

## Phase 2 Project Report

# Attitudes and Trust in Leveraging Integrated Sociotechnical Systems for Enhancing Community Adaptive Capacity: Phase II

Prepared for Teaching Old Models New Tricks (TOMNET) Transportation Center



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## **EXECUTIVE SUMMARY**

The project described in this report explores relationships between social attitudes and community-scale disaster preparedness. Specifically, we are interested in respondents' knowledge of local resources and their willingness to share their own resources with others. We report on data gathered from a pilot sample survey focused on community resilience in an earthquake scenario that was implemented in a Seattle, WA neighborhood. We find that respondents' willingness to share resources also depends upon the nature of their social ties to those in need. We look specifically at access to health care services via different modes of transportation to better understand how people's means of seeking health care might change in a disaster scenario. Findings relevant to transportation planning include general uncertainty among respondents about what transportation options might be available in the event of a disaster such as an earthquake, and few respondents were prepared with alternative transportation options. This information could be used by municipalities and transit agencies to help inform community outreach and education efforts relevant to disaster planning. We seek to implement the survey more broadly across the Pacific Northwest in order to help inform resource matching for disaster preparedness at a range of scales.

## INTRODUCTION

Although much has been written about the likelihood of the survival or failure of physical transportation infrastructure in disaster situations (for example, see Faturechi & Miller-Hooks, 2014; Soltani-Sobh et al., 2016; or Chang et al., 2012), little research has focused on the community social and contextual factors that might shape the ways in which transportation systems transform in both configuration and function as the result of a disaster. In this paper we explore, through a pilot survey project, the integration of social factors such as attitudes, trust and willingness to share into a community-level assessment of disaster preparedness with a specific focus on transportation access to health care services. This research examines transportation-related issues as they pertain to community-scale disaster preparedness. Given multiple uncertainties about what kinds of transportation will be useful in a disaster scenario, it is helpful for community members and disaster preparedness planners to better understand what kinds of transportation resources are communities equipped with, how might they serve residents in gaining access to vital resources such as health care services in the case of a large-scale disaster.

The first section of the paper explains the motivation behind such a research agenda, including a brief discussion of infrastructural interdependency and the place-based nature of disaster. Because the effects of disaster, especially earthquakes, are inherently geographical (Henry, 2018), we posit that research is needed at the scale of the community in order to better understand how different places may or may not be equipped to deal with disaster. The second section specifically discusses the effects of disaster events on transportation networks and the varying roles that transportation infrastructure services play in a disaster scenario. The following section describes our study site, an urban neighborhood in earthquake-prone Seattle, WA, where we have partnered with a local organization focused on disaster preparedness to help shape the research from a community perspective. We then discuss the findings from our pilot survey, followed by discussion and next steps for advancing a community-scale research agenda.

This work makes two distinct contributions: 1) it introduces a novel, mixed methods approach to understanding disaster preparedness that integrates community social factors and attitudes, such as social trust and willingness to share; and 2) it constitutes a first step in the development of a flexible but rigorous community-scale research methodology that can be adapted for use in different community contexts. In addition, this work identifies potential gaps that might be addressed through community education, organization, and outreach to improve disaster preparedness.



## CHAPTER 1: LITERATURE REVIEW

### *The increasing incidence of disaster*

In the U.S., disasters are actually quite common, and their impact is increasing (Elliott & Howell, 2017). According to FEMA, the U.S. declared more than 1,000 disasters between 2007 and 2017. In the fall of 2017 alone, more than 25.8 million Americans are estimated to have been impacted by Hurricanes Harvey, Irma and Maria (FEMA Ready.gov, 2018). The growing number of people affected by disasters has led to an increased need for individual and family self-reliance during and following a disaster. The public health consequences of disasters persist long after the event itself, revealing weaknesses in infrastructure and medical services that often produce many more casualties than the direct impacts of the event, and creating long-term challenges for communities, health providers and transportation planners.

The social characteristics of disaster have been widely documented (Quarantelli & Dynes, 1977; Heinberg, 2017; Henry, 2018; Elliott & Howell, 2017; Adger et al., 2005). When physical infrastructure fails, social relationships serve as a substitute or “backup” to help people survive and cope with the consequences of the disruption (Freitag et al., 2014; Ritchie, 2017; Klinenberg, 2018). For example, if transportation services were disrupted, people in a community might share what resources are available locally or provide people with social support that they would otherwise need transportation (and/or communication) services to access.

Although we recognize that preparing for a disaster involves a great deal of uncertainty, it is clear that both social connectedness and access to a variety of local resources can help communities to cope with the consequences of disaster events. In this paper, we explore, via a pilot survey, the relationship between disaster preparedness and community social networks with a specific focus on transportation connections to health care services. We also explore how social attitudes like trust and willingness to share might affect access to different kinds of resources within a community in a disaster scenario.

### *The place-based nature of disaster*

Disasters are inherently geographical (Henry, 2018). The growing number of people affected by disasters has led to an increased need for individual and family self-reliance during and following a disaster. In Washington State, the Emergency Management Division encourages individuals and families to be prepared to spend up to two weeks without outside assistance after a disaster (Washington State Emergency Management Division, 2017). Likewise, communities are often cut off from outside resources and must rely upon internal resources – the collective strengths, skills, knowledge and material goods - to survive and recover. Most immediate emergency assistance after a disaster is provided by people within their own communities long before outside help is available (Henry, 2018). Place-specific factors, such as land use patterns, segregation, violence, microclimate, poverty, and age of population, can affect the ability of communities to deal with circumstances caused by disaster (Klinenberg, 2015). Length of residence and knowledge of place play key roles in how people adapt to disturbances (Connon, 2017), and community organizations and institutions play an important role in facilitating adaptive actions (Klinenberg, 2015; Henry, 2018).

### *The interdependency of transportation infrastructure*

Disasters affect people and the physical infrastructures upon which they rely due to the interconnected nature of social and technological systems (Townsend, 2013; Graham & Marvin, 2002); in fact, physical and institutional infrastructures often remain “invisible” until their failures

produce social consequences (Graham & Marvin, 2002; Klinenberg, 2015). Deteriorating infrastructure systems and lack of maintenance have left communities in the U.S. more susceptible to risk and hazards (Little, 2004a; Flynn & Burke, 2011). Furthermore, the increasing complexity and interconnectedness of infrastructure systems increases risk of failure (Little, 2004b; Flynn & Burke, 2011).

In disasters, many of the impacts experienced by communities comprise direct impacts of failed infrastructural systems (e.g., disruptions in electricity, cellular communications, or transportation) and indirect impacts, such as the disruption of social and institutional support systems. Many people are not well-served by these systems in normal, “blue skies” circumstances, and existing social inequities are highlighted and exacerbated during times of disaster, leading to inequitable outcomes for the most socially vulnerable (Klinenberg, 2015). This is not to downplay the extraordinary ways in which communities can come together during a disaster, as described in Rebecca Solnit’s book, *A Paradise Built in Hell* (2010); rather, it is to recognize that physical and technological infrastructure play an important, but often invisible, role in the structure of social support systems that reinforce everyday community life.

The effects of a disaster can be understood as departures from the “normal” social patterns of daily life manifested at multiple scales (Chen et al., 2013). At the scale of the community, emergency response activities become urgent and paramount; at the household level, a new set of needs, perhaps ensuring the safety of loved ones and procuring basic necessities, replace the set of “everyday” needs that were previously important (Ibid). Thus, access to transportation services and the range of people’s daily needs will both change significantly in the case of a disaster, leading to a new set of conditions under which a community must function by leveraging and matching locally available resources.

Many people use transportation services on a daily basis to help them accomplish a range of necessary activities. Transportation services enable people to travel to get to work, to get to school, to run errands or do shopping, to access services such as day care or health care, and to participate in recreational or leisure activities. Many transportation activities are organized or facilitated by information and communications technologies (ICTs), which also enable the communication necessary to complete a range of tasks, from the transportation-related items noted above to carrying out work-related tasks to accessing social support.

Although there are many options for combining or substituting transportation and communications technologies (Salomon, 1986; Mokhtarian, 1990; Lyons, 2009), both often rely on infrastructure that is susceptible to systemwide failure in the event of a disruption, such as cellular or transportation networks. In addition, access to many of the transportation services that facilitate daily activities relies upon the provision of private services and participation in digital society. In a relatively contained emergency situation that limits transportation options but not communication services (such as a transit strike, flood, or large planned events) the substitution of travel by ICT becomes much more attractive, and ICT can accommodate many work, commerce and social functions if needed (Mokhtarian, 2009). However, the range of scenarios for transportation and communication technology use and substitution would likely change significantly in the case of a larger disruption. In the next section, we discuss specifically the effects of disasters on transportation systems.

