

## *ASSESSING HOUSEHOLDS' EMERGENCY PREPAREDNESS IN HAWAII*



*Hurricane Lane, 2018. Image: Sky News UK.*

### ***FINAL REPORT***

Prepared for the  
Hawai'i Emergency Management Agency (HIEMA)  
-State of Hawai'i-

by

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## EXECUTIVE SUMMARY

### ***Background***

Hawai'i is the most remote residential place on earth inclining for a special planning of emergency response during natural disasters. Due to Hawaii's location, critical delays of the federal response and support during times of a natural disaster pose a risk to the well-being of its residents. In this project, we deployed a state-wide survey questionnaire to assess the rate of households satisfying the 14-day emergency supply household readiness as outlined by the Hawaii Emergency Management Agency (HIEMA). Our study aims to inform HIEMA about the current state of households' essential supplies preparedness, and to provide recommendations on the necessary subsequent steps for the implementation of effective strategies to enhance the degree of awareness on suggested preparedness guidelines, as well as to increase the extent of households' readiness on water, food, and medical supplies across counties in Hawai'i. Our project was funded by the Hawaii Institute for Sustainable Community Food Systems at the University of Hawaii - West Oahu with the support of the W.K. Kellogg Foundation.

### ***Objectives***

With the objective of developing actionable data for Hawaii's State Emergency Management Agency, NGOs, and private sector partners, we developed and deployed a state-wide survey questionnaire to identify the distribution of Hawai'i's households meeting the 14-day emergency essential supply storage as recommended by HIEMA. In particular, our report addresses the following set of core research questions: (1) What is the overall rate of households' emergency essential supply preparedness in Hawaii? (2) How does emergency household essential supply preparedness differ across counties in Hawaii? (3) What is the difference between *actual and perceived* levels of household preparedness in Hawaii? (4) What is the degree of community awareness of the State's recommendation for 14-days of emergency essential supply storage? (5) What are the most preferred modes of communication for information attainment on emergency preparedness updates in Hawaii?

### ***Methods***

We developed a survey research design to tackle the scope of our research study. The survey instrument consisted of a series of closed-ended, matrix, contingency and open-ended questions. Specifically, the first section of our questionnaire aimed to gather information about the level of concern of natural disasters in Hawaii, as well as the public opinions on the State priorities within the context of disaster preparedness. The second section gathered information on self-assessed (perceptions) of preparedness, and the extent of essential supplies stored (actual preparedness). In the same section, we also collected data on self-reported claims about the reasons for households' lack of preparedness, and information on households' vulnerabilities. The third section focused on the degree of familiarity with the emergency preparedness recommendations, and the most preferred mode of communications enhancing public awareness on emergency preparedness guidelines and recommendations. The last two parts of our questionnaire inquired information about households' and individuals' socio-demographic characteristics. Our final sample consisted of 1006 households proportionate to the population of households across counties.

## ***Key Findings and Results***

- *Concerns about disasters:* Seventy-two percent (72%) of the respondents are particularly concerned about the impact of a hurricane in their households and communities, 60% were concerned about tsunamis, 58% about floods, 53% about earthquakes and 44% about landslides and debris. Lower levels of state-wide concern have been expressed for volcanic eruptions (41%) and wildfires (38%).
- *Improvements to the disaster preparedness system:* Improving emergency preparedness services (94%) is the top public recommendation to the State government, followed by the need to invest in, and improve of public storage facilities for essential supplies (92%). Also, the vast majority of the respondents indicated that protecting and improving the transportation and seaport infrastructure (90%) should be prioritized by the State, and 8 out of 10 respondents recommended that State should focus on the protection of private property. Finally, 76% of the households suggested that the protection of historical and cultural sites should be included in the State's disaster preparedness planning efforts.
- *Perceptions vs. actual preparedness for disasters:* Seventy-one (71%) of the households self-reported that are water-supply ready, yet only 42% of them meet FEMA's recommendations and only 19% meet the HIEMA's recommendation. Similarly, 69% of households think that they are adequately prepared in food supplies, however only 55% of them meet FEMA's 7-days recommendation, and just 29% meet or exceed HIEMA's recommendation. Finally, in terms of the medical supplies, 83% of households have the perception of being prepared, but only 62% and 39% of them tend to meet FEMA and HIEMA's suggested guidelines of essential supplies storage.
- *Preparedness for disasters by county:* Only 11.5% of the households in City & County of Honolulu, 19.5% in County of Hawai'i, 8.9% in Maui, and 8.5% in Kauai Counties appear to meet the 14-days readiness in all essential supplies (water, food and medicine) combined. At the State level, only 12% of all households appear to be ready with adequate food, water and medical supplies stored for 14 days. An overwhelming majority of households lack one or more of the essential supplies in storage.
- *Media and communications preferences for receiving information about emergency:* For the age-groups 18-24, 25-34, and 35-44, the most preferred source of receiving emergency preparedness information, and updates, is through internet sites and social media platforms. Respondents that are above 45 years old seem to prefer to receive information about preparedness guidelines, and response plans via the television. Preference of local radio seems consistent across the age groups at about 16%, while mobile apps tend to be the second most preferred mode of communication across the age groups of 35-44 and 45-54.

## ***Recommendations***

- Develop and deploy a statewide multi-media communications plan and strategy to increase awareness about the 14-days of essential supplies household readiness.
- Prepositioning of Emergency Food in Identified Vulnerable Communities
- Develop New Emergency Food Storage Infrastructure:

- Develop a community of practice constituted by a group of emergency management experts and practitioners currently employed in State government agencies, non-profit organizations, private companies, and Universities.
- Support and fund longitudinal interdisciplinary research projects aiming to periodically assess, evaluate, and monitor the effectiveness of implemented practices.

## INTRODUCTION

### **Background**

With the possibility of significant destabilization of the Earth's climate system this century, researchers, NGO leaders, agencies, and elected officials must work together on research, planning and policy efforts toward building more healthy, equitable, resilient, and sustainable food systems. In this report, we identify key factors associated with the general framework of household disaster preparedness in Hawai'i. Hawaii is the most remote residential place on earth inclining for a special planning of emergency response during natural disasters. Due to Hawaii's location, critical delays of the federal response and support during times of a natural disaster pose a high risk to the well-being of its residents.

### **Objectives & Research Questions**

With the objective of developing actionable data for Hawaii's emergency management agencies, NGOs, and private sector partners, we developed and deployed a state-wide survey questionnaire to assess the percentage of Hawai'i's households with the 14-day emergency essential supply storage as recommended by the Hawaii Emergency Management Agency (HIEMA). Our study assesses the overall degree of emergency preparedness, examines the differences between perceived and actual household preparedness, and detects the extent of community's awareness on HIEMA's recommended 14-days emergency supplies. Our research report aims to inform State agencies on emergency planning and implementation of strategies to increase the overall extent of household preparedness in Hawai'i. In particular, our report addresses the following set of core research questions: (1) What is the overall rate of households' emergency essential supply preparedness in Hawaii? (2) How does emergency household essential supply preparedness differ across counties in Hawaii? (3) What is the difference between *actual and perceived* levels of household preparedness in Hawaii? (4) What is the degree of community awareness of the State's recommendation for 14-days of emergency essential supplies storage?

(5) What are the most preferred modes of communication for information attainment on emergency preparedness recommendations and updates in Hawaii?

