 1). He found no satisfactory conclusion. In a response to Voltaire’s scathing poem, philosopher Jean-Jacques Rousseau wrote a letter detailing his own position on the nature of disaster in which he blamed civilization for human suffering while absolving nature of responsibility. If a tree falls in the woods and there is no one there to hear it, does it make a sound? If a hurricane makes landfall on a coast and there is nothing there to destroy, is it a disaster? Rousseau argued that it wasn’t. “... it was hardly nature” he wrote, “who assembled there twenty-thousand houses of six or seven stories. If the residents of this large city had been more evenly dispersed and less densely housed, the losses would have been fewer or perhaps none at all” (Rousseau and Leigh 1967, 38). In German philosopher Immanuel Kant’s essays, he attempted to separate the events of the Lisbon earthquake from the existence of a higher power. Rather, he explained the phenomena in quasi-scientific terms. Kant focused on rationality rather than spirituality, and disaster preparedness over repentance (Reinhardt and Oldroyd 1983).

It is Kant’s response that most closely echoes the dominant modern day discourse surrounding disasters, which we shall call the hazard paradigm. This understanding of disaster

can be noted as disaster risk = hazard, with natural hazards being defined for the purposes of this paper as extreme natural phenomena outside the ability of humans to manage on their own (Gaillard 2010; Wisner et al. 2014). Examples of natural hazards include hurricanes, earthquakes, flooding, and so on. Because the hazard paradigm focuses largely on the physical, solutions for disaster risk reduction in this context are dominated by geophysical scientists and engineers who seek to understand, monitor and predict hazardous natural events. For this hazard-centered approach, experts use computer modeling systems and technical equipment, measuring air pressure, seismic wave amplitude and so on (Baker 2009; Bankoff et al. 2004; Gaillard 2010). This leads to a largely top-down, command-and-control technocratic response.

While the hazard paradigm is still the most prevalent among policy makers and technocrats, many scholars have adopted a new model, which we shall call the vulnerability paradigm. This paradigm places disaster at the nexus between hazard and vulnerability, and can be noted as disaster risk = hazard x vulnerability (Wisner et al. 2004). In this model, only when a hazard meets vulnerability does it become a disaster, for disaster only serves to exacerbate pre-existing issues.

The concept of vulnerability has undergone several iterations within the academic community. Early conceptualizations of vulnerability mostly focused on social factors leading to the fragility of certain groups of people. Socioeconomic status is the most widely discussed barrier to safety (Fothergill and Peek 2004; Mulilis et al. 2000; Wisner et al. 2014), but other studies highlight a more diverse set of conditions and characteristics that can produce vulnerability, such as gender, age, race, ethnicity, education level, english language proficiency, immigration status, physical and mental disabilities, etc. (Eisenman et al. 2007; Heller et al. 2005; Morrow 1999; Zoraster 2010). Later definitions tied in the spatial aspects of vulnerability such as the physical conditions of a place. A more quantitative lense was brought to vulnerability through hazard risk mapping. Eventually, vulnerability also grew to include engineering and the built environment, recognizing a building's structural potential for destruction or harm in the face of hazards and how that might affect the people within its walls. We are all a complex web of nested vulnerabilities, each unique to our situations. For example, being black doesn't make one vulnerable, but being black within the context of institutional racism and structural bias of

American society does makes one far more likely to be systematically disadvantaged and therefore vulnerable. These social, political and economic factors affect a person's ability to cope with all stages of disaster, including before, during and after the hazardous event (Fothergill and Peek 2004).

The vulnerability paradigm also acknowledges capacity, which may counteract vulnerabilities (Wisner et al. 2014). Capacity encompasses the resources and assets people have as well as the ability or skills necessary to access and use those resources (Gaillard 2010). All of this is essential for communities to deal with and recover from hazards. When capacities are mobilized in time of crisis, they form the core coping strategies for community disaster resilience. Capacities come from within a community. In fact, each community has its very own internal databank of knowledge, skills, technology and interwoven social networks. On the other hand, vulnerabilities come from external forces such as larger structural, systemic inequities and the built environment. Capacity is not a lack of vulnerability. Rather, vulnerability and capacity can and do coexist within and around all communities (Gaillard 2010), and the presence of vulnerability in a community should not in any way discredit its capacities.