### *Transportation networks and disasters*

A functional and resilient transportation infrastructure is necessary for supporting the everyday needs of society. Disruptions such as disasters, which are uncertain and often unpredictable, can

have severely negative impacts on the transportation infrastructure that supports basic societal functions (Soltani-Sobh et al., 2016). Transportation systems are vulnerable to many kinds of hazards, including natural events, technological disruptions, and intentional malicious actions (Faturechi & Miller-Hooks, 2014).

Extreme events like earthquakes are nearly impossible to predict, and their impacts tend to be underestimated (Kermanshah & Derrible, 2016). Each disaster brings with it unique consequences, shaped by the magnitude and character of the disaster itself as well as the geographical, infrastructural and social context in which it occurs. Disasters can involve an array of different kinds of disruptions; for example, an earthquake might also cause fires, facilitate the spread of disease, or result in exposure to toxic chemicals (Litman, 2006). Transportation network damage from earthquakes results from a combination of factors, including ground failure (e.g., landslides or ground cracks), faulting (e.g., movement in the horizontal and/or vertical plane of the roadbed), vibration, and, in coastal areas, tsunami (Kermanshah & Derrible, 2016).

In any large-scale disaster, transportation systems are very likely to be affected, limiting the availability of service. The impacts that disasters have on transportation systems have intensified because transportation systems are increasingly complex and interdependent (Faturechi & Miller-Hooks, 2014). Damaged transportation networks lead to traffic congestion, transit delays, fuel supply problems, and disruptions to logistics operations (Litman, 2006; Ishfaq, 2012). The failure of mobile phone and electricity networks can in turn cause the failure of complementary ICT mobility services as well as more basic transportation infrastructure like stoplights (deJong, 2017). Disrupted transportation systems also result in damage to economic and social systems (Faturechi & Miller-Hooks, 2014).

#### *The role of transportation in disasters*

Transportation systems enable access to critical resources for daily activities as well as in emergency scenarios, where they can support evacuation, rescue operations, reconstruction, and recovery. (Faturechi & Miller-Hooks, 2014). Transportation networks and services play different roles in different types of disasters, including evacuation; delivery of emergency supplies and services; search and rescue operations; quarantine; and transportation infrastructure repair (Litman, 2006). The success of disaster recovery efforts is often influenced by the relative ease with which resources can be transported into and out of a community (Soltani-Sobh et al., 2016).

Transportation infrastructure might be appropriated for uses other than their intended purpose in the case of a disaster. For example, after the 2017 Mexico City earthquake, when separated bus rapid transit lanes served as emergency transportation corridors because they were not congested with traffic. In the days following the earthquake, walking, biking and motorcycles become the primary means of transportation, providing a mobility option for navigating obstructed streets, enabling the transportation of medicines and supplies, and enabling responders to scout heavily damaged areas (deJong, 2017).

## CHAPTER 2: PILOT STUDY SITE AND REGIONAL CONTEXT

The setting for this pilot study is an urban neighborhood in the Pacific Northwest, a region recently attuned to the potential impact and uncertainty of natural hazard events. Although Seattle is susceptible to several different types of hazards, we focus here on the likely impact of earthquakes, which in the region might range from more frequent and smaller disturbances to a potential magnitude 9.0 earthquake as detailed in the highly visible New Yorker article, “The Really Big One: Earthquake Preparedness in The Pacific Northwest” (Schulz, 2015). A massive Cascadia Subduction Zone earthquake such as the one described by Schulz and anticipated by the disaster science community would have a devastating impact on communities throughout the region, both urban and rural.

The pilot community of Laurelhurst is a relatively wealthy and well-connected urban neighborhood in Seattle of approximately 4,000 residents. In response to increasing concern about the potential effects of a Cascadia Subduction Zone earthquake, a group of Laurelhurst residents have self-organized to form a disaster preparedness organization, Laurelhurst Emergency Action Plan (LEAP). The highly educated and mobile residents of Laurelhurst have access to a range of health care services across the city, including world-class specialist care. Located near the University of Washington’s Seattle campus, the neighborhood is within close range of the University of Washington Medical Center, a nationally renowned hospital. Located within the neighborhood is the main campus of Seattle Children’s Hospital, one of the nation’s top children’s hospitals, as well as a handful of smaller private businesses and clinics offering a range of health care services.

LEAP, a community-initiated organization, regularly engages with existing City of Seattle disaster planning personnel and hosts preparedness events in the neighborhood providing instruction on a range of topics from how to put together an emergency preparedness kit to how to stop a bleeding victim from hemorrhaging. LEAP is attempting to organize the entire Laurelhurst neighborhood into approximately 20-household clusters, each with a cluster captain that can help to facilitate their group’s preparation for disaster by building stronger social connections within the cluster. To date, LEAP has not coordinated its efforts with the local health care and wellness community.

While Laurelhurst is not representative of Seattle neighborhoods, it provides an interesting test case for comparative purposes. The objective of future research along this line is to engage additional communities along spectra of both urban-ness and economic status. In addition, the goal of this research endeavor is not to seek out one-size-fits-all solutions; rather, it is to understand the ways in which community context and social factors uniquely shape disaster preparedness and capacity for response. For example, comparing the types resources available between communities of different economic status could be informative for disaster preparedness planning.

## CHAPTER 3: METHODS

The research methodology comprised two main components: a public workshop with community members, and a pilot sample survey. The research team first connected with LEAP members in the fall of 2016, at which time the two groups discussed their mutual interest in community-scale disaster preparedness. Discussions focused on better understanding how community assets can be leveraged to enable resilience in the face of disruptions (such as earthquakes) or other long-term changing conditions, in ways that also improve everyday community well-being. The research team began to join LEAP meetings, which led to collaboration on the design of a community workshop to learn more about assets and values within the Laurelhurst neighborhood.

### *3.1 Community Workshop*

On November 7, 2018, LEAP and the UW research team co-hosted a public workshop at the Laurelhurst Community Center, creating a forum for neighborhood stakeholders to discuss, via participatory group activities, the qualities that contribute to a resilient community. The purpose of the workshop was twofold: 1) to help LEAP recruit new members by spreading the word about community emergency preparedness; and 2) to build a better understanding of the unique community values and assets that might contribute to strengthening community resilience in Laurelhurst. Fifteen community members (including five LEAP members) and the UW team participated in the workshop.

Working together in small groups, participants were asked to map community assets in response to the following questions:

- What values or assets make your community unique?
- What are Laurelhurst's strengths as a neighborhood?
- What characteristics of the neighborhood contribute to everyday quality of life?

Participants were encouraged to think broadly about what might constitute a community strength or asset. The Community Capitals Framework developed by Emery and Flora (2006) was used as a prompt for participants to consider natural, cultural, human, social, political, financial and built capital in the exercise. Transportation-related assets identified by participants included a nearby light rail station, "lots of bikes," the road network and access to water and boats via neighborhood-adjacent Lake Washington. The presence of Children's Hospital within the neighborhood was identified as an asset. Social network assets include the fact that many generations live within the neighborhood; a strong sense of community; people knowing their neighbors; helpful and caring neighbors; respectful, "dogs on leashes" behavior within the neighborhood, and low residential turnover resulting in stable neighbors. Transportation emerged as a primary concern following a potential disaster. Participants voiced their uncertainty about what transportation infrastructure and travel options would be viable following an earthquake; some suggested that all-terrain vehicles or bicycles might be more easily used than cars if extensive damage to roads were incurred.

Gathering this information in the workshop helped the research team to better understand Laurelhurst's unique neighborhood context, which in turn helped to shape the survey instrument. For example, the different neighborhood "zones" outlined on a map contained within the survey instrument were created using guidance from a workshop conversation about how LEAP might organize its 20-household clusters into larger zones that could collaborate internally on disaster preparedness efforts. We were also able to learn about which places or establishments within the

community are important to community members and might serve as resources in a time of need. The information gathered during the workshop also helped with interpretation of survey responses, particularly in providing context for answers to some of the open-ended questions. After the workshop, the research team met with LEAP to review the survey instrument and received helpful feedback that was integrated into the questionnaire for the pilot study.

### ***3.2 Pilot Sample Survey***

The pilot survey comprises a random sample of 200 Laurelhurst households. Residential properties were sampled from within the boundaries of the Laurelhurst neighborhood as defined by the Laurelhurst Community Club.

Potential respondents were first contacted in April of 2019 via a letter explaining the importance of the project and directing them to an online survey website. Survey materials were designed using guidance from Dillman's Tailored Design Method (2007), and multiple contacts were made with each potential respondent. Each recipient was given a unique identification number for logging in to the survey website, and contact information was provided for those who preferred to request a paper survey. A reminder was sent after two weeks, again highlighting the online survey website. Finally, after another two weeks, those who had not yet completed the online survey were mailed a paper copy of the survey booklet. A total of 44 people completed the online survey, while 34 people completed the paper survey. Three incomplete responses were discarded for a total of 75 complete and useable responses between the paper and online surveys, a 37.5% response rate. Responses were collected through June of 2019.