## METHODS

### **Sample**

We employed an opt-in proportional quota sampling technique aiming to produce a State-level representative sample of households with characteristics that are proportional to the socio-demographic characteristics of the general population in the State of Hawaii. The sampling frame of our study was formed by a panel-amalgamation process -performed by *Lucid*. An opt-in method was implemented in the data collection process aiming at a completion rate that would allow us to be confident over the representativeness of the projected results with a +/- 3% margin of error. Our final sample was constituted by 1006 households with 707 households from the City and County of Honolulu, 134 from Hawai'i County, 114 from Maui County and 51 from Kauai County. Table 1 illustrates the population of residents and households, and the sample size per county.

Table 1. Population and Sample Distribution by County in Hawai'i

Counties	Households	Population	Sample size
C&C of Honolulu	312,798	984,821	707
Hawai'i County	69,453	199,459	134
Maui County	54,503	166,045	114
Kaua'i County	22,658	71,769	51
Total	459,412	1,422,094	1006

The data collection process was performed predominantly via an online distribution of the survey questionnaire (opt-in method), and partially via Computer Assisted Telephone Interviews (CATI) from January 12<sup>th</sup> to February 9<sup>th</sup>, 2023.



The invitation letters included a summary of the study, the description of activities and conduct, a note about the time commitment, a thorough description of the ethical considerations ensuring confidentiality, anonymity, voluntary participation, and the contact information of the senior researchers conducting the study.

### **Survey Design**

The survey questionnaire consisted of 5 distinct sections associated with the attitudes, concerns, perceptions, awareness, rates of preparedness, and public recommendations over the general theme of disaster preparedness in Hawaii. The questionnaire included series of open and closed-ended questions designed in various forms such as Likert scale, matrix, contingency questions with a total of 67 items of inquiry divided into 5 distinct sections. The first section rated the level of concern associated with specific types of natural disasters in Hawaii, as well as the public opinion over the State emergency preparedness priorities.

The second section was designed to assess perceptive preparedness, actual preparedness in several sub-dimensions with an emphasis on households' extent of water, food, and medical emergency supplies stored. Also, in the same section a few items assessed the overall familiarity with the Emergency Preparedness recommendations, and the most preferred mode of communication that may increase the extent of public awareness. The next section of the survey questionnaire gathered information on the households' characteristics including the county and zip code of residence, household size, ownership status, highest educational level attained, and household income. Finally, the remaining sections of the questionnaire inquired information about the reasons of lack of preparedness, need of special accommodations (i.e., infants, elderly, etc.) and socio-demographic characteristics of households. Our research design was approved by the Institutional Review Board ensuring the integrity of our study.

### **DATA ANALYSIS**

We performed an array of descriptive univariate analysis and bivariate analysis through cross-tabulation examining dependence between the

categorical variables of interest. Discrete codes were assigned to each category of the variables, followed by a recoding process organizing the attributes in a logical sequence and ranking. Furthermore, we collapsed the attributes of preparedness and awareness into dichotomous categories of *prepared* and *not prepared*, and *aware* and *not aware* for the purpose of our analysis. The process of data entry, data cleaning, and data management were performed in IBM SPSS. Prior to performing our descriptive data analysis, we used a Random Iterative Method (RIM) weighting to moderate the differences between the sample and actual population distributions.

## **RESULTS & DISCUSSION**

The results of our descriptive analysis are presented in 6 distinct sections. The first section presents data on the individuals' socio-demographic information, the second focuses on the households' characteristics, while the third describes the distribution of households with factors that are associated with social vulnerabilities. The fourth section analyzes data associated with the perceived risk of hazards and the public recommendations over State's priorities within the context of disasters. The fifth section portrays the rate of emergency essential supply preparedness, and the sixth provides information on public awareness and preferred mode of communication for public announcements about guidelines and updates on emergency preparedness and response.

### **Section 1: Respondents' Demographics**

Even though our study focuses on households' emergency preparedness (not the individual), analyzing information at the individual-level serves the purpose of representativeness of our sample. Also, it accounts for the detection of vulnerable populations that are more susceptible to the impact of natural disasters. As it appears in figure 1, the percentage frequencies of the respondents' age groups are as follows: 10.6% of within 18 to 24 years of age, 17.3% are anywhere between 25 to 34 years old, 16% within 35-44 years old, 15% falls within the age range of 45-54, while 16.1% within the age group of 55-64, 14.5% in the range of 65-74 years, and 10.4% appear to be above

75 years of age. The average age of the respondents is approximately 49 years old.

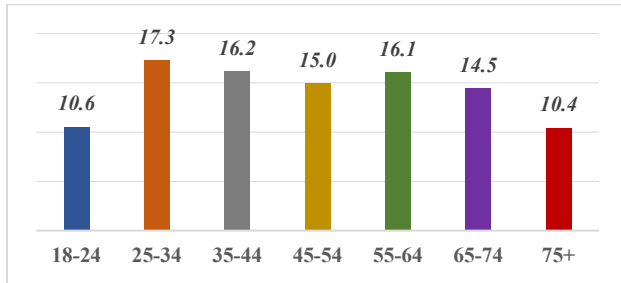


Figure 1. Respondents' Age-Groups

Also, 47% of the respondents are females, 50% males while 1% falls under the non-binary category and 2% preferred not to share information about their gender. The pie chart shown in figure 2 illustrates the gender distribution of the respondents included in our sample.

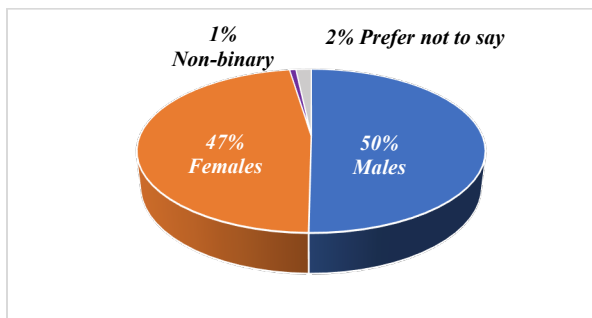


Figure 2. Respondents' Gender

With regards to marital status, as it appears in figure 3, 42% of the surveyed individuals are married, while 48% stated that are single who were never married, 12% divorced, 5% widowed and 2% identified as other (i.e., partnership, cohabitating, separated, etc.).

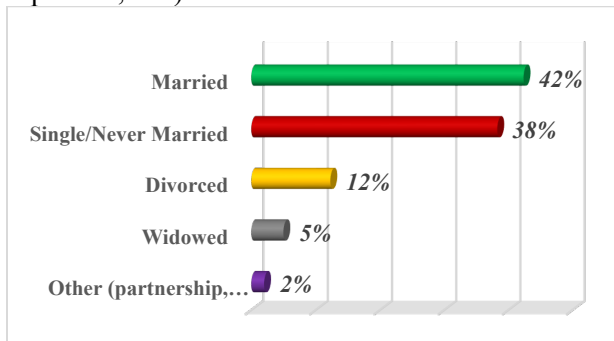


Figure 3. Respondents' Marital Status

Finally, in terms of the racial and ethnic groups of the respondents of our sample, figure 4 portrays the

percentage frequency distribution for each racial and ethnic category. Thirty-five percent (35%) of respondents are Asian, 28% white/Caucasian, and 21% appear to be within the group of Native Hawaiian/Pacific Islander. Finally, the remaining 16% of the respondents have identified their racial or ethnic group as Latino/Hispanic, African American, Native American, or Alaskan Native and two-or-more races.