People are vulnerable to hazards, but hazards, in their own way, are vulnerable to people as well, or at least partially a product of human activities (Baker 2009). The final construction of disaster we will examine, the complexity paradigm, highlights the mutuality of human society and natural hazards and the complex, intertwined systems therein. For example, with the onset of human-induced climate change, coastal storms continue to increase in frequency and intensity, disrupting coastal communities and their infrastructure and exacerbating issues such as erosion and coastal inundation (Beatley 2012). Wetland drainage, urban sprawl and its inevitable expansion of impermeable surfaces, levee building and floodplain manipulation all exacerbate or cause hazard symptoms such as flooding.

The way we construct our understanding of disaster is important because it directly affects the way we go about dealing with it. If we think of disaster as a purely physical force of nature to be dissected and controlled, we are more likely to use a technocratic, top-down approach. But if we understand disaster as phenomena deeply entrenched in existing societal

forces, we may see a shift of focus to new solutions (Baker 2009). This leads us to the question, how does the way we conceptualize disaster cause our institutions to change over time?

Comparative Study

In August of 2005, the world watched as Hurricane Katrina decimated the Gulf Coast of the United States. It was one of the deadliest hurricanes in American history. It was the costliest too, until 2017 when Hurricane Harvey hit. A massive storm surge, failed levees, flooding, and 145 mile per hour winds displaced almost one million people during Katrina, roughly half of which were from the city of New Orleans (Elliott and Pais 2006). The social and physical impacts were so deep that the United States was forced to reexamine its conceptualization of vulnerability and risk.

Most people categorize the disaster response effort to Katrina as a failure amplified by almost astounding levels of incompetence. The U.S. Army Corps of Engineers constructed faulty levees, inadequate even by their own calculations, and then neglected to maintain them; government at the local, state and federal levels failed to meet the needs of their citizens; the media allowed unvetted rumors to run rampant; and the insurance companies refused to fully compensate the victims of flooding. But mere incompetence was not the only existing issue exacerbated by Katrina. The storm and resulting disaster brought light to some ugly truths about the systemic disadvantages placed on people of color in the United State of America.

Studies conducted even before Katrina showed that racial and ethnic minority groups were differentially affected during times of emergency and disaster—both physically and psychologically—than their white, middle to upper class counterparts. They perceived the risks of natural disasters differently than white communities and responded to the warnings differently as well (Fothergill et al. 1999). Communities of color tend to live in low lying areas more prone to flooding and plagued by issues such as poor infrastructure and isolation. They face further barriers to safety during emergencies such as language, lack of personal transportation, and cultural barriers to conventionally promulgated communication (Brodie et al. 2006; Fothergill et al. 1999; Zoraster 2009). The larger structural inequalities found throughout American systems

become even more apparent during times of crisis. Disaster preparedness and response is, in some ways, the perfect storm to notice patterns of racial and ethnic inequality

The studies that came out in the wake of Katrina detailed the failures in disaster preparedness specifically in the Gulf Coast region. According to these studies, vulnerable communities—mostly those with high minority populations—suffered the health effects of the storm most heavily (Allen 2007; Brodie et al. 2006; Eisenman et al. 2007; Elliott and Pais 2006; Zoraster 2010). Elliot and Pais (2006) found that black communities across the disaster area were less likely to evacuate than white communities. Eisenman et al. (2007) asked why this might be, as this factor leaves these communities more likely to be directly affected by disaster. They found strong correlations between economic status, access to resources, disaster preparedness, and social vulnerability. The most common responses to the question “why didn’t you evacuate?” in a survey done with people living in Houston’s three major evacuation centers post-Katrina were “lack of transportation” and “misjudging the storm’s danger”. After a semi-structured interview follow up with survey participants, responses were divided up into three main sub-themes. The researchers ultimately concluded that the main barriers to safety were instrumental, cognitive and sociocultural. In this case, instrumental meant concrete resources needed for evacuation, cognitive was the personal processing of disseminated evacuation information, and sociocultural was both the individual beliefs and attitudes surrounding disaster and the community structure and perception of disaster prior to the hurricane. These studies, along with others, went on to suggest several strategies to compensate for these gaps in preparedness.