As part of the pilot survey, the research team tested two different incentives: 1) a one-time, two-dollar cash incentive included in the initial mailing; and 2) a five-dollar e-gift card, which required respondents to provide their email address. Twenty-seven people who received the two-dollar incentive completed the web survey, compared to sixteen people who received the five-dollar incentive. Twelve people who received the two-dollar incentive completed the paper survey compared to twenty people who received the five-dollar incentive. We found that although the two-dollar incentive prompted a higher initial response, it was only offered to respondents once, in the initial mailing, while it was possible to offer the five-dollar incentive with each mailed communication. In addition, not all respondents who were offered the five-dollar incentive chose to request it.

The survey instrument was reviewed by members of the City of Seattle's Office of Emergency Management, the Northwest Healthcare Response Network, Washington State's Emergency Management Division, and the University of Washington Medical Center, as well as being reviewed by members of LEAP. Some questions from a previous City of Seattle survey on disaster preparedness were adapted and used as part of the survey instrument.

The survey comprises 35 items, which were a mix of multiple selection and open-ended questions and took respondents approximately 20 minutes to complete. The survey was divided into four modules: disaster preparedness, access to health care, neighborhood connections, and background information.

The disaster preparedness module asks respondents what preparedness items they have, what daily activities they are most concerned about carrying out if utility services are lost, and where they would go to get essential items in a disaster scenario, among other general disaster preparedness questions. The second module asks respondents specifically about how they access health care services via different modes of transportation and communication, how far they travel to access health care services, and how their choice of health care provider might change from a

normal, “blue skies” day to an emergency (disaster) scenario.

The third module focuses on neighborhood context and social connections. Respondents were asked to provide the number of core and distant connections within different areas of the neighborhood (the neighborhood “zones” defined with help from LEAP). This module also includes a place attachment scale (adapted from Fornara et al., 2010), a social trust scale adapted from the General Social Survey, and a measure of the number of hours respondents spent engaged in neighborhood activities each month.

The final module was designed to collect respondent background and demographic information, including household size and makeup, ethnicity, age, education, income, and rent/own status. This module also includes questions related to transportation behavior such as number of commute days per week, commute distance, number of household cars and bikes, and the number of people in the household with mobility limitations for different modes.

Together, the information gathered from the four survey modules helps to paint a picture of the ways in which community members have prepared for a potential disaster, what unique assets are located within the community that might serve as resources in the case of a disaster, a profile of neighborhood social connectivity, and the ways in which everyday travel behavior relates to health care access normally as well as during a potential disaster.

### *Sample Size Calculation*

In this survey, key variables such as travel modes, household preparedness measures and willingness to share are measured in terms of proportions of the survey population.

Within in the study area, there are 1,512 single-family homes and 63 apartments (1,575 households within the two strata). Assuming 25% variance, specifying a 95% confidence level and accepting a 5% margin of error for a proportion estimation, the base sample size would be 300 households:

$$n_0 = .25(1 - .75)/(.05/2)^2 = 300$$

Adjusting for the finite population correction, we reduce the sample size to 252 households:

$$n = n_0/(1 + n_0/N) = 300/(1 + 300/1,575) = 252$$

Assuming a 20% response rate and a 10% undeliverable rate, we increase our sample size to  $252/.2/.9 = 1400$  households. For the full survey, we will sample all 63 multifamily units and 1,337 units from the single-family household stratum to achieve the desired sample size of 1400 households.

For the pilot survey, a random sample of 200 single-family households was drawn without replacement from the sampling frame using the *sample()* function in R.

## CHAPTER 4: PILOT SURVEY FINDINGS

The mean age of respondents was 57, with 48% of respondents identifying as female and 45% as male (7% preferred not to answer). The neighborhood is very well-off and educated; 65% of households surveyed have an annual income of more than \$150,000, and 63% of respondents had completed a bachelor's degree or higher. Just over half of the households speak English only (57%). An overwhelming majority of respondents (93%) live in a stand-alone house, and 85% own their homes. The mean tenure of respondents in their current home is 17.0 years, and 20.1 years living in the Laurelhurst neighborhood. On average, respondents log 2.8 work travel days per week with a mean commute distance of 5.0 miles. Households have two drivers on average, and just over two vehicles (2.1).

### 4.1 Transportation Preparedness and Level of Concern

In the survey, we asked respondents how concerned they were about being able carry out a variety of everyday activities in the case of a major utility outage due to a disaster like an earthquake, including: cooking, bathing/washing, staying healthy, staying dry and warm in winter, staying cool in summer, staying safe and secure, communicating with family and friends, and using transportation to get around. On a five-point Likert scale of “not at all concerned,” “slightly concerned,” “somewhat concerned,” “moderately concerned,” and “extremely concerned,” the average response was 2.76/5, or between “slightly” and “somewhat” concerned. Among the eight everyday needs we asked about, transportation fell sixth in terms of level of concern (see Figure 1).

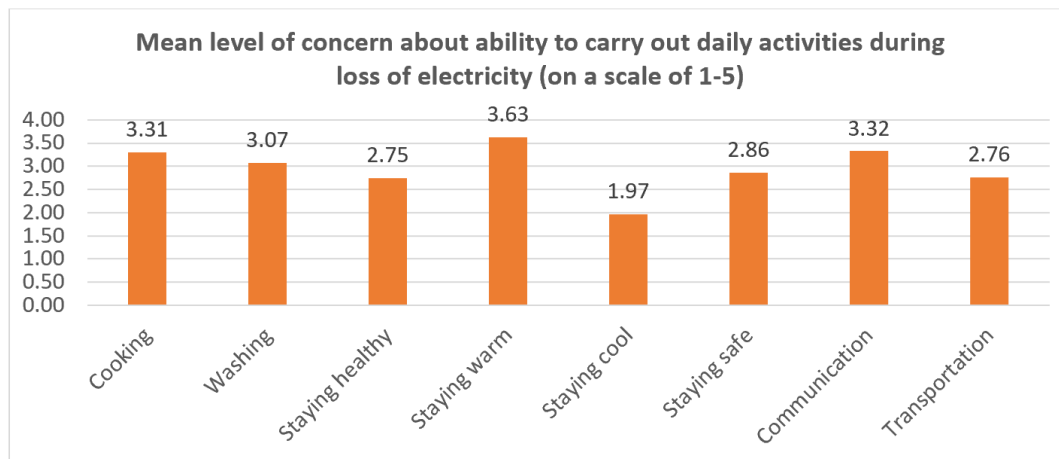


Figure 1. Relative levels of concern about carrying out everyday activities in a disaster scenario

We also asked respondents how prepared they are to survive on their own regarding ten different preparedness items if there were an extended utility outage in the event of an earthquake (see Figure 2). Answering on a four-point scale of 0 = “not at all prepared,” 1 = “prepared for 1-3 days,” 2 = “prepared for 4-6 days,” and 3 = “prepared for 7+ days,” the mean level of response for transportation was 2.55, or preparedness for three to four days. Of the ten items in the question, transportation fell third in terms of what people felt they were most prepared with, behind warmth and medications. Every household surveyed had at least one vehicle, and the mean number of bicycles was 2.5/household, suggesting that people may feel secure in being able to use their vehicle or a bicycle in the event of a disaster, thus the relatively low level of concern compared to



other everyday activities.