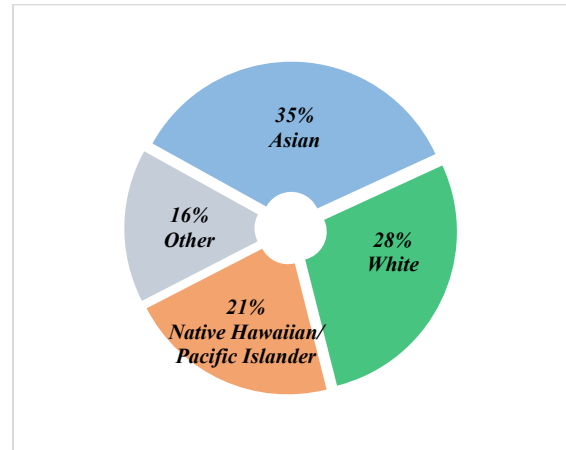


Figure 4. Respondents' Race/Ethnicity

## Section 2: Household Characteristics

This section of our analysis portrays the frequency distribution of specific household characteristics such as homeownership status, years of residence in Hawai'i, household size, highest educational level attained in the household, and household income from all sources. Gathering information on such exogenous factors is important in the process of categorizing and assessing households' emergency preparedness in the State of Hawai'i. Further, some of the characteristics constitute indicators of social vulnerability (i.e., household income, years of residence, etc.) that significantly affect the extent of actual household preparedness.

As we can see in figure 5, fifty-six percent (56%) of the respondents own the house they live in, while 40% are currently renting, and 4% are living with parents, are house guests or homeless.

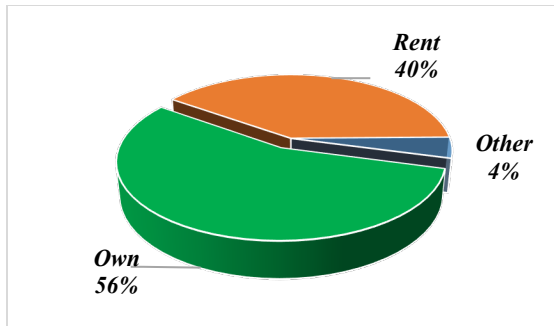


Figure 5. Home ownership

Developing community ties is very important for the degree of awareness about hazard risks and extent of familiarity with the suggested preparedness guidelines. Hence, years of residence could serve as proxy of the *sense of belonging* and *participation in community networks*. Our analysis revealed that on average, the respondents have been residing in their current household for 13 years (figure 6). Clustering the categories of years of residence, the percentage frequency distribution revealed that thirty-five percent of the surveyors fall within the range of 0 to 4 years of residence, 26% within the range of 5 to 10 years, 7% within the range of 11 to 15 years, 9% within the range of 16 to 20 years, 5% within the range of 21 to 25 years, 6% within the range of 26 to 30 years, and 12% above 25 years of residence.

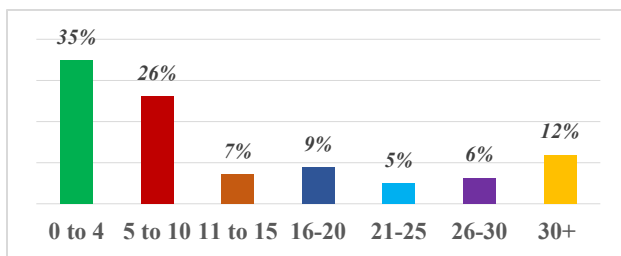


Figure 6. Years of Residence in HI

Also, in our sample, the average household size is constituted approximately by 3 residents. As we can see in figure 7, twenty five percent (25%) of the households are occupied by one person, 32% by two people, 15% by three individuals, 10% by 4 residents, 8% by 5, and 9% with 6 or more people that are currently living in the same household.

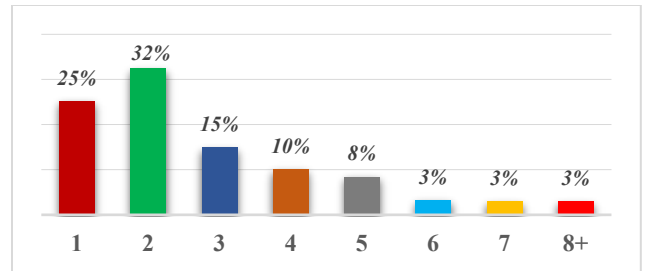


Figure 7. Household Size

The next item of the survey questionnaire inquired about the highest level of education attained in a household. Education is a critical factor of preparedness awareness and risk of hazards. As it appears in figure 8, the highest level of education attained in 10% of the households of our sample, is less than highschool, 27% have reached highschool diploma, 17% reached some college or university, 13% an associate's degree, 21% a bachelor's degree, and 12% have at least one member with some time at graduate school or a graduate degree.

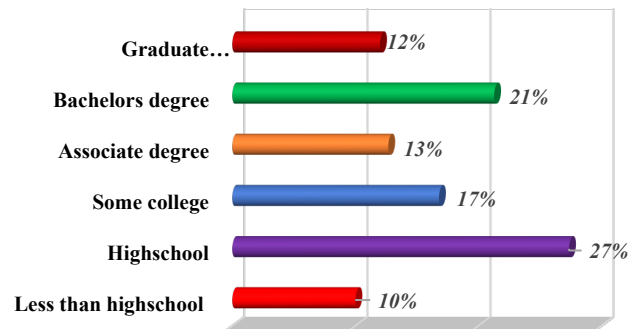


Figure 8. Highest Level of Education in Household

### Section 3: Social Vulnerability

Entering into the examination of household characteristics that have a significant impact on social vulnerability, we gathered information on household income from all sources, presence of infants, senior citizens, and people with disabilities, as well as presence of pets in the household.

Regarding the households' income level from all sources, we considered that the average household size is 3 individuals, and that the income threshold for receiving federal assistance is close to \$40,000. As we can see in figure 9, 22.3% percent of the households in our sample fall under the \$40,000 benchmark, while 24.7% of them are within the

range of \$40,000 - \$79,999, 18.5% are in the income category of \$80,000 - \$119,999. Also, approximately 10% of the households have income anywhere between \$120,000 to \$159,999, 7.2% between \$160,000 to \$199,999, while 13% of the households have a total income from all sources equal or above \$200,000 a year. Based on our descriptive analysis, one fifth of the households are particularly vulnerable due to limited financial resources that may affect the extent of their households' essential supply preparedness.

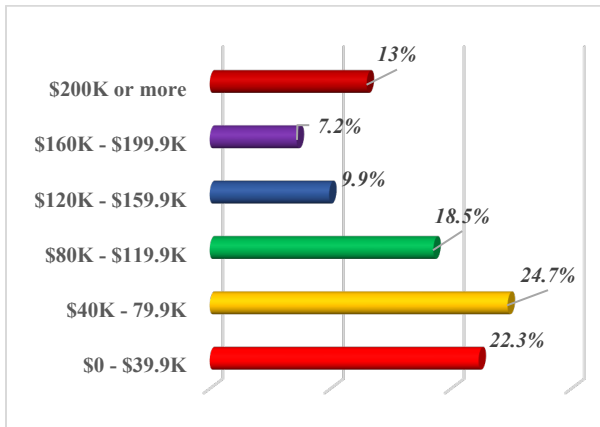


Figure 9. Household Income Categories

Finally, the presence of individuals requiring special accommodations, and presence of pets can be classified as vulnerable households that may be most affected by the impact of a natural disaster. As we can see in figure 10, eight percent (8%) of the households in our sample have at least one infant, 18% of households have at least one person with disability, while 38% of the households have at least one member that qualifies as a senior citizen. Lastly, approximately one half of the households have at least one pet.