Skip forward to 12 years later when Hurricane Harvey hit the Gulf Coast and stole Hurricane Katrina’s title as costliest storm in the history of the United States. With intense flooding from heavy rains and storm surge, 130 mph winds and tornado offshoots, Harvey became the deadliest hurricane to hit Texas since 1990. Over half of the deaths directly caused by storm conditions occurred in Harris County, home to the Houston metropolitan area. Houston is the largest city in the American South and the fourth largest by population in the United States. Devastating property damage, loss of human and animal life and historic levels of flooding left the city reeling after the storm.

People have begun to draw comparisons between Hurricane Katrina and Hurricane Harvey because of their similar geographic location and high costs, making it the perfect case study to look at the changes in the way we address disaster. Have things really changed much since Hurricane Katrina? Have we as a society learned our lessons? Since disaster risk reduction and preparedness strategies in the United States still operate largely under the hazard paradigm and large scale, top-down institutional regimes have the main authority, this study seeks to find out whether the vulnerabilities suffered by marginalized communities have been addressed by policy changes. Therefore, we must ask: How has the way we address unequal health burdens of minority communities during hurricane disasters in the Gulf Coast changed since Hurricane Katrina?

Methods

In order to understand the shift in the policy and practice regarding hurricane disasters in the Gulf Coast, it is imperative to first understand the current state of things. Hurricane Harvey did not have the same outcry of injustice for marginalized communities following in its wake like Katrina did, so we have to dig a little deeper. In order to flesh out the state of affairs of disaster response in regards to marginalized communities, my approach is fourfold. First I will attempt to summarize the general understanding of Hurricane Harvey as a disaster--beyond the inevitable hurricane itself, how do people see the destruction it caused? How much of the popular discourse includes mentions of social vulnerability factors? Then, using GIS mapping, I will explore the spatial layout of marginalized communities in Houston and compare that to hazards and resources they were in proximity to during the storm. How did the built environment play into the effects of Hurricane Harvey on these communities? I will also look at discourses specifically about these populations during and after the storm to understand the lived experiences and unique problems. Finally, I will reflect on the institutional level changes made by FEMA to update federal emergency management actions since Hurricane Katrina in 2005.

Disaster often sparks a new round of the blame game. While we have mostly shifted our blame from sinners bringing divine retribution upon their cities to less spiritual culprits, it is still important to understand the way people construct disasters. Therefore, I collected 35 news

articles written on the disaster in Houston post-Hurricane Harvey with a Google search. I used this method to find articles the general public would have access to. I then assigned them all a number and used a random number generator to select 20 articles to code. I then categorized them based on what events or policies they assigned blamed to for the disaster in Houston.

In order to understand the unique vulnerabilities in Houston, I then used QGIS to create maps of Houston's vulnerable populations with the Center for Disease Control's Social Vulnerability Index. This index uses data from U.S. census variables to determine social vulnerability at the tract level. Social vulnerability, in this case, is taken to mean the resilience of the community to external stressors on human health in the case of disaster. The SVI measures 14 total social factors and then combines them into four major themes: socioeconomic status, household composition, race/ethnicity/language, and housing/transportation. I mapped these themes over the city of Houston in order to identify vulnerable areas. I then compared this with a map of the relief clinics set up for Hurricane Harvey.

I then performed a content analysis by identifying the discursive themes and lived experience of marginalized communities by coding ten news articles specifically about vulnerable populations affected by Hurricane Harvey. These articles specifically addressed communities of color, non-English speaking communities, high elderly population communities, low socioeconomic status communities, and women. Finally, for a policy approach, I looked at the six statutes identified by the Congressional Research Service in an update report for congress on the state of new statutory provisions regarding emergency management and response post-Katrina. At the time of the report, these were all the laws that had gone into effect as a result of Katrina.

Results

According to my discourse analysis, people mainly blamed the lack of zoning regulations and unchecked urban development over socioeconomic factors for the disaster surrounding Hurricane Harvey. Unchecked development and urban growth was the most heavily blamed disaster theme. I included items such as lax building regulations, outdated infrastructure and floodplain maps, lack of zoning regulations, and lack of greenspace in this category. Sources

frequently called out the many impervious surfaces characteristic of urban sprawl when assigning blame for flooding. None made mention of which populations lived in the areas of Houston most likely to contain compromised structural integrity. Climate change was another common theme in these articles, as climate change increases the frequency of storm events and rainfall along the warm waters of the Gulf Coast. A couple of articles accused Mayor Turner of aiding the disaster by not issuing an evacuation request to Houston residents. Only three of the twenty articles I analyzed referenced socioeconomic factors in their interpretation of Harvey's aftermath.