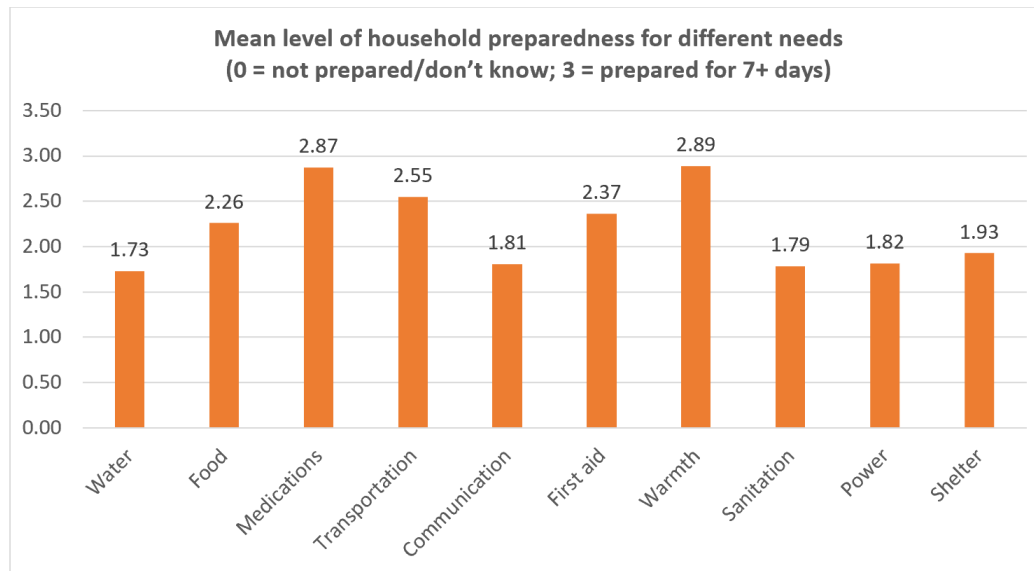


Figure 2. Respondent preparedness for carrying out everyday activities in a disaster scenario

When asked in an open-ended question where they would go to get transportation resources if they found themselves without a means of getting around in a disaster, many people responded that they “don’t know” where they would go to obtain transportation (see Table 1). Of the ten items people were asked about (water, medications, food, shelter, communication, transportation, warmth, sanitation, power, and first aid supplies), only transportation and sanitation received more “don’t know” answers than any other answer, suggesting that people may be at a loss in terms of finding alternative transportation. Only six people said they would turn to neighbors, while another six thought they might be able to rely on bus service, which limited in the neighborhood even on a normal day. Walking and biking received relatively few responses. Although in the previous questions reviewed, people felt relatively little concern about transportation in a disaster scenario and felt relatively well-prepared, the answers to this question suggest that people may not know what to do if their own transportation resources (e.g., cars, bikes) cannot be used in the event of a disaster. We do note that this question had a high rate of non-response, we believe due to its open-ended nature, thus the relatively minimal response relative to the 75 total respondents.

Don't know	9
Neighbors	6
Bus	6
Bike	4
Family	3
Friends	3
Store, Lake Washington (boats), community center, employer, school, emergency shelter, walk	1 response for each

Table 1. Where respondents would turn for transportation resources in the case of an emergency

#### 4.2 Willingness to share

Because communities often need to rely on internal resources in the case of a disaster, we were interested to know how willing people might be to share different kinds of resources in the event

of a disaster, and how the strength of social ties might affect that willingness to share. People seem willing to share transportation with family, friends and acquaintances, but somewhat less with anyone in need (see Figure 3. Of the 75 total respondents, 51 (68%) indicated that they would require some kind of social tie in order to share transportation resources with others in their community (three people indicated they would not share with anyone, 19 indicated they would share with everyone regardless of social ties, and two did not respond). We did not find a significant correlation between social trust and willingness to share.

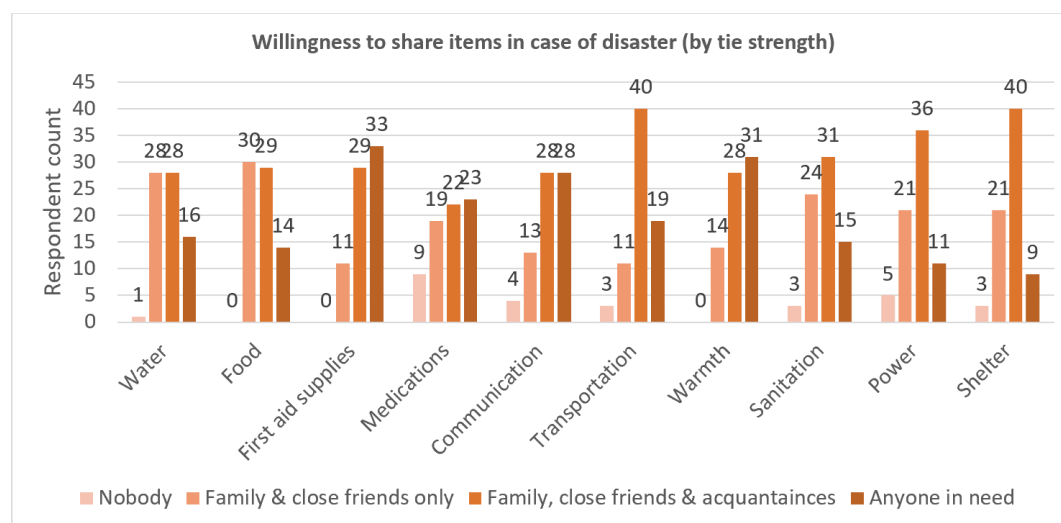
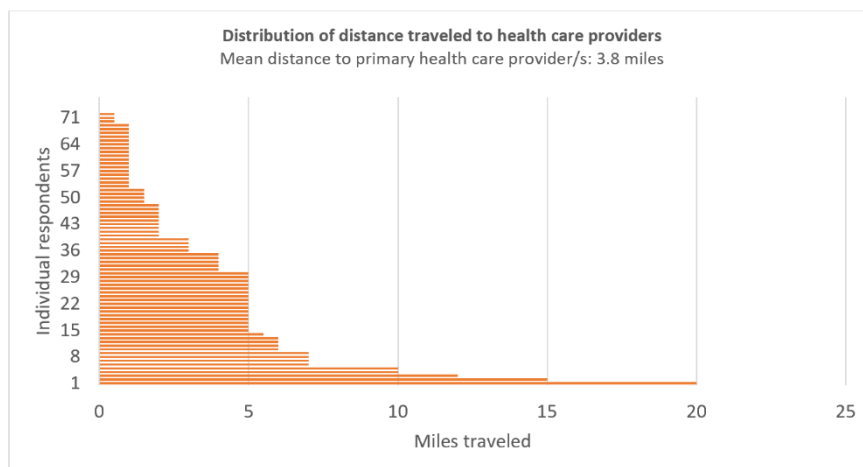


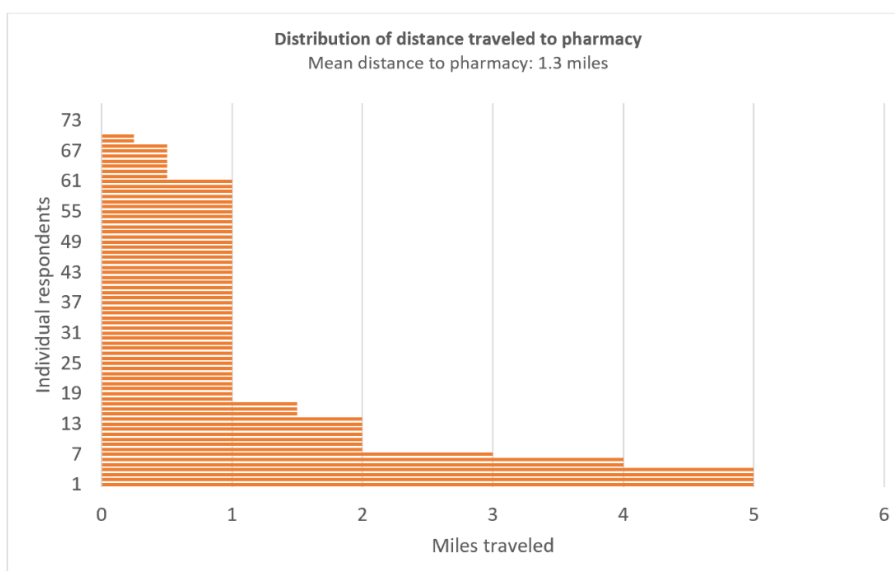
Figure 3. Willingness to share resources in the case of disaster according to strength of social ties

#### 4.3 Transportation, disaster, and health care services

On average, respondents typically travel 3.8 miles to reach health care services and 1.3 miles to reach their pharmacy. We found that the majority of respondents (76%) travel less than one mile to their pharmacy, while only 26% travel less than one mile to their primary care provider. This suggests that it may be feasible for people to reach their usual pharmacy in the case of a disaster, but likely not their usual primary care provider (see Figures 4 and 5). However, people felt very prepared with medications because prescriptions tend to provide several weeks' worth of medications at one time. We also found that 68% of respondents felt that they would travel to the same emergency care provider in both normal and disaster circumstances. Whether or not health care facilities and pharmacies would be functioning in the case of a disaster, however, is highly uncertain.



*Figure 4. Distribution of distance traveled to primary health care providers*



*Figure 5. Distribution of distance traveled to pharmacy*

Approximately half (51%) of respondents typically use more than one mode of transportation to access health care services (we asked about automobile, transit, ride-hailing, car sharing, carpooling, bicycling and walking), suggesting that familiar alternative modes of transportation may be available to some people in a disaster scenario (see Figure 6). Just over half of the respondents (53%) indicated that they have some first aid skills, which might provide an important community resource if access to health care facilities were limited.