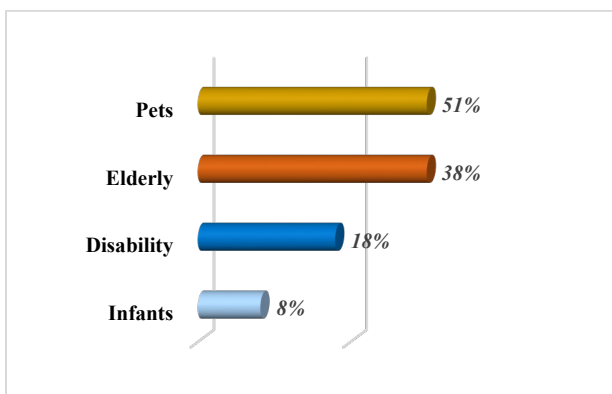


Figure 10. Vulnerable Households

All the categories of vulnerable populations require special accommodations for the emergency response during the event, and extensive support to prepare for, as well as to recover from the impact of a natural disaster.

#### Section 4: Hazards & State Priorities

The fourth section of our analysis assesses the degree of concerns for natural hazards (hazard risk), as well as the public recommendations over the State's government priorities in the context of emergency preparedness.

As it appears in figure 11, seventy-two percent (72%) of the households are particularly concerned about the occurrence of hurricane, while 60% identified that their household and community is particularly susceptible to tsunamis, 58% expressed concerns about floods, 53% about earthquakes and 44% about landslides and debris. Lower levels of concern were reported for volcanic eruptions (41%) and wildfires (38%). However, the rate of concern for volcanic eruptions was particularly positively skewed in the households of the County of Hawai'i (Big Island). Finally, relatively low levels of concern for wildfires (38%) reported at the time of the data collection, may have significantly changed since the dire and tragic consequences of Lahaina's wildfires in August 2023.

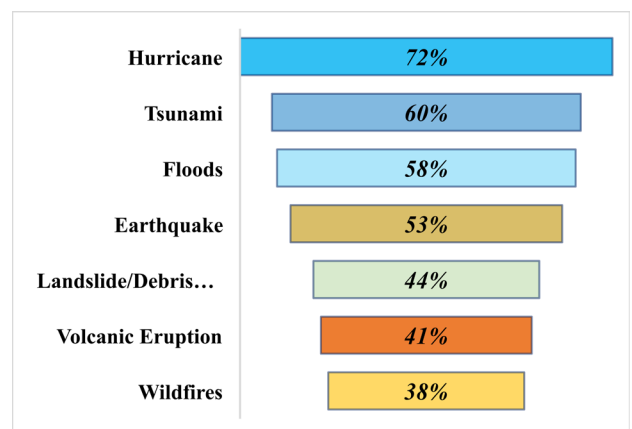


Figure 11. Public Concern for Natural Hazards

With regards to the public recommendations over the State's priorities (see figure 12), we identified the top suggested priorities: (1) improving State's agencies emergency response and preparedness services (94%); (2) investing, and improving on public essential supply storage facilities (92%); (3)

protecting, and improving the transportation and seaport infrastructure (90%); Also, 8 out of 10 households recommended that State priorities should focus on the protection of private property, while 76% of the households suggested that the protection of historical and cultural sites should be at the top of the State’s priority list.

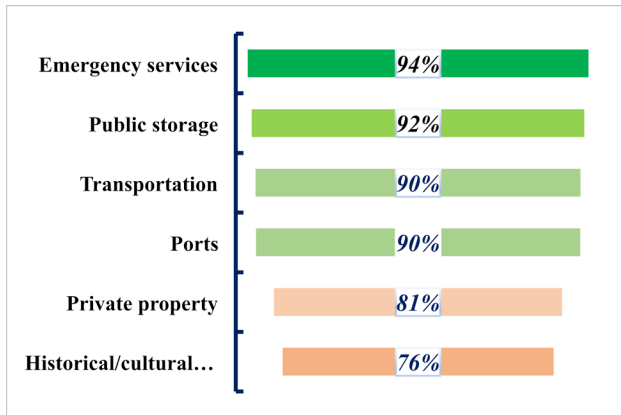


Figure 12. Recommended State Priorities

### Section 5: Essential Supply Preparedness

The fifth section of our descriptive analysis focuses on assessing the public opinion about the importance of having essential supplies stored, the self-reported (perceived) level of preparedness, the extent of emergency supplies stored (actual preparedness), and the rate of households Statewide that meet HIEMA’s recommendations for 14-days emergency supplies preparedness. In this section, we also focus our analysis on a subset of households that did not meet the State’s recommendations and identified the main reasons of lack of households’ readiness.

Firstly, as we can see in figure 13, an overwhelming majority of households (94%) recognize the importance of having essential supplies stored. This finding reveals that households acknowledge the vitality of emergency supplies stored revealing the notion of affirmed intentionality for water, food, and medical supplies preparedness.



Figure 13. Importance of Storing Essential Supplies

In the next step of our analysis we detected the extent of essential supplies stored across the levels of perceived preparedness. That is, a survey question asked the participants to indicate the exact number of days that their households have water, food and medical supplies stored. Then, a different question asked the respondents to self-report the level of their households’ preparedness. Table 2 summarizes the average days of water, food and medical supplies stored across the levels of perceived preparedness.

Table 2. Average Days of Essential Supplies Stored across Perceived Preparedness Categories

# of days of essential supply stored	Perceived Preparedness			
	Not Prepared at all (perceived)	Not Prepared (perceived)	Prepared (perceived)	Most Prepared (perceived)
	Mean	Mean	Mean	Mean
Water Supply	2.32	2.45	3.81	7.06
Food Supply	3.01	3.92	6.04	8.71
Medical Supply	3.61	6.20	7.01	9.74

The average days of water, food, and medical supplies stored for the respondents who self-reported that *are not prepared at all* are 2.32, 3.01, and 3.61. Respondents who claimed that their households are *not prepared*, average a 2.45 days’ of water, approximately 4 days of food, and 6 days of medical supplies stored.

At this point, we can highlight that the respondents appear to have a valid perception of lack of preparedness. However, within the category of households that their respondents claimed that are *prepared*, the average days of water, food and medical supplies are 3.81, 6, and 7 days

respectively. Finally, the category of households that are identified by their residents as *most prepared* have 7 days of water, 8.71 days of food and close to 10 days of medical supplies stored. Evidently, even though the average days of essential supplies stored (*actual preparedness*) rises as the levels of perceived preparedness increase, the subset of households that self-reported as *most prepared* tend to meet FEMA’s recommendation (7-days of essential supplies stored), yet they do not meet the threshold of the 14-days *readiness* in accordance with the HIEMA’s recommendation.