CDC's Social Vulnerability Index: Socioeconomic SVI in Houston, TX

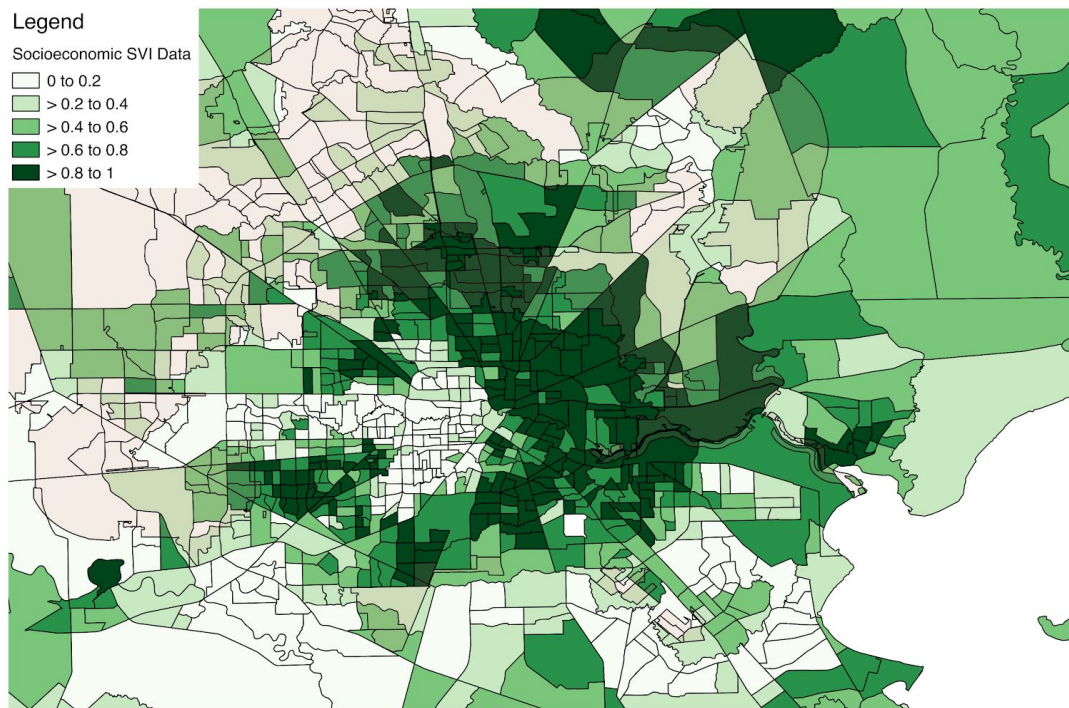


Fig. 1: Map of the socioeconomic status SVI theme over the city of Houston, TX

CDC's Social Vulnerability Index: Minority/Language SVI in Houston, TX