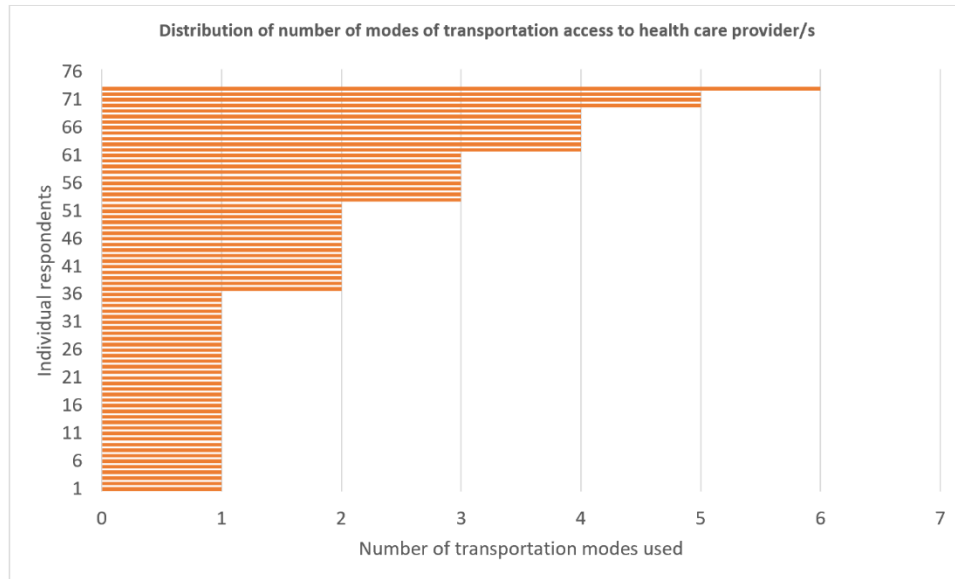


Figure 6. Distribution of number of transportation modes used to access health care services

## CHAPTER 5: DISCUSSION AND CONCLUSIONS

In a very general sense, few everyday activities are completed without leveraging some kind of transportation resource. The ability to leverage community resources via local knowledge and social ties is likely to play a significant role in helping people carry out everyday tasks following a disaster. The literature reviewed suggests that robust social ties serve a critical function when access to everyday resources is limited (Klinenberg, 2015). As noted previously, disasters are place-based phenomena, with the implication that characteristics of place will influence the composition of internal resources available at the community level and levels of interpersonal trust and connection at the individual level. Because the community capacity necessary to avoid or recover from a disaster is typically only apparent after a disruption, planning for disaster mitigation involves a great deal of uncertainty.

Predicting the behavior of sociotechnical systems (such as transportation networks) when they experience significant disturbance (such as a disaster) is a massively complex endeavor and a task that remains elusive (Vespignani, 2009). Disaster preparedness planning is rife with uncertainties, and although models can provide a partial illustration by identifying less stable ground, where the faults lie, and what infrastructure might be more susceptible to damage, the specificity of the post-earthquake landscape is largely unknowable.

It is important for planners and communities to be flexible and to think about contingencies in their earthquake preparedness planning. Despite all the uncertainties involving the built environment in a disaster scenario, we do know from past experience and research that the social environment of communities is very important in the hours, days and weeks following a disaster (Freitag et al., 2014). Social connections often substitute for infrastructural connections when needed (Ritchie, 2017; Klinenberg, 2018), and knowledge of local resources can be critical when communities are cut off from the outside world. Helping communities to build social ties and enhancing local access to a diversity of resources is one constructive approach to planning for disasters despite great uncertainty.

While Laurelhurst, a well-connected urban neighborhood, experiences few if any barriers to obtaining access to health care and wellness resources on an everyday basis, it will face unique context-specific challenges in the event of a disaster. Because neighborhood residents have many options for health care services and are quite mobile, they may have a lack of familiarity with local health care facilities. In addition, the hospital that is located within the neighborhood provides specialty care to children and youth, while the population of the neighborhood itself is older than average, with many retirees. A next step might involve talking to health care institutions about what they expect to happen in a disaster and about any community outreach plans or actions regarding disaster preparedness. The steep topography and non-intuitive urban form of the neighborhood (the community's meandering streets are so mazelike that public buses often get lost in the area) are also likely to pose challenges to emergency access, hindering reconnaissance and rescue efforts in the event of a disaster.

The findings suggest that although people have relatively little concern about transportation in a disaster scenario compared to other everyday needs, they would not know where to turn for alternative transportation if they could not supply it themselves. Addressing this disparity may involve education efforts regarding what transportation systems may or may not be available in

the event of an earthquake (for example, some people felt that the bus network could serve as an alternative transportation resource, but this is unlikely due to the nature of earthquake damage). Community events and activities encouraging the construction and strengthening of social connections could help to make community members more aware of the disaster preparedness resources available in their neighborhood (and where the gaps might be).

### *Remaining gaps and next steps*

Mitigation strategies associated with earthquakes have traditionally overlooked the important role played by transportation systems after disasters (Soltani-Sobh et al., 2016). Research on transportation in extreme events has also focused on technological applications without revisiting the fundamental principles of the transportation industry (e.g., design concepts, supporting technological systems, functionality requirements, capacity) and the ways it is challenged to cope with risks and uncertainties (Kaewunruen et al., 2016), resulting in a series of repeat failures (with societal consequences) in the face of extreme events without significant change. Our findings suggest that incorporating community social factors into transportation planning could provide helpful information for both “everyday” transportation planning and transportation planning for disaster preparedness and mitigation.

In addition, another major gap is understanding the needs of vulnerable populations, such as people who are dependent on transit, in disaster planning and mitigation (Litman, 2006). An approach to disaster preparedness planning that recognizes the diverse needs of people in poverty, those with various physical or mental disabilities, those with language barriers and children is required, pointing to the need for community-scale awareness and research to create inventories of special needs, available resources, and gaps. It is our hope that moving forward with a research agenda that integrates community social factors can help to address some of these gaps. Next steps include testing the workshop and survey protocol in a range of other neighborhoods along spectra of urban-ness and economic status to better illustrate regional variation in disaster preparedness planning needs and gaps.

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## APPENDIX 1: COMMUNITY WORKSHOPS THROUGH APPRECIATIVE INQUIRY METHOD

### Introduction and Purpose

As part of this project and besides the quantitative survey described in Chapter 3, the team also conducted community workshops as a qualitative means to understand how a community's sociotechnical resources can be integrated for enhancing community adaptive capacity.



*Prof. Abramson introduces the workshop activities and provides some background information on the ongoing UW/LEAP partnership on November 7, 2018.*

On November 7, 2018, Laurelhurst Earthquake Action Preparedness (LEAP) and a multidisciplinary research team from the University of Washington (UW) co-hosted a public workshop at the Laurelhurst Community Center, creating a forum for neighborhood stakeholders to discuss, via participatory group activities, the qualities that contribute to a resilient community. The purpose of the workshop was to build a better understanding of the unique community values and assets that might contribute to strengthening community resilience in Laurelhurst. Several community members, a handful of LEAP team members and the UW team participated in the workshop.

## Partners and Background

**LEAP** is a community-based organization in Seattle's Laurelhurst neighborhood that works to increase awareness, knowledge, and connections within the community to help minimize the potential for injury and damage in the case of a major disruptive event, such as an earthquake.

The multidisciplinary **UW research team** is led by Prof. Dan Abramson (Urban Design & Planning) and Prof. Cynthia Chen (Civil & Environmental Engineering). Other UW team members included doctoral student TAs Katherine Idziorek and Lan Nguyen as well as students in Prof. Abramson's Fall 2018 community resilience urban planning studio: Helen Stanton, Pegah Jalali, Lauren Kerber, Catharina Depari, Sreya Sreenivasan and Charlotte Dohrn. The students helped to facilitate the workshop activities.

LEAP and UW have been working together since the fall of 2017 to better understand how community assets can be leveraged to enable adaptive capacity in the face of disruptions (such as earthquakes) or other long-term changing conditions, in ways that also improve everyday community well-being.