In the next stage of our analysis, we broke down the categories of *perceived preparedness* into binaries of *not prepared* and *prepared* and we compared the percentages of *perceived preparedness*, *FEMA readiness* (percentage of households that meet or exceed the 7-days threshold) and *HIEMA readiness* (percentage of households that meet or exceed the 14-days threshold). Figure 14 shows that 71% of households self-reported that they are water-supply prepared, yet only 42% of them meet FEMA’s recommendations and only 19% meet HIEMA’s recommendation. Similarly, 69% of households think that they are adequately prepared in food supplies, however only 55% of them meet FEMA’s 7-days recommendation, and just 29% meet or exceed HIEMA’s recommendation. Finally, in terms of the medical supplies, 83% of households have the perception of being prepared, but only 62% and 39% of them tend to meet FEMA and HIEMA’s suggested storage of essential supplies.

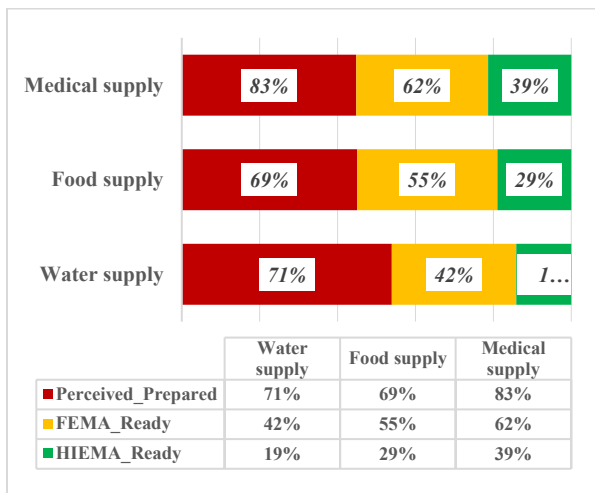


Figure 14. Perceived Preparedness, FEMA and HIEMA Readiness

As we moved on to the next stage of our descriptive analysis, we assessed the rate of households’ *readiness* for all essential supplies combined at the County and State level. As it appears in figure 15, only 11.5% of households in the City & County of Honolulu, 19.5% in the County of Hawai’i, 8.9% in Maui, and 8.5% in Kauai Counties appear to satisfy the 14-day criterion of readiness in all essential supplies (water, food and medicine) combined.

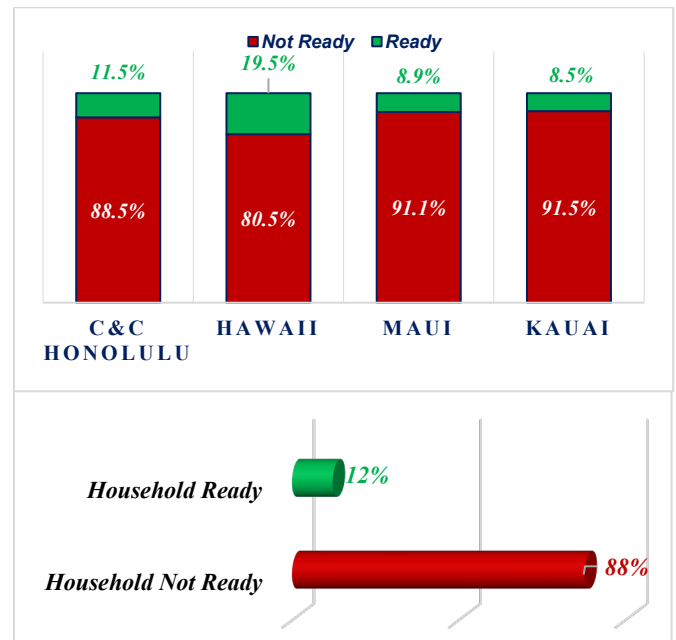


Figure 15. Households Readiness of all essential supplies combined at County and State Level

In sum, at the state level, only 12% of all households appear to be ready, while an overwhelming majority of the households appear to fall short on storage for one or more of the essential supplies.

In the last part of this section, we asked the participants of households that are *not ready* to identify the reasons for lacking food, water and medical supplies stored for 14 days. As we can see in figure 16, most of the respondents (56%) stated that *lack of storage* in their households prevents them from having food and water stored for 14-days, while 41% of them reported that *lack of information on emergency guidelines* is the major constraint of lacking preparedness. Furthermore, other preventing factors such as *limited financial resources* and *lack of time to prepare* were also

identified as reasons for not having adequate supplies stored.

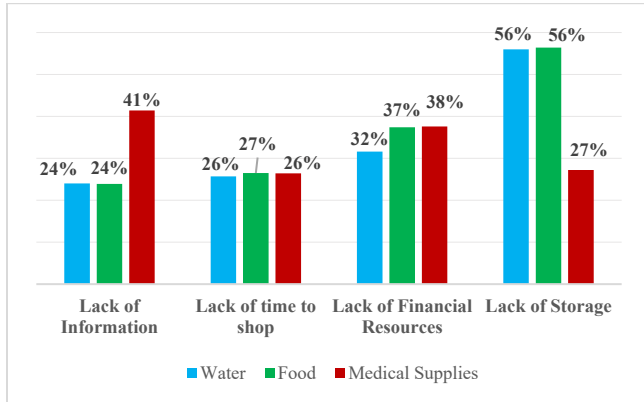


Figure 16. Reasons for not meeting HIEMA's 14-day essential supply recommendation.

### Section 6: Awareness and Preferred Mode of Communication

The last stage of our analysis focuses on the respondents' familiarity with FEMA and HIEMA emergency preparedness guidelines, the public awareness of HIEMA's recommendation of essential supplies stored and the preferred communication outlet to receive updates on emergency preparedness and response.

As it appears in figure 17, the majority of the respondents (56%) are *not aware* of the general emergency preparedness guidelines, and 57% of the households are *not aware of the HIEMA's recommendation for 14-days* of food, water and medical supplies stored.

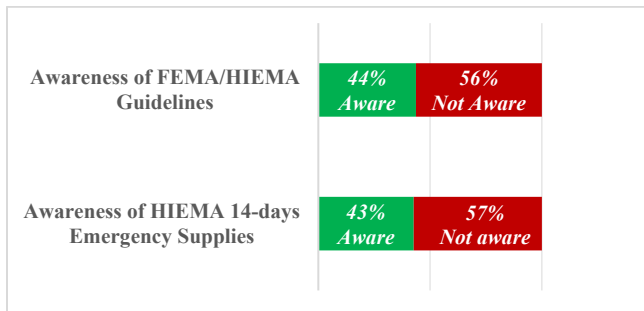


Figure 17.. Public Awareness of FEMA and HIEMA emergency preparedness guidelines and recommendations

Looking closely at the variation of awareness across counties in Hawai'i (see figure 18), we can conclude that households in Hawai'i county are the least informed (30.6%), while in Kauai County only

42.6% of the households are aware of HIEMA's recommendations. Also, in the City & County of Honolulu, not even half of the households (43.6%) are familiar with the updated guidelines, while in Maui, half of the households (50%) appear to be adequately informed about the updated recommendations of essential supplies readiness.

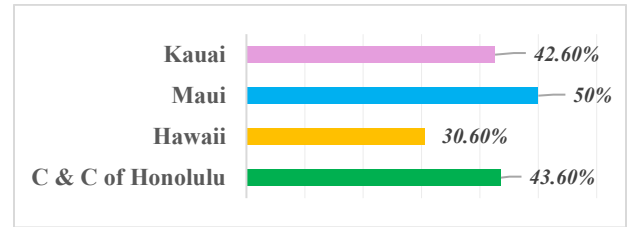


Figure 18. Awareness with HIEMA recommendations across Counties

The next step of our assessment we identified the subset of the households that are aware of HIEMA's updated recommendations and detected their source of information. In figure 19, 80% of the aware households became familiar with the suggested guidelines through ties with their community; they attained relevant information through family and friends. Sixty-four percent (64%) became aware by visiting *HIEMA's website*, while 62% got informed by signing up to an agency to receive updated information. Finally, 61% of the aware households attained information on essential supply preparedness through FEMA's website, and 39% by attending in-person or virtual informational meetings about the emergency preparedness guidelines.