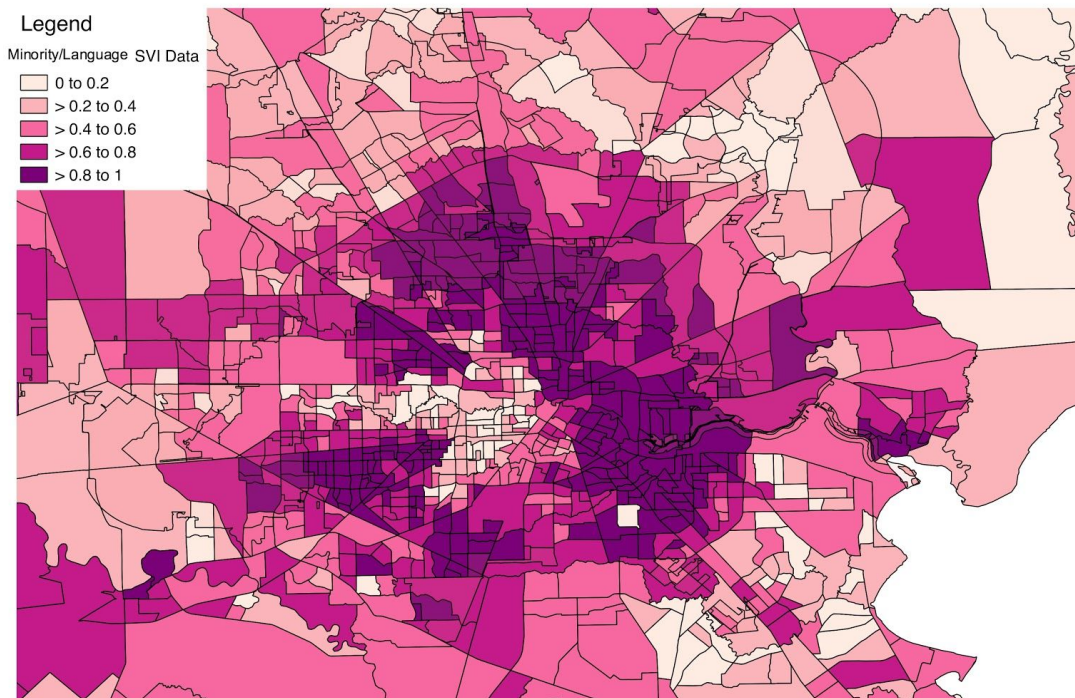


Fig. 2: Map of the race/ethnicity/language SVI theme over the city of Houston, TX

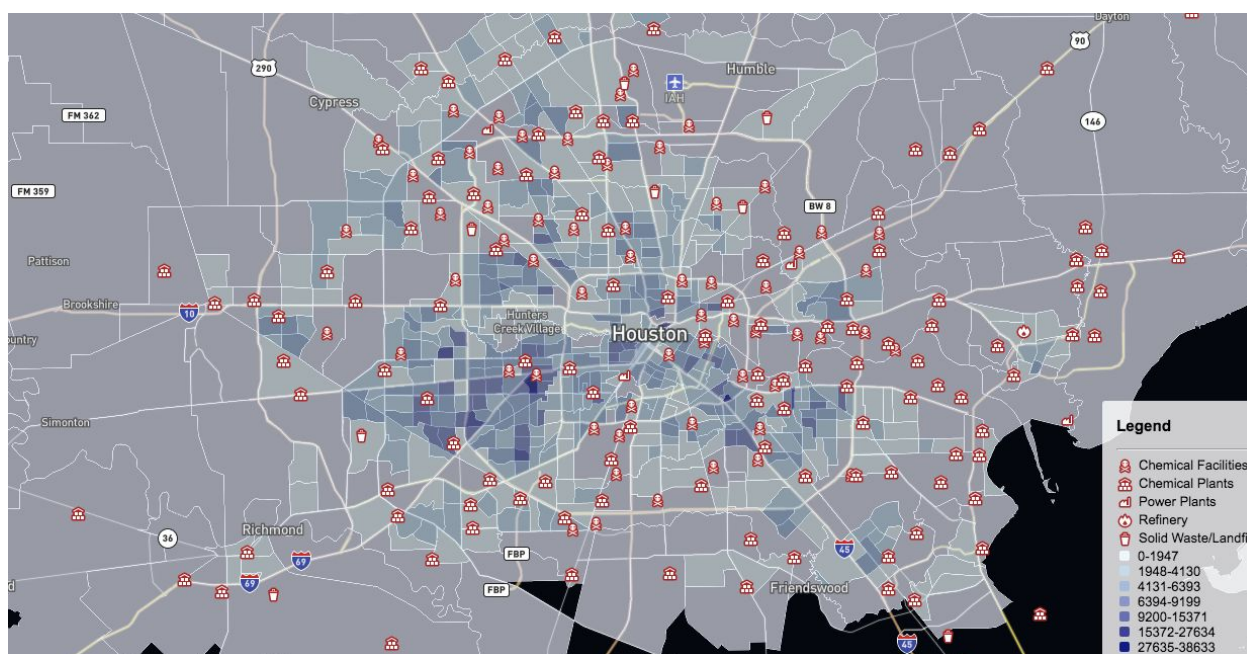


Fig. 3: Map of human hazards in Houston, TX (Mapbox 2017)