## Workshop Methodology

The team adopts the appreciative inquiry-based method for community engagement. Unlike in most risk assessment efforts, mitigation planning processes, or even pre-disaster recovery plans, an appreciative inquiry-based community engagement protocol does not begin with presentations of exposure and vulnerability. Rather, we first ask participants to list the sources of human well-being (HWB) in their community. What do they like about their community? What makes their community unique? How do they define quality of life in their community, and what aspects of their community support quality of life? What brings them joy? Only then do we present the hazard, or "change agent," for discussion on how the community might prepare for it, respond to it, recover, and rebuild. We present recovery as a broad process that depends on built, natural, and social forms of capital, similar to NOAA's Roadmap for Adapting to Coastal Risk, which has participants develop a profile of "the local population" ("societal"), "the built environment" ("infrastructure") and "important natural resources" ("ecosystem"). However, the NOAA Roadmap describes a hazard scenario in detail first and seeks to identify vulnerabilities and strengths primarily in the context of that specific hazard scenario. Our approach differs significantly in that we present the hazard or "change agent" only after the participants have profiled the unique attributes of their respective communities using HWB categories. Moreover, instead of cataloging dysfunctions or vulnerabilities, we ask questions that lead from the community's strengths. In effect, we are applying principles of asset-based community development to disaster planning (Green & Haines, 2012), specifically the idea that creative thinking leads from strength-based positive approaches to inquiry and action, as expressed in the Appreciative Inquiry (AI) model (Emery & Flora, 2012).

Moreover, a broader, more balanced, and integrative consideration of assets—not just built, but also natural and social capital—can prompt more adaptive thinking. Communities rely on goods and services provided by built, natural, and social capital in varying degrees and at different times. Capital typologies differ; Green and Haines (2012) categorize community capital as physical, human, social, financial, environmental, political, and cultural. We draw our simpler classification

from the Millennium Ecosystem Assessment literature (Millennium Ecosystem Assessment, 2005) and particularly from Mulder, Costanza, and Erickson (2006), leaving out human capital (“personal growth and development”), and define three key categories as follows:

1. *Built Capital*: Things built by humans for rather specialized purposes, and with significant ecological footprints. Examples include bridges, buildings, dams, and machinery.
2. *Natural Capital*: Environmental features that yield a flow of ecosystem services and tangible natural resources. Examples include forests, wetlands, mangroves, soil, sand dunes, agriculture, and fossil fuels.
3. *Social Capital*: Networks and associations of human relationships based on mutual trust, common interest, or particular skills. Examples include service providers, regular festivals and gatherings, clubs, and faith-based organizations.

These categories are not exclusive. A park, for example, might be considered a source of ecosystem services, but if it is engineered for a special purpose (as in a baseball field), it might be considered “built capital.” If it functions as a gathering place (as in a farmers’ market), it might be considered “social capital.” The classification allows us to see how the quality of life provided by one type of asset or capital might be provided by a different type under changed conditions after a disruption.

## **Workshop Activities**

Prof. Dan Abramson and LEAP member Nancy Woods introduced the workshop purpose and background.

The workshop comprised three primary activities, explained in detail in the following sections:

- 1) Asset mapping
- 2) Zone mapping
- 3) Disaster preparedness resource matching game

### **Activity 1: Asset Mapping**

Participants sat in small groups at tables according to where they lived so that neighbors sat near one another. Groups were prompted with the following questions:

- What values or assets make your community unique?
- What are Laurelhurst’s strengths as a neighborhood?
- What characteristics of the neighborhood contribute to everyday quality of life?

Participants were encouraged to think broadly about what might constitute a community strength or asset. The *Community Capitals Framework* (Emery & Flora 2006) was used as a prompt for participants to consider natural, cultural, human, social, political, financial and built capital in the exercise.

Each table worked with a large map of the neighborhood that included space for both mapping (drawing) and listing assets and values. Each person was asked to quickly write down their “top three” ideas on sticky notes to get the activity started. Then, using pens and markers, groups spent about 20 minutes discussing community assets and values and recording them either on the map

(for spatial assets/values) or on the list (for non-spatial assets/values).



*Participants recorded Laurelhurst values and assets by drawing on neighborhood maps (photos by Amy Fouke).*

**Assets** listed and mapped during the exercise fell into the following broad categories:

- **Shops, restaurants and services:** Independent, small businesses in “business district” on Sand Point Way; University Village; grocery stores (PCC, Metropolitan Market, QFC); City People’s, Katterman’s Pharmacy, Sand Point Grill, hardware store, gym, good restaurants
- **Parks, nature, open space and recreation:** Burke Gilman trail; Laurelhurst Community Center (sports facilities, views, youth summer programs, meeting place, nature access); community-developed “Saving Urban Nature” pocket park (NE 47<sup>th</sup> & 47<sup>th</sup> NE); Magnusson Park nearby; Center for Urban Horticulture (offers birding, public open space, nature access, education, public meeting space, library, walking); green neighborhood; natural beauty
- **Institutions:** Beach Club, churches, private school/pre-schools, hospital in neighborhood, fire station, NOAA nearby, UW hospital, Children’s Hospital (helipad), ties to UW (“education pride”)
- **Transportation:** Light rail nearby (with just “ok” bus access), lots of bikes, road network (traffic at Montlake Cut mentioned as a negative aspect of neighborhood), water and boats
- **Neighborhood activities and communication outlets:** Crime watch, block parties, newsletter, community blog, NextDoor, Constant Comment, social media (e.g., “Buy Nothing”)
- **Social character:** many generations live here, sense of community, people know their neighbors, neighbors are helpful and caring; “dogs on leashes” behavior, social ties, static/stable neighbors, feels safe, quiet
- **Political/financial/knowledge resources:** some residents involved in/have former experience in politics, many very politically active people (engaged in social issues and school funding), financial resources, owner-occupied homes, highly educated community, medical professionals, UW professors/retirees, health care and engineering “know-how”



- **Built environment:** multiple-family dwellings, accessory dwelling units, well-spaced-out houses, walkable area, gardens in the neighborhood, beautiful neighborhood, beautiful homes, visibility, no tall buildings, waterfront/water access with street end public access to waterfront in multiple locations

Although **values** tended to be more difficult to map than assets, several important neighborhood values were noted: cross-generational interaction; value of education; access to water and nature; sense of community; willingness to connect via social activities (block parties, welcoming new homeowners, “sidewalk friends”); ability to rely on trusted neighbors for communicating important information.

### **Asset mapping discussion themes**

Several themes emerged during the group discussions as assets and values were mapped. They are presented here with suggestions for potential follow-up action items by LEAP:

#### **1) Coordination with local institutions**

The groups discussed the role that several identified community institutions might play in a disaster scenario, including schools, churches, the hospital and the community center. Specific roles mentioned included:

- Laurelhurst Community Center could support evacuation processes and logistics during a disaster
- Seattle Children’s Hospital might be a source of medical support in a disaster, including use of the helipad for evacuation
- St. Stephen’s Episcopal Church could potentially act as a neighborhood hub to provide shelter, power and communication in the case of a disaster

#### **Potential LEAP action items:**

- Coordinate (or continue to coordinate, as appropriate) with Laurelhurst Community Center, Seattle Children’s Hospital and St. Stephen’s Episcopal Church to understand how (and to what extent) those institutions are able to support the community in the case of a disaster

#### **2) Transportation and connectivity**

Participants emphasized that they value the walkability of their neighborhood, including access to the Burke-Gilman and other trails. They discussed the proximity to downtown and the light rail as assets. They suggested that major neighborhood streets (47<sup>th</sup> Ave NE, NE 45<sup>th</sup> St., NE 41<sup>st</sup> St.) might support evacuation and delivery of medical aid in the case of a disaster. If cut off or isolated in a disaster situation, boats or kayaks could potentially be used for transportation.

#### **Potential LEAP action items:**

- Understand whether there are designated evacuation routes or strategies for the neighborhood and how to support community understanding of any designated routes or recommended actions (coordinate with relevant departments at the City of Seattle)
- Further investigate how boats might be potentially useful for establishing connectivity with nearby areas or used as rescue conveyances in the case of a disaster



### **3) Disaster skills communication and training**

Participants appreciated the skills and knowledge resources of Laurelhurst residents (e.g., engineering, health care expertise) that could be very helpful in the case of a disaster if known and coordinated. It was noted that the role of cluster captains will be very important for maintaining coordination during a disaster via walkie-talkie (or other communication devices).

#### Potential LEAP action items:

- Increase neighborhood skills and knowledge by continuing to support trainings (e.g., first aid)
- Create cluster-based “skills inventories” that could be used to understand what knowledge and skills are available locally and in what areas the community may need more education or training

### **4) Engaging local businesses**

Participants highlighted several businesses within or near the neighborhood they perceive as assets: a pharmacy, a hardware store, local restaurants, grocery stores and University Village. They noted Laurelhurst itself does not have a business core, but there are many shops and businesses within walking distance. Participants suggested that neighborhood shops and restaurants could provide logistics, food, or other basic needs for the community in a disaster.