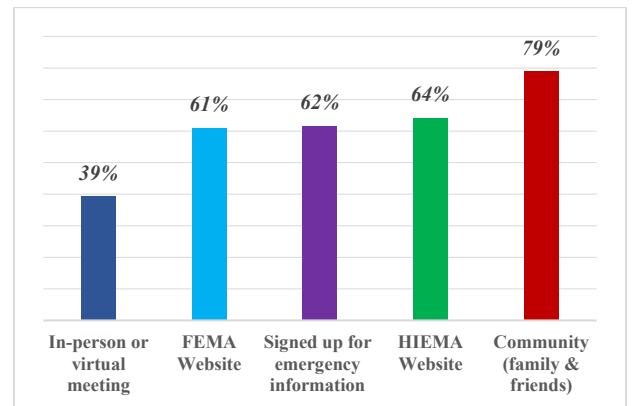


Figure 19. Source of Information for Households currently aware FEMA/HIEMA recommendations

The final step of our analysis detected the preferred mode of communication across different age

categories. Figure 20 illustrates that for younger individuals (age groups 18 to 44), the most preferred source of receiving emergency preparedness, and updates, is through the internet sites and social media platforms. On the other hand, respondents that are above 45 years old seem to prefer to receive information about the emergency preparedness and response guidelines via the television. Preference of local radio seems consistent across the age groups at approximately 16%, while mobile apps tend to be moderately preferred across the age groups of 35-44 and 45-54.

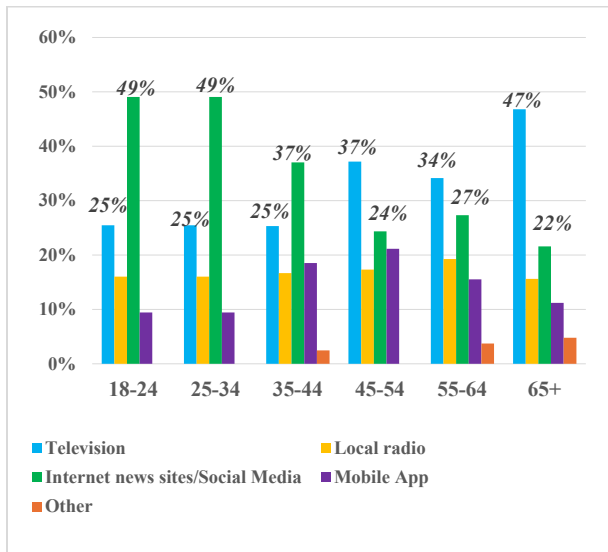


Figure 20. Preferred source of information across age categories

## CONCLUSIVE REMARKS

Overall, our results revealed a high degree of concerned residents of Hawai'i over the risk of natural disasters that may have direct impact on their communities/households. Also, an overwhelming majority of the respondents (94%) conceded that it is either *very important*, or *important* for their households to have emergency supplies prepared/stored in the event of a natural disaster.

The respondents identified the top two state priorities: (1) Improving the State Emergency Services (94%) and (2) investing in the expansion and protection of food/water public storage facilities (92%). Also, ninety percent (90%) of the respondents recommended that protecting transportation networks and the ports should also be

considered as a state priority, while 76% suggested that the state should focus on the protection of private property. Finally, 3 out of 4 respondents suggested that the state should protect the historical and cultural sites in times of natural disasters.

Assessing the overall extent of emergency preparedness, approximately 7 out of 10 respondents consider (perceive) that their households are most prepared or prepared with essential emergency supplies such as water and food. More than 80% of respondents think that they have adequate medical supplies (regularly used medications) stored in their households. More specifically, 71% of the respondents *perceive* that their households are “water supply prepared,” 69% think that they are “food supply prepared” and 83% percent claim that are “medical supply prepared.” However, in terms of the actual preparedness measured by the extent (# of days) of essential supplies stored in their households, our analysis revealed that approximately 42% of the households in Hawaii meet FEMA’s 7-day water supply recommendation, 55% of the households meet FEMA’s food emergency supply and 62% of them have regularly used medications stored for 7-days.

An overwhelming 81% of households in Hawaii do not meet the “water supply readiness” in accordance with the HIEMA’s 14-day recommendation. Also, 71% of the households do not have food for 14-days stored, and 61% of the households do not have adequate medical supplies stored for the recommended 14-day threshold.

Merging the results on perceived preparedness, actual preparedness, and readiness, we can conclude that a great majority of the respondents “think” that their households are prepared, yet, in reality, they do not nearly meet the criteria of HIEMA’s standards of the 14-day emergency supplies that are essential for coping and recovering after a catastrophic event.

Analyzing even further the trend of overall household preparedness, we created the binary categories of preparedness “*prepared*” and “*not prepared*.” The binary coding scheme is based on the assumption that any household in Hawai'i must



meet the 14-day emergency supplies for water, food, and medical supplies combined. For instance, in this binary measure, households that are “food supply ready” but not “water supply ready” or “medical supply ready” are classified as “not ready.” In simple terms, any given household is categorized as “ready” when the following criterion is satisfied: Households have all essential supplies stored for at least 14 days.

The analysis of the binary categories revealed that, per HIEMA standards, only 12% of the households in Hawaii are “ready” for an emergency, while 88% or approximately 9 out of 10, of the households do not have adequate emergency supplies stored.

Another interesting finding is that there is a small variation of “household preparedness” across the counties in the State of Hawaii. Households in Kauai and Maui Counties appear to be least prepared with 9 out of 10 households not being ready. Similarly, in the City and County of Honolulu, 88.5% of the households are not ready, and in Hawaii County despite the fact that household appear to be a readier than the other counties, only 1 out of 5 households meet or exceed HIEMA’s recommended threshold. As a general observation resulted by our analysis, we can conclude that the vast majority of the households in the State do not satisfy HIEMA’s recommended guidelines. A more thorough explanatory study focusing on detecting the factors associated with households’ lack of preparedness must be conducted.

Our descriptive analysis attributed insufficient household preparedness to lack of storage space for food and water in most of the households (56%). Also, approximately 1 out of 3 respondents identified lack of financial resources as the cause of unpreparedness, and 1 out 4 claimed that lack of information as well as lack of time to shop for emergency supplies are the main reasons for the low level of their households’ preparedness.

Another important factor is the lack of awareness that seems to play a significant role of inadequacy of supplies stored across the State. Fifty six percent (56%) of the respondents are familiar neither with FEMAs, nor with HIEMA’s recommended guidelines and 57% are not aware of HIEMA’s recommendations.

In terms of the preferred mode of public announcements on emergency preparedness guidelines and updates, television appears as the most preferred media outlet for the age groups 45-54, 55-64 and 65 or higher with ratings of 37%, 34% and 47% respectively. Among younger groups (18 to 44) internet news sites and social media platforms appear to be highly preferred. Finally, preference over radio announcements on disaster preparedness and response appears to be consistently within the range of 16% - 19% across all age groups.