Looking at the first two maps in figures 1 and 2 side by side makes it clear how interrelated minority status and socioeconomic status are in the city of Houston. Areas of high

vulnerability (SVI >0.8 to 1) are almost identical across both themes. Lower class, minority communities tend to live outside the city center. However, when compared with a map of the relief clinics set up to tend to Hurricane Harvey victims, the clinics are largely concentrated in the city center in areas of comparatively lower vulnerability (SVI >0.4 to 0.6, >0.2 to 0.4, 0 to 0.2) where the population is predominantly white, english-speaking, upper to middle class. This is possibly due to available resources, existing infrastructure and ease of access. When looking at the map of potential human hazards such as chemical facilities and industrial plants as in figure 3, these risk-prone structures are more concentrated in areas of higher SVI, both socioeconomic and minority status. The most wealthy part of Houston, downtown, is more or less clear of these plants. One notable effect of Hurricane Harvey was the flooding and partial explosion of Arkema Inc. chemical plant (Dunklin 2017), which left highly unstable compounds behind. While the plant had recently updated its emergency response plan, it was still unprepared for containing flood waters even though it was located within the 2007 version of the 100-year floodplain.

I then performed a content analysis of ten articles written about marginalized communities and Hurricane Harvey, as summarized in figure 4 below. Lack of mobility for evacuation and lack of flood insurance were the two most heavily referenced themes in this study, as five out of the ten articles reviewed mentioned these factors. The struggle of undocumented immigrants was also prevalent. As mentioned in four out of the ten articles, border patrol kept the immigration checkpoints open even during the storm, so undocumented peoples had to choose between risking deportation and staying in their flooding homes. Social isolation, lack of resources and low priority on the aid distribution timeline were all raised in three articles. Two articles noted that women were more likely to become victims of sexual assault following a disaster. Similarly, two articles discussed how marginalized communities are more likely to live in low lying areas prone to flooding due to the cost of housing in those areas compared to high ground areas. The following were all mentioned in only one article: slow FEMA application process led to lack of disaster funds for residents; communities lacked long term relief systems (mental health, etc.); women and marginalized communities were less likely to evacuate due to caregiving responsibilities for children or disabled family members; marginalized communities living near superfund sites may have been subject to overflow of

toxic waste during storm flooding; homeless people were flooded out of the low lying areas under bridges they often inhabit in an attempt to take shelter from the torrential rain.

Issues for marginalized communities during Hurricane Harvey	Percentage of sources in which issue is mentioned
Mobility/transportation	50%
Issues with flood insurance	50%
Undocumented status	40%
Social isolation	30%
Access to resources	30%
Time lag in getting aid from distributors	30%
Time lag in FEMA application process	10%
Lack of long term formal support institutions	10%
Caregiver responsibilities hindered evacuation	10%
Proximity to toxic waste	10%
Homelessness	10%

Fig. 4: Table of findings from analysis of articles written on the experiences of marginalized communities during Hurricane Harvey

None of the articles mentioned any sort of city or state level policies or systems in place that these communities could utilize. Several did, however, mention specific community lead efforts meant to ease the burden on certain populations. For example, a Houston community member set up a system in which people could donate to a fund that would go directly to the bank accounts of black women suffering the impacts of Harvey. Black Lives Matter Houston coordinated aid efforts such as buying and distributing food and toiletries to local relief shelters. A local non-governmental organization distributed tampons and other sanitary supplies to women displaced by Harvey. Even the private sector got involved. H-E-B, the largest grocery store chain in the state of Texas, managed to open 72% of its stores within hours of Harvey,

focusing on the distribution of water and bread. The manager specifically brought in stocks of emergency supplies such as batteries and canned foods. This was all organized and run through a command center in San Antonio where employees from all over the region volunteered to help their Houston neighbors. In a similar vein, several hotel chains in Texas discounted their nightly rates for Harvey evacuees. Some even waved pet fees.

In the two years following Hurricane Katrina, six statutes were passed by congress with applications to the orchestration of federal emergency management actions (Bea 2007). The Post-Katrina Emergency Management Reform Act of 2006 had perhaps the most broad reaching impacts. It rearranged the structure of FEMA, expanded its statutory authority and autonomy and established several new programs. Several of the programs directly targeted marginalized communities, including guidelines to accommodate individuals with disabilities during evacuation, a system to reunite separated family members after a disaster and a transportation service to return displaced peoples to their residence. The Student Grant Hurricane and Disaster Relief Act allows certain student federal grant debts to be waived if the student is majorly impacted by the disaster. However, most of the other new statutes did not focus on underserved populations most affected by Katrina. For example, the Security and Accountability for Every (SAFE) Port Act of 2005 addressed port security (with a random internet gambling rider attached), while the Pets Evacuation and Transportation Standards Act of 2006 required FEMA to consider pets in their evacuation planning, and the Federal Judiciary Emergency Special Sessions Act of 2005 authorized courts to hold special sessions outside of their designated circuit if emergency conditions demand it. Finally, a section of the John Warner National Defense Authorization Act for Fiscal Year 2007 authorized National Guard troops to be used to “restore public order” in the event of a disaster.

