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Perspectives on Risk Mitigation Among Homeowners Across the Disaster Recovery Life Cycle[1]

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1 INTRODUCTION & SCOPE OF WORK

Coastal homeowners are potentially crucial actors in reducing the risks to property and human life given the growing population density in these regions and their exposure to rising seas and increased hurricane activity, as well as earthquakes and tsunamis prevalent along coastlines in many countries. Absent strict, enforceable regulatory action, coastal resilience will largely reflect private, voluntary decisions of millions of individuals. However, research is scarce on the mitigation measures that homeowners are taking or plan to take. In fact, research devoted to disaster preparedness routinely neglects the specific actions of homeowners as consumers of structural mitigation products, despite the fact that such mitigation is the most cost-effective means to reduce disaster losses and the fact that homeowners are indeed the stakeholders with the most to gain (from a cost-benefit perspective) from investing in pre-emptive mitigation (*NIBS, 2017*).

Understanding the decision process of homeowners is essential if society ever hopes to mobilize collective effort to enhance resilience. This study explores household survey data collected from homeowners at different points in the disaster recovery life cycle and subject to different socio-economic contexts. The data set includes over 500 homeowners in each of the following settings: (1) Pre-Disaster: New Hanover County, NC, USA approximately one year before 2018's Hurricane Florence, (2) Immediate-Post-Disaster: Les Cayes, Haiti almost a year and a half after 2016's Hurricane Matthew, and (3) Extended-Post-Disaster: Léogâne, Haiti, the effective epicenter of the 2010 Earthquake. These three datasets provide unique perspectives into the decision processes of homeowners in the developed and developing world, who are exposed to escalating hazards. The level of structural vulnerability in respondent's homes, the mitigative actions taken to date, and the intention for further actions to reduce these vulnerabilities are respectively quantified by a trio of indices for home protection (HPI), homeowner action (HAI) and homeowner intention (HII) (*Javeline and Kijewski-Correa, 2018*). These indices are examined in light of wide-ranging demographic and attitudinal variables that underscore the complex factors influencing homeowner decision making.

2 METHODOLOGY

All three surveys included questions on home risk reduction, past disaster experiences (including home damage), socio-political attitudes and opinions, community life, and demographics. In New Hanover County, NC, which was hit by at least one storm in 12 of the 20 years prior to the survey's implementation, the survey also focused on other considerations such as including home valuation and protections offered by government and insurance. The survey was administered using a probability-based sample of single-family households in Special Flood Hazard Areas (SFHAs) on FEMA's digital flood insurance rate maps (DFIRMs). The sample was stratified at the Census Block Group level and targeted primary decision makers in each home. Between

[1] This extended abstract is a compilation and extension of the preliminary findings orally presented at "A Safe House: An Interdisciplinary Tèt Ansanm" during the *30th Annual Conference of the Haitian Studies Association* in Port-au-Prince, Haiti on November 9, 2018 and during the panel "Big Research – Understanding How to Better Motivate Homeowners" at the *FLASH National Disaster Resilience Conference* in Clearwater Beach, FL on November 9, 2018.
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June 23 and August 13, 2017, a professional survey firm mailed 4,180 households a questionnaire booklet (doi:10.7274/R07H1GPG), which was completed by 662 respondents.

In the two comparative post-disaster settings in Haiti, a shorter survey was designed with two versions, one for Léogâne focused on post-earthquake recovery examining masonry wall mitigations and one for Les Cayes focused on post-hurricane recovery emphasizing roof mitigations, with additional emphasis on religion and philosophy of causality. A random walk protocol was developed to administer a door-to-door oral survey using mobile platforms operated by a team of Haitian enumerators. 549 homeowner surveys were collected in Léogâne between February 28 and March 7, 2018 (instigating disaster: January 12, 2010), and 523 surveys were recorded in Les Cayes between March 26 and May 19, 2018 (instigating disaster: October 4, 2016).

3 RESEARCH OUTCOMES

While more in-depth analyses are ongoing, for the purposes of this extended abstract, descriptive statistics are presented to summarize overall trends observed in the surveyed populations. The homeowners across these study zones does share a common profile: the vast majority perceive an increasing threat due to natural hazards, have had damaging encounters with them in the past, and expect to again in the near future. Despite this, the vast majority in the three study zones do not intend to relocate from their respective cities due to natural hazard risk. Even in the more fluid real estate market of the US, most New Hanover respondents intend to remain in their current home for at least another 6 years (75%) and a majority for at least a decade (55%). With structural mitigation as the only recourse for risk reduction, there is a growing imperative that homeowners understand their exposure and their home's hazard vulnerability, while more importantly having knowledge of and access to effective mitigation strategies that they can implement and afford. These preliminary findings suggest significant knowledge-action gaps remain in this regard.

Pre-Disaster Respondents: New Hanover, NC

Examination of the trio of indices reveals that homes in New Hanover are, on average, minimally protected (μ_{HPI}=0.48/1.0), that homeowners have taken limited action thus far (μ_{HAI}=0.15/1.0), and show even less intent to act in the future (μ_{HII}= 0.07/1.0) (*Javeline and Kijewski-Correa, 2018*). Over half of the respondents who reside in zones requiring use of impact-rated glazing or protective panels do not protect their windows in any way and another quarter are unsure if their glass is impact-rated. Lack of knowledge is apparent for other features, such as shingles, with 42% of coastal homeowners not even knowing their shingle type. In exploring various incentives to take mitigative action, only the prospect of free mitigation products or free instillation would prompt a significant proportion of the respondents to take action in the next year. While property tax reductions and insurance discounts were appealing, they have little impact on urgency to respond.

