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Perceptions for Natural Disaster Preparedness among Historic Houses of Worship

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Historic houses of worship have traditionally been cornerstones for society and have the potential to become resilience hubs for the community in response to the increasing impacts of natural disasters. However, given that most historic houses of worship are decades or centuries old, the maintenance paradigm for such buildings is unknown and should be investigated before they can be considered resilience hubs. Therefore, the research investigated the building maintenance paradigm of historic houses of worship in coastal Texas counties impacted by Hurricane Harvey. The study also determined the role played by the historic houses of worship in response to a natural disaster. The study utilized an online survey method in which the instrument was shared with historic houses of worship stakeholders. Pre-established criteria were used as parameters to determine respondents. About 17 out of 40 historic houses of worship in 16 counties responded to the study. The study found considerable vulnerabilities in building maintenance protocols, maintenance budget, and the lack of professionals to maintain the historic houses of worship. Most respondents also indicated the need for standard guidelines to support historic houses of worship's maintenance. The study also found that historic houses of worship volunteer in response to natural disasters.

Key Words: Natural disasters, building maintenance, disaster resilience, resilience hubs, historic places of worship

Introduction and Background

Natural disasters severely impact societies across the globe from the perspective of loss of lives, economic loss, and population displacement (Kreft et al., 2016; Stapleton et al., 2017; Guha-Sapir et al., 2016). Historically, the U.S. is among the top five countries globally most hit by reported natural disasters and sustaining most economic damages from natural disasters each year (Guha-Sapir et al., 2016; CRED 2019; CRED 2020). As a result of natural disasters, more than 15,030 people have died within the U.S., and economic losses have been assessed to exceed two trillion USD since 2016 (NOAA-NCEI, 2021). At the same time, faith-based organizations operating from houses of worship have demonstrated they play a pivotal socio-cultural role within local communities, contributing to disaster risk reduction and disaster management (Gianisa & Le De, 2018). They also help reduce community vulnerability by raising awareness among community members and offering training. There have been multiple instances when faith-based organizations/religious institutions have helped

communities during the disaster or the recovery phase within the U.S. and globally (Keller, 2017).

Historic houses of worship provide intimate and close interconnection between tangible (such as the building and its sub-components) and intangible (such as social practices, rituals, and festive events, oral traditions, performing arts, knowledge, and others) aspects of heritage (Aulet & Vidal, 2018). They are culturally significant because of the authenticity and integrity of the physical features of a site or building. The building is also a social interaction space, "loci" within which religious and cultural expressions are performed through rituals and festive events. Houses of worship can serve as refuges to the surrounding communities and have the potential to become resilience hubs, prepared for natural disasters and the threats posed by climate change.

Resilience hubs are facilities such as neighborhood or community centers used year-round for community-building activities but can also coordinate resource distribution before, during, or after a natural disaster (Baja, 2019). A key attribute of resilience hubs is that they are localized, created, and managed independently by the communities they serve (Baja, 2019; de Roode & Martinac, 2020), thereby reducing the burden on public resources while improving initiatives in public health and wellness. They can also act as a liaison to local government agencies, informing them of immediate issues affecting their specific communities. In the process, they can enhance organization, trust, and leadership within a community, foster neighborhood revitalization (Baja, 2019), and empower local communities to be more resilient (de Roode & Martinac, 2020). An ideal characteristic for a resilience hub is to be based out of an existing community-serving facility (de Roode & Martinac, 2020). Resilience hubs also lie at the intersection of community resilience—its intangible aspect—and resilient design, the physical facility. Both are applications of the concept of resilience, pioneered by C. S. Holling in his seminal study of stability in ecological systems (Folke, 2006). Holling's (1973) proposition that resilience measures the ability of "*systems to absorb changes of state variables, driving variables, and parameters, and still persist*" applies to both social systems in the form of communities and environmental systems in the form of buildings and infrastructure. For communities to be considered resilient, they must amass, attain, and enhance "*economic resources, infrastructure, assets, skills, information, knowledge, community networks, access to services, and shared values*" (Cramer et al., 2018). As for the built environment, resilience is at the heart of design, and any intervention should be designed to the highest standard, exceeding code-compliance minimums, to best protect public health, safety, and welfare (AIA, 2021). Resilience hubs can also engender a culture of preparedness by providing guidance and resources. Without them, individuals may not understand how best to prepare for disasters or, worse, may mistakenly believe they are prepared, exacerbating damages. Overall, "*the vulnerability of a community to the impacts of a disaster depends as much on social and cultural elements of the community as on the natural hazard itself*" (Cramer et al., 2018).