## RECOMMENDED ACTION PLAN

- ***Communications: Raising awareness of HIEMA Emergency Preparedness Recommendations***  
We strongly recommend a statewide multi-media communications plan and strategy (including TV, internet, radio, and mobile app) to raise public awareness of the Hawaii Emergency Management Agency (HIEMA) recommended 14-day supply of household emergency food, water and medicine.
- ***Prepositioning of Emergency Food in Identified Vulnerable Communities:***  
Develop a census blocks geo-referenced data on household essential supply preparedness, rates of household food insecurity, and c.) identification of infrastructure limitations and physical vulnerabilities, we recommend pre-positioning emergency food pods statewide in identified vulnerable communities.
- ***Develop New Emergency Food Storage Infrastructure:***  
Plan and build new commercial and emergency food storage infrastructure to increase the capacity for in-state storage of commercial and emergency food.
- ***Coordination & Planning:***  
Develop formal coordination plan and strategy between public sector agencies (e.g. C/Co EMAs, HIEMA, DoD) and private sector firms (e.g. Hawaii Foodservice Alliance) for state-wide emergency food distribution.
- ***Investment on Interdisciplinary Research and Development:***
  - Fund geo-referenced data gathering and analysis to map layers of: (1) household emergency preparedness (above); (2) rates of household food insecurity; and (3) infrastructure and physical vulnerabilities.
  - Fund Explanatory/Predictive Analytics Research to examine socioeconomic factors preventing emergency preparedness in Hawai'i.
  - Fund longitudinal study to assess household emergency preparedness in Hawaii to measure the impact of state-led interventions.

## APPENDIX

### Survey Questionnaire on Households' Emergency Preparedness in Hawai'i

#### Start of Block: INFORMED CONSENT

Consent to Participate in a Survey Research Study

Title: Assessing Household Emergency Preparedness in Hawai'i

Aloha! Thank you for participating in this research study on Emergency Preparedness in Hawai'i. The purpose of this study is to assist the Emergency Management Agency to identify the extent of Hawai'i households' compliance with emergency preparedness recommended guidelines. Your contribution is crucial for the completion of this project, and it will inform the strategies improving the emergency preparedness planning efforts of the Emergency Preparedness Agency in Hawai'i.

**Activities and Conduct:** Your contribution to this study is voluntary. You will be asked to complete a survey questionnaire consisting of twenty-five (25) questions associated with attitudes, perceptions, awareness, and practices for emergency preparedness of your household. For your convenience, you will be given the option of a computer-assisted telephone survey interview, or you may choose to complete the questionnaire online (self-administered).

**Time Commitment:** Participation in this study will take approximately ten to fifteen minutes. You may choose to participate either by computer-assisted telephone survey interview or by completing the online questionnaire on your own.

**Benefits and Risks:** There will be no direct benefit to you for participating in this project. The results of this project will have an important impact on assessing the extent of household emergency preparedness in Hawai'i. Your assistance may improve the Emergency Management Agency's current practices and recommendations for increasing safety in times of emergency. There is little risk to you throughout the process. If you become anxious, stressed, or uncomfortable with any of the questions, you can skip any item in the questionnaire or take a break. You can also withdraw from the project altogether.

**Confidentiality and Anonymity:** To ensure the confidentiality of your answers, the database derived from the survey questionnaires will be stored in a computer that will be in a locked office on a password protected computer in a password protected folder. Only the key personnel of the research team will have access to the information. Other agencies that have legal permission may review unidentifiable records ensuring anonymity of the respondents and confidentiality of the responses. The Emergency Management Agency of the State of Hawai'i has the right to review research records for this study.

**Voluntary Participation:** Your participation in this study is voluntary. If you stop being part of the study at any time, there will be no penalty or loss to you.

**Questions:** If you have any questions about this study, please call or email either Dr. Konstantinos Zougris, at (808) 689-2496 or [kzougris@hawaii.edu](mailto:kzougris@hawaii.edu) or Dr. Albie Miles at 808-689-2376 or [albie@hawaii.edu](mailto:albie@hawaii.edu). If you have any general comments associated with the study, you will have the opportunity to express your opinions/comments in the last question of the survey.

Agreement: I reviewed this form and give permission to join the research project titled "Assessing

Household Emergency Preparedness in Hawai‘i.”

Please indicate whether you consent or do not consent to participate in this research study.

**I consent** (1)

**I do not consent** (2)

*Skip To: End of Survey If QID1 = <strong>I do not consent</strong>*

**End of Block: INFORMED CONSENT**

**Start of Block: Section 1. Natural Disaster Household Concerns & Perceptions on State Priorities**

Question 1 How concerned are you about each of the natural disasters/emergencies that may affect your community/household?

	Very Concerned (1)	Concerned (2)	Not as Concerned (3)	Not Concerned at all (4)	Not Sure/Don't know (5)
Hurricane (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tsunami (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Volcanic Eruption (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Floods (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Landslide/Debris Flow (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wildfires (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Earthquake (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (8): Please specify (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Question 2 Please rate the level of importance for each of the following preparedness State priorities for a natural disaster/emergency.

	Very Important (1)	Important (2)	Not as Important (3)	Not Important at all (4)	Not sure / Don't know (5)
Protecting and expanding public food/water storage facilities (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Protecting transportation networks (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Protecting historical and cultural landmarks (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Protecting infrastructure (ports, etc.) (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Protecting Private Property (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improving State emergency services (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other: Please describe (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

End of Block: Section 1. Natural Disaster Household Concerns & Perceptions on State Priorities

---

Start of Block: Section 2: Households' Emergency Preparedness

Question 3 How important is it for your household to have emergency supplies stored in preparation for natural disaster/emergency?

- Very Important (1)
  - Somewhat Important (2)
  - Not as Important (3)
  - Not Important at all (4)
  - Not Sure / Don't know (5)
-

Question 4 To your knowledge, please indicate the level of your household's emergency preparedness for each of the following items.

	Very Prepared (1)	Prepared (2)	Not as Prepared (3)	Not Prepared at all (4)	Not sure / Don't know (5)
Water supply (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food supply (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Manual can opener for food (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
First aid kit (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Regularly used medications (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sanitation and hygiene items (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generator for emergency power (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Battery-powered radio (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Flashlight and extra batteries (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cell phone with chargers (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Extra set of house and car keys (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Matches in waterproof container (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Determined emergency out of town contact (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Emergency financial budget (i.e. available cash and coins) (14)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Determined  
adequate  
insurance  
coverage (15)

Question 5 If there was a natural disaster/emergency in your community today...

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

My household has enough water (1 gallon per person) stored for ___ days. ()	
My household has enough imperishable food stored for ___ days. ()	
My household has medical supplies stored for ___ days. ()	

Display This Question:

If Question 5 [ My household has enough water stored for \_\_\_ days. ] < 14

Question 5a Which of the following barriers prevented your household from having stored enough water supply for 14 days?