Those who have replaced their roofs recently are nearly equally divided about the role future hurricane concerns paid in their re-roofing decision. For those still contemplating roof replacements, over a quarter will not factor hurricane risk into their decision, even though a strong majority think their roof will sustain significant damage. A slim majority have the same expectation of damage for their windows, even though they do not agree that they should be required to protect their windows by law or insurers. Homeowners overwhelmingly (over 80%) believe upgrades or retrofits to home features like roof cover, roof-to-wall connections and opening protection are effective. Over 60% of the respondents also believe most of these measures are affordable, though one mitigation mandated in this region, window protection, interestingly is perceived as slightly less so. Perceived affordability plays no statistically significant role in explaining intent (or lack thereof) to mitigate home vulnerabilities in the future (*Javeline and Kijewski-Correa, 2018).*

While investments in mitigation may have significant benefits in the event of a disaster (*NIBS, 2017*), homeowners find that such investments are nevertheless not valued in the market. For each of the mitigations surveyed, only about one quarter of respondents believe there would be a significant increase in the value of their home, with impact-rated windows and shingles certified for high winds being the two most marketable home features. Moreover, most homeowners (87%) have not lost their insurance coverage, and over 60% report that all or a majority of their worst hurricane damage in the past was covered by insurance. Ironically, even though over 70% of respondents believe that the homeowner should be largely responsible for paying uninsured costs of recovery, three quarters still expect government assistance if their home is damaged. Interestingly, while interaction with such institutions as government and insurance is clearly expected post-disaster, these interactions are limited pre-disaster with 78.1% of respondents having received no form of risk communications or mitigation guidance from these and other key stakeholders in the past 12 months. It is

perhaps unsurprising then that limited "sunny day" actions are taking place in contexts which under-value and under-communicate the risks facing coastal homeowners.

Post-Disaster Respondents: Léogâne and Les Cayes, Haiti

Haitian households paint an even starker portrait of this reality, having limited means to prepare and adapt and, as these survey findings illustrate, limited capacity for recovery. In Les Cayes, over 66% of respondents experienced roof damage in Hurricane Matthew; approximately 1.5 years after the hurricane, almost 95% are repairing or have repaired those damages. Unfortunately, this swift response – in the absence of capital -- did little to address underlying vulnerabilities: the majority of respondents' original roofs were covered with vulnerable thin corrugated galvanized iron (CGI) framed with hand-processed timber. This practice was regrettably used at an even higher rate in the recovery. Those who did wait or are possibly upgrading their roof are more often considering concrete slab roofs or thick CGI with metal or milled-lumber frames, which would reduce their vulnerability in future hurricanes, though the slab roofs could exacerbate their seismic risk.

In Léogâne, over 94% of respondents experienced home damage in the 2010 earthquake. Approximately 8 years after the earthquake, over 75% of those with damaged walls (cracked but not collapsed) have started or completed repairs; sadly 61% of those whose house completely collapsed have still not yet started rebuilding their homes. Unfortunately, only 40% that have addressed their wall damages/failures are using higher quality concrete masonry unit (CMU) block, and only 20-30% of the population are installing a ring beam or adding steel reinforcement to their walls. Those who have not yet begun repairs are indicating even lower rates of adoption of such measures. This illustrates the challenge in uptake of mitigations that fundamentally change structural typologies or require new technical skills in settings left to self-recovery. One typology shift that did reach critical mass with limited targeted risk communication was lightweight roofs. Prior to the earthquake, 40% of respondents employed heavy slab roofs that further increased the seismic mass and instigated dramatic pancake collapses that killed many in this community. Among those who have reconstructed, slab roof rates have dropped in favor of more lightweight CGI, though again creating the cruel trade-off of increasing the home's vulnerability to hurricanes in this multi-hazard climate.

While both Haitian communities had similar levels of vulnerability (Léogâne: μ_{HPI}=0.45/1.0, Les Cayes: μ_{HPI}=0.53/1.0), households in Léogâne on average have taken greater mitigation actions, though over a much longer period of recovery and having more substantive damage to address (Léogâne: μ_{HAI}=0.70/1.0, Les Cayes: μ_{HPI}=0.37/1.0), while Les Cayes has slightly higher mitigation intentions in the future (Léogâne: μ_{HII}=0.74/1.0, Les Cayes: μ_{HII}=0.83/1.0). These intentions still must play out in a setting where respondents are near uniformly divided about their ability to protect their homes against earthquakes and hurricanes, due to a number of factors often tied to notions of capital. While Les Cayes households tended to have more earners, more access to formal lending, and more remittances from abroad, the amounts of financial capital either community can access are inadequate for the scales of recovery they are facing. Respondents in both communities also do not anticipate receiving support from those around them. This may explain why, regardless of their actual experience in this pair of disasters, they still anticipate support from the state or non-governmental organizations (NGOs), especially in Les Cayes. Léogâne respondents, who have lived through a longer period of limited external aid, are less optimistic. With limited social and economic capital, a non-responsive state, and an aid community that has largely concluded the limited reach of its post-disaster programming, these households default toward quick-fix vulnerable repairs (see Les Cayes) or progressive reconstruction with discrete elements that are not well integrated into a structural system (see Léogâne).

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