For historic houses of worship to play a vital role as resilience hubs and build community resilience towards natural disasters, the resilience of the historic building itself must first be enhanced. One substantial way to improve resilience of historic houses is by ensuring they are maintained consistently. The definition for maintenance of historic buildings has been operationalized in numerous ways (Forster & Kayan 2009; Seeley 1993; Feilden & Jokilehto 1993). Forster and Kayan (2009) further state that there is no consensus on the definition for maintenance of historic structures. More recent approaches propose that historic building resilience can be enhanced through a preventive conservation approach, an innovative 'systemic' method that uses maintenance protocols based on building conditions and user needs. Preventive conservation, developed initially for museums, has recently broadened to include the built environment, emphasizing historic buildings and contexts (Della Torre, 2020) to reduce building vulnerability and enhance resilience. A combination of condition-based and scheduled cyclical building maintenance is a critical element of

this process to ensure the good health of the historic building. The resilience of historic houses of worship can be assessed through cyclical maintenance protocols and interlinking them with dynamic external factors (such as infrastructural, environmental, and others) (Van Balen & Vandesande, 2013). The maintenance process may include treatments that respond to climate change based on minimal interventions to reduce risk, increase the building's resilience, and build capacity to respond to the community's growing needs and social role. Building maintenance is an essential tool for preventive conservation that moves the paradigm from an expert-centered to a user-centered model, based on the active involvement of users to improve awareness of what is needed to effectively respond as a community resilience hub towards natural disasters (Della Torre, 2020). Although some resources for maintaining historic houses of worship exist within the U.S. and abroad (Prieto et al. 2019; Partners for Sacred Places, 2019), limited studies exist that document the building maintenance paradigm for historic houses of worship within the U.S. Therefore, there are performance/prescriptive recommendations for optimal maintenance of historic houses of worship, but limited studies documenting the existing maintenance paradigm followed by houses of worship within the U.S. In addition, the problem is exacerbated by the fact that the historic building's maintenance is complex due to a confluence of considerations, including the users' perceptions, needs, expectations, and devoted funds (Prieto et al., 2019).

Therefore, given the potential for these buildings to become resilience hubs, the research assessed the building maintenance paradigm for historic houses of worship in coastal Texas, U.S. Texas was purposively selected because it has been impacted by 139 billion-dollar weather and climate disasters in the last twenty-one years, making it the state within the U.S. with the highest disaster incident rate (NOAA-NCEI, 2021). Historic houses of worship accounted as the general population for the study are existing community-serving institutions based in historic buildings, listed on the National Register of Historic Places (NRHP), or determined eligible for inclusion on the NRHP. These institutions manifest the Texas region's rich and complex diversity, linking communities to ancestral traditions and cultures and serving as places of education, cultural centers, and supporting citizens in need. Since the analyzed buildings were constructed decades or, in some cases, centuries ago using various construction methods and have undergone numerous generations of maintenance, understanding the building maintenance paradigm is crucial.

Method

An online survey method was determined to be optimal to determine the building maintenance paradigm among historic houses of worship and their preparedness for natural disasters in 2021. The selected research method allowed for identifying trends and perceptions (Gable, 1994). An online method for data collection was used as most people in the U.S. have internet access (Sheehan, 2001). In addition, online data collection allows for quick response generation (Flaherty et al., 1998), and the value generated by the method outweighed other survey methods (Sheehan, 2001), especially as the research was conducted during the COVID-19 pandemic. After identifying the research method, the instrument was developed on Qualtrics and consisted of multiple choice and essay question types. The developed instrument was pilot tested for validity and reliability by historic houses of worship representatives. The general population for the study was historic faith-based organizations geographically located in Texas coastal counties (Figure 1). A comprehensive listserv of faith-based organizations was developed with Philadelphia-based nonprofit Partners for Sacred Places. The instrument was then emailed to representatives of historic houses of worship located on the Texas Gulf Coast. The respondents were asked to share the instrument with decision-makers or people associated with the maintenance of the historic building. Only one response from each historic house of worship was used. Two reminders were emailed, and the survey was closed two weeks after the