#### Potential LEAP action items:

- Engage with area businesses; support disaster preparedness efforts of local employers

### **5) Leveraging attachment to place**

Place attachment, which refers to strength and basis of feelings for a specific place, was a common theme in several of the workshop conversations about values and assets. Neighborhood characteristics such as access to water and Laurelhurst’s unique, hilly topography with views to green spaces evoke the natural beauty of rural areas. These are important features of the neighborhood that cannot be found in parts of the city dominated by tall buildings. Likewise, the calmness and quietness of Laurelhurst provide a reprieve from the noisier and more stressful “urban” areas of the city. Residents enjoy the unique experience of walking through Laurelhurst offered by its organic, curvilinear streets and the opportunities this degree of walkability creates to meet and greet neighbors on the sidewalk.

#### Potential LEAP action items:

- Organize neighborhood walks or tours to build social capital among neighbors and to help people get to know the neighborhood better with a focus on unique, place-based assets.

## **Activity 2: Zone Mapping**

LEAP member Louise Luthy provided background on the intent and importance of creating

neighborhood “zones.” LEAP is in the process of organizing the entire neighborhood into approximately 20-household clusters for the purposes of sharing information that might be useful in the case of a disaster. Each cluster has a designated captain or captains who are responsible for disseminating information to cluster members and organizing the cluster’s own internal information and disaster preparedness resources. Because there are a relatively large number of clusters across the neighborhood (98 in total), LEAP is interested in creating “zones” that comprise multiple clusters to help provide another level of efficiency and organization between the clusters and LEAP itself. The workshop activity provided an opportunity to ask community members, based on their own knowledge of the neighborhood, what criteria should determine how clusters are grouped together to form zones.

Participants were given the following questions as a prompt:

- 1) How many clusters should be in a zone? How large should a zone be?
- 2) What characteristics should define a zone? (Topography? Transportation networks? Existing social connections? Land use? Distribution of assets/resources? Information about hazards?)

In small groups at tables, participants were asked to outline potential zones by drawing on large maps of the neighborhood showing LEAP’s already-designated clusters. Groups were given additional maps showing local hazards and neighborhood topography to help inform their discussion and mapping.



*Groups outline zones on maps of LEAP’s neighborhood cluster system.*

The groups discussed several factors that could be considered when deciding where zones should be located and how they should be organized:

- **Personal relationships and social interaction:** When determining how to divide zones, participants considered which neighbors they interact with regularly, which can create an intangible “feeling of connection.” Areas in which people tend to interact when walking (or walking their dogs), holding block parties, or sharing information (e.g., people that share an alley and communicate about parking, construction, etc.) could help to inform how the zones are created. Creating zones that connect already-connected block groups

could also help to foster new social connections between and among clusters. One group suggested that already-established social connections should override any natural or physical boundaries when outlining zones.

- **Residential character and density:** Participants suggested that areas characterized by similar densities and development styles (single family homes vs. apartments/condos) should be grouped together in zones.
- **Zone size:** Groups discussed the ideal size of zones for efficient organization and management, suggesting that each zone should contain approximately 100-120 people or 4-6 clusters.
- **Access:** One group suggested zones might be formed based on common access because people might already know one another from habitually using the same travel and access routes. Physical accessibility between clusters could help to facilitate inter-cluster sharing and support.
- **Topographic and spatial boundaries:** Some neighborhood features create barriers between potential clusters, including topography (divisive ridgelines or location of the clusters with respect to a hill/slope), street type (boulevards, busy thoroughfares, etc.), housing typology (multi-family, single-family), orientation of houses (houses facing each other vs. houses facing away from one another) and presence of a parcel with a commercial or institutional use. Depending on topography, residents of some blocks tend to be “alley-dwellers” – to know their neighbors across the alley better than those across the street, while others, *vice versa*, are “street-dwellers”.
- **Resident knowledge:** Multiple groups found it was easiest to determine how zones should be organized in the areas nearby where they live. It was more difficult to determine how zones should be organized in areas of the neighborhood with which they were less familiar. This suggests that geographically-based focus groups may be useful for outlining zone boundaries.

### **Activity 3: Disaster Preparedness Resource Matching game**

The final activity involved a disaster preparedness card game in which groups worked as teams to creatively match skills and resources with hypothetical challenges that might arise in the case of a disaster. University of Washington Ph.D. student Katie Idziorek explained the game and rules to the participants. Each group received a deck of game cards containing cards for “skills” as well as one for “equipment and supplies.” The content of the skills and equipment cards was based on a Seattle Neighborhoods Actively Prepare (SNAP)<sup>1</sup> Neighborhood Block Watch Skills and Information questionnaire. A third deck of cards contained a set of “disaster challenges” based on scenarios that might arise in the case of an earthquake.

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<sup>1</sup> <https://www.seattle.gov/emergency-management/prepare/prepare-your-neighborhood/seattle-neighborhoods-actively-prepare>



*One group considers how to solve a “disaster challenge” by pooling together the skills and resources on their cards.*

#### Content of cards:

- *Skills cards:* First aid/CPR, childcare specialist, search and rescue, crisis counseling/psychologist, damage assessment, disaster feeding, HAM radio operator, plumber, carpenter, electrician, firefighter, health care provider
- *Equipment and supplies cards:* first aid and medical, spare bedding/tents, chain saw, generator, portable lights, camp grill/stove, walkie talkie, long ladder, crowbar/axe, strong rope
- *Disaster challenge cards:* widespread power outage, building damage, medical emergency/injury, communication need, transportation need, family separation, food/water need, fire, shelter need, sanitation need, landslide, missing person, medication need

Continuing to work in small groups at tables, participants each drew a card from each of the three stacks: skills, equipment/supplies and disaster challenge. Taking turns, participants posed their disaster challenge to the table, and group members worked together to use their skills and equipment cards to help solve the challenge. Participants were encouraged to be creative in their matching of disaster needs with resources.



Teams were prompted to discuss the following questions during the game activity:

- 1) How would you use your group's cards to solve each of the disaster challenges?
- 2) How many of the challenges do you feel your group was able to adequately solve (i.e., you have *all* the skills and equipment/supplies needed to realistically solve the challenge)?
- 3) Did anything surprise you in this activity? What was your group's most creative solution? What was the most difficult challenge to solve, and why?

At the end of the card game, teams were awarded disaster preparedness "prizes" (first aid handbooks, emergency blankets and headlamps) based on their ability to solve the most challenges or to develop the most creative solution.

Disaster challenge	Group response (skills/resources cards in bold)
After an earthquake, there is no longer running water and your cluster has run out of food	Use a <b>walkie talkie</b> to call for help; use <b>extra water</b> stored by some cluster members; for food, pick vegetables from the <b>community garden</b> and hunt rabbits within the neighborhood
Your cluster needs to communicate with areas outside the neighborhood to arrange for the delivery of critical supplies and "normal" communications systems are not working after an earthquake	Use a <b>bicycle</b> for transportation to reach areas outside the neighborhood
Some people within your cluster are missing after an earthquake	Make use of cluster members' <b>search and rescue</b> , <b>child care</b> and <b>first aid</b> skills; use a <b>crowbar</b> to help search damaged buildings for missing people
Some families in your cluster were separated during the earthquake	Use a <b>ham radio</b> to establish communication with outside areas

*Examples of hypothetical disaster scenarios and the groups' responses.*

After the game, teams were asked to consider the following two questions:

- 1) What additional skills or equipment/supplies beyond those on the cards you drew would have been helpful in solving the disaster challenges?
- 2) Thinking back to the first activity of the evening, which of Laurelhurst's existing values and assets would help in solving the kinds of problems presented by the disaster challenges? What additional assets or values might be useful to develop to help solve these kinds of problems?

## Workshop summary

As participants discussed the questions posed during and after the resource matching activity,

several broad themes emerged that could potentially help to inform future LEAP actions and initiatives, including some that overlap with or complement the themes discussed in the asset mapping exercise:

- **Preparation through training:** Some participants discussed having previous (childhood) experience with evacuation drills at school and suggested this kind of preparation could be very useful. Groups mentioned several specific skills development/training topics that might be helpful for boosting Laurelhurst residents' confidence in disaster response protocol, including:
  - Earthquake drills
  - Psychological support/psychological first aid for survivors
  - Medical first aid training
  - Fire response training
  - Waste disposal protocol
  - Water treatment protocol
- **Vulnerability due to loss of power:** Several participants expressed extreme concern about the loss of electricity and communication abilities during and/or after a disaster and agreed that generators are critical to resilience. Other alternative power sources mentioned included portable chargers, extra fuel, solar cells or other solar-powered equipment.
- **Health and sanitation:** Groups were unsure how to deal with issues of sanitation and water treatment in the event of an earthquake. Hygiene supplies ("toilets and trash"), water purification equipment and first aid kits were mentioned as important items to have on hand.
- **Transportation and communication:** Communication tools (e.g., ham radio, walkie talkies, drones) emerged as critical items for preparedness. Transportation also emerged as a primary need following a disaster. All-terrain vehicles (ATVs) or bicycles might be more easily used than cars if roads are damaged in an earthquake.
- **Neighborhood- or cluster-level inventories:** Many participants emphasized the need for a skills/tools registry, so they can be aware of what neighborhood resources are available to mobilize in an emergency response effort (for example, items such as boats or camping equipment could be inventoried). A skills inventory might document who knows how to provide medical care, or who has knowledge of plumbing or carpentry. Another form of inventory or registry might record special medical care needs.
- **Community-building:** In addition to the disaster skills and equipment needs outlined above, some groups suggested that holding more social events would help neighbors get to know one another better, facilitating the kinds of social connections that can be very important in disaster situations.