Conclusion

So what has changed following the studies done post-Hurricane Katrina? According to the articles analyzed, the general public still understands disaster as a physical phenomena, rooted in the hazard itself and potentially exacerbated by human modifications of the natural and built environments. While the physical environment is a major factor in disaster risk and

vulnerability, even that fails to remain apolitical. Marginalized communities are still spatially arranged in ways that put them at higher risk, near potentially dangerous chemical plants or in poorly built housing. The main resources provided by public institutions were often centered in wealthier areas of the city.

The data from Houston's marginalized communities is fuzzy, particularly because the communities in question *are* marginalized and therefore underrepresented and understudied, but according to available data, they still have trouble gaining access to resources such as transportation and post-disaster mental health care. They have to overcome additional barriers to safety such as undocumented immigrant status or language hurdles. The National Flood Insurance Program continues to be a nightmare both for the state and for the individuals seeking recompense for damages, mirroring similar struggles after Katrina. Some measures have been passed at the federal level to specifically address underserved, vulnerable populations such as the disabled and students, but most new emergency management legislation focuses elsewhere. Congress managed to pass an entire bipartisan bill about pets but not underserved human communities.

The politics of prevention are difficult. Motivation for change is hard to drum up in times of peace. Donors and politicians are often motivated by actual or imminent disaster rather than the vague threat of tragedy some time in the future. The temporal and emotional distance of future disasters also makes citizens less understanding when it comes to additional tax dollars being taken out of their paychecks (Ginzburg 1994). The best time for change would be directly after a disaster, but that is also the time in which our resources and attention are focused on immediate recovery rather than long term planning. Institutional reform and socio-technical systems change take a long time, but perhaps, for this specific area of reform, we are not learning and improving because the people most affected are marginalized communities without the clout to change things in their favor.

Current disaster risk reduction strategies in the global North largely play into the hazard paradigm, which paints nature as the enemy and traditional warfare tactics as the solution (Bankoff et al. 2004; Gaillard 2010). This can be seen in the John Warner National Defense Authorization Act which calls upon the armed forces to deal with disasters and “restore public

order”, which sounds almost menacing. The United States and other major powers rely on technological innovation, engineering, zoning and urban planning, and PSAs to mitigate hazard risk, downplaying or even ignoring local capacities and instead trying to force a command-and-control, trickled-down approach. So if the faulty government systems aren’t changing, is the responsibility for change then placed on individuals? Communities? NGOs? Many academic reports have called for more community-based strategies that build upon existing local capacities and minimize dependency on external resources by empowering communities to develop their own appropriate coping mechanisms (Gaillard 2010). After all, the unique needs of an affected community are best met by the community itself with its deep knowledge of its own context and history. We began to see this some already during Hurricane Harvey, with both local formal and informal organizations and corporations from the private sector stepping up to help where the government couldn’t or wouldn’t. However, these types of initiatives are hard to do without government and policy support.

And still we continue to treat the symptoms of disaster without tackling the root cause. Because disasters exacerbate pre-existing conditions, it is imperative that we put concerted effort into addressing the socio-econo-political structures that generate vulnerability in the long term while simultaneously meeting the immediate needs of disaster victims in the short term. Incentives to stop rebuilding projects on floodplains, increased transportation opportunities during disaster events, and new disaster messaging communication strategies are all examples of short term fixes. The long term is, of course, more difficult, as it addresses issues woven into the very fiber of our society.

Further research needs to be done in order to investigate whether it is more effective to build special plans for marginalized community evacuation or to target the underlying issues of marginalization instead: the social vulnerability. Is it possible for disaster preparedness plans to include steps to reduce social vulnerability in the first place? This line of questioning gets into the nature of proactive resilience building and how we want to grow as a society. Or, perhaps on a related note, is it that our disaster response systems are inherently targeted at white, middle class communities and need to be entirely reevaluated? How do we divest the process of disaster

response from our countries larger structural racism issues? These are all questions for future studies to investigate.

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