second reminder. Approximately twenty-nine faith-based organization representatives responded to the survey. All collected data were subjected to the following filters: 1) Presence on the NRHP or determined eligible for inclusion on the NRHP; 2) Geographic location in counties deemed as most impacted by the U.S. Department of Housing and Urban Development (HUD) (Figure 1); 3) Survey completion. Based on the applied filters, the final respondent size was 17. All compiled quantitative data was downloaded and subjected to descriptive analysis. All textual data was subjected to thematic analysis to determine the commonly identifiable themes representing the areas of support provided by historic houses of worship in response to a natural disaster.

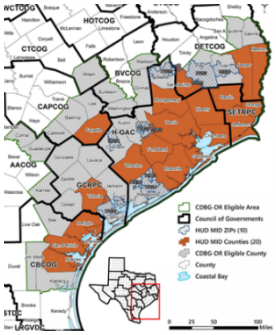

Figure 1: Most impacted counties analyzed in the study (Source: TxGLO, 2020)

Results

Approximately 17 out of 40 historic faith-based organizations in HUD-identified Texas counties most impacted by Hurricane Harvey (TxGLO, 2020) responded to the study. The majority of the respondents (70.6%) identified themselves as clergy, 17.6% as staff (non-clergy), and 11.8% as volunteer/lay leaders. Harris (41.2%), Galveston (23.5%), and Victoria (11.8%) were the top three counties from which responses were received. Further, most respondents (41.2%) identified their congregation size as less than 75 members (Figure 2). Most of the respondents (41.2%) indicated to have last experienced a natural disaster 4 – 5 years back (Figure 3). In addition, all respondents had experienced a natural disaster, indicating the severity of the problem. The majority also stated that they were a part of the current congregation when they encountered the last natural disaster.

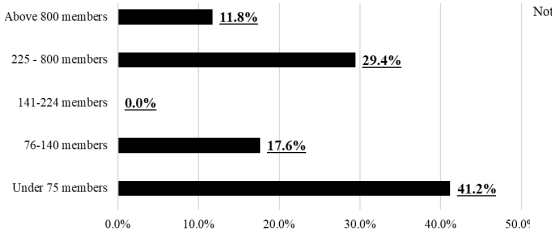

Figure 2: Respondent congregation size (n=17)

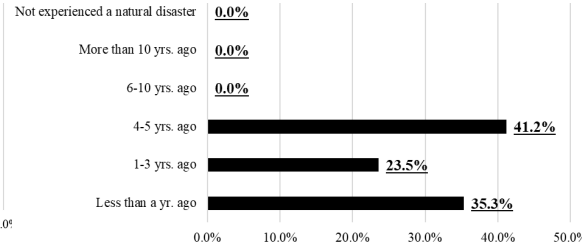

Figure 3: Respondent's last experience to a natural disaster (n = 17)

Disaster Recovery

The research also investigated if the analyzed historic houses of worship supported the response/recovery efforts to recent natural disasters. Although only 35.3% of the historic houses of

worship indicated having a longstanding/permanent disaster response recovery program, the majority did indicate their congregation volunteered in the recovery efforts in response to recent natural disasters (Figure 4). The thematic analysis enabled the determination of areas where the volunteer efforts of the historic house of worship were focused (Figure 5). The top three themes for voluntary support in response to a natural disaster included: 1) Distribution (food and water); 2) Offering shelter; 3) Home repairs.