(Check all that apply)

- Lack of financial resources (household budget) (1)
- Lack of information about recommended emergency preparedness supplies (2)
- Lack of storage space in my household (3)
- Lack of time to shop for the supplies needed (4)
- Other: Please specify (5) \_\_\_\_\_

*Display This Question:*

*If Question 5 [ My household has enough imperishable food stored for \_\_\_\_\_ days. ] < 14*

Question 5b Which of the following barriers prevented your household from having stored enough food supplies for 14 days? (Check all that apply)

- Lack of financial resources (household budget) (1)
  - Lack of information about recommended emergency preparedness supplies (2)
  - Lack of storage space in my household (3)
  - Lack of time to shop for the supplies needed (4)
  - Other: Please specify (5) \_\_\_\_\_
- 

*Display This Question:*

*If Question 5 [ My household has medical supplies stored for \_\_\_\_\_ days. ] < 14*

Question 5c Which of the following barriers prevented your household from having stored enough medical supplies for 14 days?  
(Check all that apply)

- Lack of financial resources (household budget) (1)
  - Lack of information about recommended emergency preparedness supplies (2)
  - Lack of storage space in my household (3)
  - Lack of time to shop for the supplies needed (4)
  - Other: Please specify (5) \_\_\_\_\_
- 



Question 6 Which of the following food supplies are stored in your household for emergency purposes?  
(Select all that apply)

- Dried fruit (1)
- Crackers (2)
- Potatoes (3)
- Canned meat (4)
- Canned fruits (5)
- Ready-to-eat cereals (not wheat-based) (6)
- Peanut butter (7)
- Jelly (8)
- Hard candy and canned nuts (9)
- Vitamins (10)
- Wheat (i.e. bread products, flour, etc.) (11)
- Vegetable oils (12)
- Dried corn (13)
- Baking powder (14)
- Soybeans (15)
- Instant coffee (16)

- Salt (17)
  - Noncarbonated soft drinks (18)
  - White rice (19)
  - Bouillon products (20)
  - Dry pasta (21)
  - Condensed vegetable soups (22)
  - Fruit juices (23)
  - Vegetables (24)
  - Tea (25)
  - Cocoa (26)
- 

Question 7 Are there any infants (1 year old or younger) in your household?

- Yes (1)
  - No (2)
  - I would rather not answer this question (3)
- 

*Display This Question:*  
*If Question 7 = Yes*

Question 7a Have you stored any specific food supplies for infants?

- Yes (1)
  - No (2)
  - Not sure / Don't know (3)
- 

Question 8 Are there any elderly people (65+ year old; including yourself) in your household?

- Yes (1)
  - No (2)
  - I would rather not answer this question (3)
- 

*Display This Question:*  
*If Question 8 = Yes*

Question 8a Have you stored any specific food supplies for elderly people?

- Yes (1)
  - No (2)
  - Not sure / Don't know (3)
-

Question 9 Are there any individuals (including yourself) with disabilities in your household?

- Yes (1)
  - No (2)
  - I would rather not answer this question (3)
- 

*Display This Question:*

*If Question 9 = Yes*

Question 9a Will you need any type of special accommodation for the person with disabilities in times of natural disaster/emergency?

- Yes (1)
  - No (2)
  - Not sure / Don't know (3)
- 

Question 10 Are there any pets in your household?

- Yes (1)
  - No (2)
  - I would rather not answer this question (3)
- 

*Display This Question:*

*If Question 10 = Yes*

Question 10a Have you stored any specific food supplies for your pet(s)?

- Yes (1)
- No (2)
- Not sure / Don't know (3)

End of Block: Section 2: Households' Emergency Preparedness

---

Start of Block: Section 3. Natural Disaster/Emergency Preparedness Awareness and Communication

Question 11 Is anyone in your household (including yourself) familiar with the Food Emergency Preparedness guidelines as outlined by FEMA and/or Hawai'i Emergency Management Agency?

- Yes (1)
- No (2)
- Not sure / Don't know (3)

---

*Display This Question:*

*If Question 11 = Yes*

Question 11a Which of the following actions have you taken to become familiar with the emergency preparedness guidelines in Hawai'i ?

	Yes (1)	No (2)	Not sure / Don't know (3)
Collected food emergency preparedness information from FEMA website (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Collected food emergency preparedness information from Hawai'i Emergency Management Agency website (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attended (in-person or virtual) meetings dealing with the food emergency preparedness (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Signed up for emergency information and alert systems (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Became familiar with the emergency preparedness guidelines after a discussion with family members or friends (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

---

Question 12 Which of the following would be the most preferred source of information for your household regarding the food emergency preparedness guidelines/recommendations updates?

- Television (1)
- Local radio (2)
- Internet news sites (3)
- Mobile App (4)
- Social Media platforms (e.g. Twitter, Facebook, Instagram, etc.) (5)
- Other, please specify: (6) \_\_\_\_\_



Question 13 Are you aware that the Hawai'i Emergency Management Agency increased the recommended amount of emergency supplies for Hawai'i residents from 7 to 14 days' worth?

Yes (1)

No (2)

End of Block: Section 3. Natural Disaster/Emergency Preparedness Awareness and Communication

---

Start of Block: Section 4. General Household Information

Question 14 What is the zip code of your residence?

\_\_\_\_\_

-----

Question 15 How many people are currently living in your household?

1 2 3 4 5 6 / 8 9 10

Please indicate the number of people living in your household. ()



Question 16 Do you own or rent this residence?

Own (1)

Rent (2)

Other, please specify: (3) \_\_\_\_\_

Not sure / Don't know (4)

-----

Question 17 How long have you owned or rented this residence in Hawai'i?

---

Question 18 Which of the following is the highest educational level reached by a household member (including yourself) in your household?

- Less than high school (1)
- Some high school (2)
- High school (3)
- Trade school (9)
- Some college (4)
- Associate degree (10)
- Bachelor's degree (5)
- Some graduate school (6)
- Graduate Degree (i.e. Masters, Ph.D., etc.) (7)
- Other, please specify (8) \_\_\_\_\_

Question 19 Which of the following categories better describes the current total income of your household from all sources?

- \$0 - \$19,999 (1)
- \$20,000 - \$39,999 (2)
- \$40,000 - \$59,999 (3)
- \$60,000 - \$79,999 (4)
- \$80,000 - \$99,999 (5)
- \$100,000 - \$119,999 (6)
- \$120,000 - \$139,999 (7)
- \$140,000 - \$159,999 (8)
- \$160,000 - \$179,999 (9)
- \$180,000 - \$199,999 (10)
- \$200,000 or more (11)
- Not sure / Don' t know (12)

End of Block: Section 4. General Household Information

---

Start of Block: Section 5. Participant's Demographic Information

Question 20 What is your age ?

\_\_\_\_\_

-----

Question 21 What is your gender ?

- Male (1)
  - Female (2)
  - Non-binary / third gender (3)
  - Prefer not to say (4)
- 

Question 22 What is your current marital status?

- Single/Never Married (1)
  - Married (2)
  - Divorced (3)
  - Widowed (4)
  - Other, please specify: (5) \_\_\_\_\_
-

Question 23 Which of the following categories best describe your race?

- White (1)
  - Black or African American (2)
  - Hispanic/Latino (3)
  - American Indian or Alaska Native (4)
  - Asian (5)
  - Pacific Islander (6)
  - Native Hawaiian (7)
  - Two or more races (8)
  - Other: Specify
-

Question 24 What is your present religion, if any?

- Evangelical Protestantism (1)
- Mainline Protestantism (2)
- Catholicism (3)
- Church of Latter-day Saints (Mormon) (4)
- Orthodox (any) (5)
- Jehovah's Witnesses (6)
- Judaism (7)
- Islam (8)
- Buddhism (9)
- Hinduism (10)
- Other: Please specify (11) \_\_\_\_\_
- Don't Know/Not sure (12)
- None

---

Question 25 Please feel free to provide any additional comments in the space below.

\_\_\_\_\_

**End of Block: Section 5. Participant's Demographic Information**

---