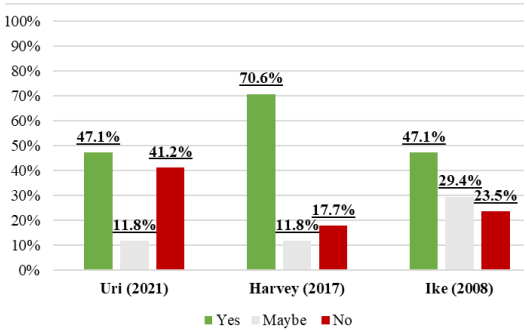

Figure 4: Volunteer recovery efforts for recent natural disasters (n=17)

Figure 5: Theme identifying the support offered by the historic houses of worship

Building Maintenance Paradigm

Historic houses of worship support recovery efforts (Figures 4 & 5) post-natural disaster. The critical question that emerges is if the houses of worship themselves were maintained to be resilient and contribute effectively to the recovery efforts post-disaster. Such a query becomes vital, especially when the buildings were constructed decades or, in some cases, centuries before the potential event. Further, given their role in the post-disaster recovery, they must be maintained to absorb external shocks and stresses imposed by the natural disaster, especially when the building is used to shelter affected people or distribute goods and volunteer for recovery. Therefore, part of the survey investigated maintenance standards for the historical place of worship.

Most respondents (35.3%) indicated having an annual operating budget of up to $99,000 (Figure 6). Further, about 35.3% of the respondents indicated a separate budget for building maintenance and capital improvements. About 70.6% of the respondents indicated that the house of worship implemented a significant capital improvement project (significant repairs or renovations) in the past 15 years, indicating that a substantial portion of the respondents (about 29.4%) had not made any significant improvement to the historic building. For the houses of worship that had implemented a significant capital improvement project, only 58.3% of the respondents invested in capital improvements specifically for disaster response/recovery efforts, whereas 25.0% did not, and the remainder were categorized as unsure.

About 76.5% of the respondents indicated they were involved in the maintenance of their historic house of worship. At the same time, only 23.5% of the respondents had received any formal training for the maintenance of buildings. When asked about their proficiency to make decisions for maintaining historic houses of worship that are resilient to natural disasters, most (41.2%) identified their confidence levels as “fairly confident” (Figure 7).

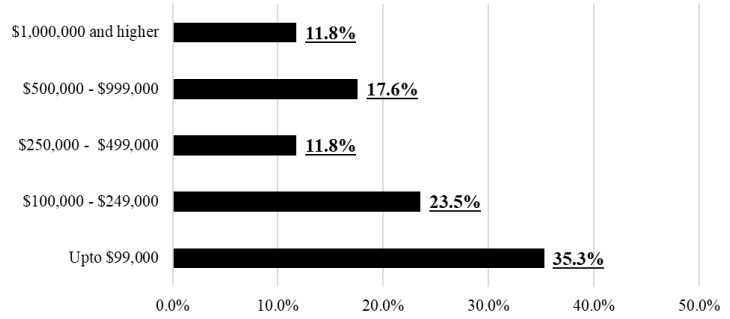

Figure 6: Respondent annual operating budget for the historic house of worship (n=17)

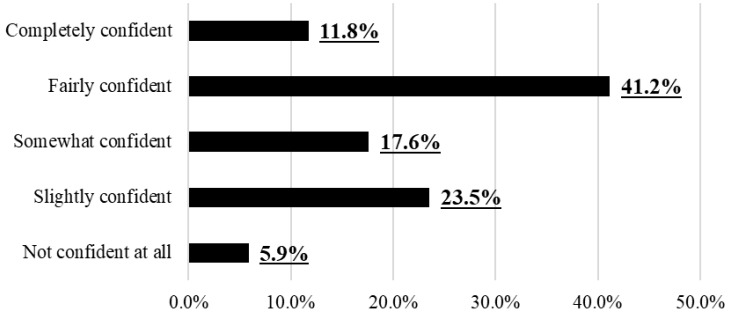

Figure 7: Confidence in making decisions for maintaining the building

About 52.9% of the respondents identified protocols for building maintenance in the historic house of worship. At the same time, a significant majority (70.6%) of the respondents also indicated that they had either no knowledge (35.3%) or were unsure (35.3%) of anyone in the congregation having any formal training regarding the maintenance of buildings. Only 43.8% of the respondents indicated having a dedicated staff person for the historic house of worship maintenance. The research also identified that most respondents had someone within the congregation who possessed the ability to design or construct non-residential buildings (Figure 8). However, only a tiny percentage indicated the existence of someone in the congregation who could maintain the historic house of worship and thereby an area of concern (figure 8). The majority of the respondents (76.5%) also indicated the existence of a committee dedicated to the historic house of worship's maintenance.

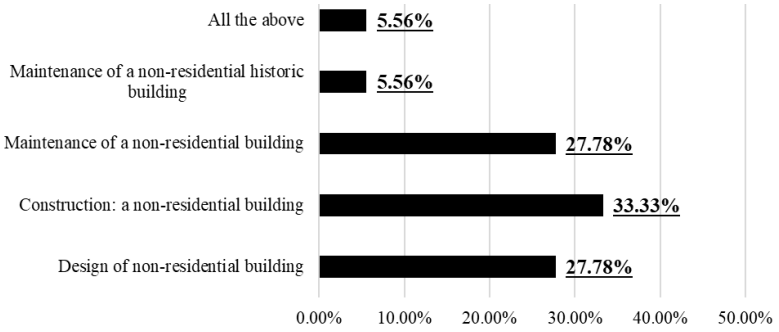

Figure 8: Response for anyone within the congregation having a building design, construction, or maintenance background

From the perspective of building improvements that are a priority for the historic houses of worship to

enhance the resilience, the top five building components (based on scores) were: 1) Air-Conditioning System; 2) Roof; 3) Exterior Windows; 4) Exterior Doors; 5) Fire Protection Systems. Most respondents (82.4%) indicated a need for "Standard Guidelines" to make historic houses of worship resilient to natural disasters. At the same time, the opinions were reversed when asked about the need for "Regulatory Guidelines" to make historic houses of worship resilient to natural disasters. The majority of the respondents (52.9%) indicated that they did not want regulatory guidelines. Thus, the results also indicate a need for guidelines to enhance the resilience of historic houses of worship in the form of supporting information rather than regulations or enforceable mandates.

Conclusion

This research is one of the first few studies within the U.S. that identified the building maintenance paradigm for historic houses of worship. The historic characteristics of these buildings can intrinsically transmit and preserve culture, heritage, and communities, creating the potential to be resilience hubs, although their age and construction techniques can leave them vulnerable to natural disasters. With future intense natural disasters, these buildings become more vulnerable, and the losses can be irreparable or irreplaceable to the communities and future generations in terms of heritage, culture, and values that bring the communities together.

The study found that over two-thirds of the respondents did not have a dedicated budget for building maintenance. Of those with a dedicated budget, only 58.3% invested in disaster response. The findings are concerning, as the historic buildings need dedicated funds to address maintenance requirements to be resilient to natural disasters and serve the communities in disaster recovery efforts. Along with dedicated funds, there is also a need for building maintenance protocols, dedicated staff for building maintenance, and people trained in its maintenance to alleviate occupant-driven vulnerabilities. Within these, developing building maintenance protocols is vital as the protocols can support maintenance through minimal interventions to retain the significance and integrity of the historical buildings. The findings are significant because coastal areas will become more prone to intense natural disasters in the future due to climate change (Miller Hesed et al., 2020).

As historic buildings are complex and houses of worship can have a pivotal role as resilience hubs, formalized training for specific congregation members in building maintenance of historic houses of worship is needed and at the core of the preventive conservation approach. The study also found that most historic houses of worship participated actively in the recovery efforts that impacted the region. Most of the recovery efforts focused on resource distribution (such as food, water, and supplies), post-disaster cleanup, and shelter for the affected in their buildings. Some of the historic houses of worship indicated they already perform some of the services that resilience hubs would undertake. At the same time, they have the potential to improve their role as resilience hubs but need to offer more services (such as natural disaster-resilient shelters) and/or become a part of a network of resilience hubs at the regional level.

Future Research

This research assessed the building maintenance paradigm for historic houses of worship in hurricane-prone counties of Texas. The researchers aim to expand the study to other disaster-prone areas of the U.S. to determine if a pattern emerges that could facilitate the identification of weaknesses and strengths of similar historic houses of worship. This identification would help congregations protect their structures and explore the possibility of potential resilience hubs through a possible resilience

network. Results also indicated a need for "standard guidelines" that help users maintain historic buildings. Future research could also investigate the best tools for preventive maintenance plans that will help to increase the resilience of the historic houses of worship, allowing them to best perform as resilience hubs.

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