## APPENDIX 2: PILOT SURVEY QUESTIONNAIRE

UNIVERSITY of WASHINGTON  
& Laurelhurst Earthquake  
Action Preparedness (LEAP)

# COMMUNITY RESILIENCE IN LAURELHURST

A Study of Health Care Access  
and Disaster Preparedness  
in Seattle Neighborhoods

MARCH 2019





## Section 1: Disaster preparedness

In this section, we ask some questions about disaster preparedness, including how you would get supplies or other items you might need in the case of an emergency (such as an earthquake).

1. If you were to lose electricity for a week or more due to a disaster (such as an earthquake), how concerned would you be about being able to do the following things?

	<i>Not at all concerned</i>	<i>Slightly concerned</i>	<i>Somewhat concerned</i>	<i>Moderately concerned</i>	<i>Extremely concerned</i>
Cooking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bathing/washing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Staying healthy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Staying dry and warm (in winter)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Staying cool (in summer)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Staying safe and secure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communicating with family and friends	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Getting around (transportation)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please describe) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. In the past year, from where have you heard about disaster preparedness? Please select all that apply.

- ☐ Newspaper
- ☐ Billboards/bus billboards
- ☐ Radio
- ☐ TV
- ☐ Social media (Facebook, Twitter, etc.)
- ☐ Website
- ☐ Friends/family
- ☐ City presentations
- ☐ Community groups
- ☐ Children's school
- ☐ Employer
- ☐ None, I have not recently heard about disaster preparedness
- ☐ Other (please specify) \_\_\_\_\_





## COMMUNITY RESILIENCE IN LAURELHURST

3. For each item listed below, please tell us for how long your household is prepared to be on its own in the case of a disaster.

	0 days	1-3 days	4-6 days	7+ days	Don't know
Drinking water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-perishable food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transportation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communication (phone, Wi-Fi, AM/FM radio, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
First aid supplies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Warmth (clothes, blankets, shoes, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sanitation (toilet facilities)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power (extra batteries, generator, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shelter (tent or alternative shelter if needed)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please explain) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. In the past month, how many neighbors have you talked to about disaster preparedness?

\_\_\_\_\_ neighbors

5. If you did not have the items listed below, where do you think you would go to get them in the case of a disaster (such as an earthquake)?

Drinking water \_\_\_\_\_

Non-perishable food \_\_\_\_\_

Medications \_\_\_\_\_

Shelter \_\_\_\_\_

Communication (phone, Wi-Fi, AM/FM radio, etc.) \_\_\_\_\_

First aid supplies \_\_\_\_\_

Warmth (clothes, blankets, etc.) \_\_\_\_\_

Sanitation (toilet facilities) \_\_\_\_\_

Power (extra batteries, generator, etc.) \_\_\_\_\_

Transportation \_\_\_\_\_

Other (please describe) \_\_\_\_\_

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## COMMUNITY RESILIENCE IN LAURELHURST

6. There are many reasons why you might not want to share some of your own resources with neighbors. For example, you may need them for yourself or your family, or perhaps you think your neighbors should have been more prepared themselves, or that others who have more than you should be the ones to share. So, honestly speaking, in the case of a large-scale disaster (such as an earthquake), and assuming you had a one-week supply of the items listed below, with whom would you be willing to share the following kinds of resources?

	<i>Nobody</i>	<i>Family and close friends only</i>	<i>Family, close friends <u>and</u> acquaintances</i>	<i>Anyone in need (including strangers)</i>
Drinking water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-perishable food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
First aid supplies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communication (phone, Wi-Fi, AM/FM radio, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transportation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Warmth (clothes, blankets, shoes, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sanitation (toilet facilities)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power (extra batteries, generator, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shelter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please describe _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. Which of the following skills do you have? Check all that apply.

- |   |  |
|---|--|
| <input type="checkbox"/> First aid/CPR                  | <input type="checkbox"/> Disaster feeding              |
| <input type="checkbox"/> Childcare specialist           | <input type="checkbox"/> HAM radio operations          |
| <input type="checkbox"/> Search and rescue              | <input type="checkbox"/> Plumber/carpenter/electrician |
| <input type="checkbox"/> Crisis counseling/psychologist | <input type="checkbox"/> Firefighting                  |
| <input type="checkbox"/> Damage assessment              | <input type="checkbox"/> Other (describe): _____       |

8. In case of a disaster (such as an earthquake), which of the below do you have? Check all that apply.

- ☐ A household evacuation plan
- ☐ Copies of important documents stored separately from originals
- ☐ A family/household meeting place in case you are separated
- ☐ A family/household communication plan in case cell phone service is not available
- ☐ Access to a land line phone
- ☐ Earthquake insurance
- ☐ Homeowner or renters' insurance
- ☐ Other (please describe) \_\_\_\_\_



Section 2: Access to health care

In this section, we ask some questions about how you normally access health care services using different means of transportation and communication. We also ask about where you would go for emergency medical care if needed.

9. How many miles (from your home) do you travel to get to your... *Please round to the nearest mile.*

primary health care provider/s? \_\_\_\_\_

pharmacy? \_\_\_\_\_

10. What means of transportation do you use to get to your health care provider/s for medical appointments or other health care services? *Please check all that apply.*

- ☐ personal automobile
- ☐ public transit (bus and/or light rail)
- ☐ ride-hailing service (Uber, Lyft, etc.)
- ☐ car-sharing service (ZipCar, ReachNow, etc.)
- ☐ carpool or ride from a friend
- ☐ bicycle
- ☐ walk
- ☐ other (please describe) \_\_\_\_\_

11. What means of communication do you use to contact and/or communicate with your health care provider/s? *Please check all that apply.*

- ☐ phone
- ☐ email
- ☐ online/website
- ☐ social media (Facebook, WhatsApp, etc.)
- ☐ other (please describe) \_\_\_\_\_

12. Where would you go if you or a member of your household needed emergency medical care on a "normal" day? *Please provide the name of the hospital, clinic or other medical provider you think you would go to if needed.*

\_\_\_\_\_

13. Where would you go if you or a member of your household needed emergency medical care during or immediately after a disaster (such as an earthquake)? *Please provide the name of the hospital, clinic or other medical provider you think you would go to if needed.*

\_\_\_\_\_



## COMMUNITY RESILIENCE IN LAURELHURST

### Section 3: Your neighborhood

In this section, we ask some questions about how well you know people in the Laurelhurst neighborhood. We also ask some questions regarding your feelings about your neighborhood and your involvement in neighborhood activities.

Please use the map below to answer questions 14 & 15 on the next page.



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## COMMUNITY RESILIENCE IN LAURELHURST

14. In which area of the map do you live? Please select the letter marking the area in which you live.

- ☐ A      ☐ D      ☐ G  
☐ B      ☐ E      ☐ I don't live in any of the areas marked on the map  
☐ C      ☐ F

15. For the different areas marked on the map (A–G), please tell us how many close, trusted friends/family members and how many acquaintances (people you know on a first-name basis) you have who live in each area. Count each person in one category only – either family/friend OR acquaintance.

	Number of close, trusted friends or family members	Number of acquaintances		Number of close, trusted friends or family members	Number of acquaintances
Area A			Area E		
Area B			Area F		
Area C			Area G		
Area D					

16. In the past month, how many hours did you spend participating in community, civic, recreational or social activities with other people who live in Laurelhurst? \_\_\_\_\_ hours

17. Please indicate how much you agree or disagree with the statements below:

	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
In general, you can trust people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nowadays, you can't rely on anybody.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It's better to be cautious before trusting strangers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel Laurelhurst is a part of me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do not feel integrated into the Laurelhurst neighborhood.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Laurelhurst is the ideal neighborhood for me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It would be very easy for me to move away from Laurelhurst.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Section 4: Background information

**This section asks some questions about you and your household. The answers you provide will help us to project the information from this small study sample to a larger population.**

**18. On average, how many days per week do you...**

*One week = 7 days. If you work from home, or if you take classes online instead of traveling to school, please enter "0."*

travel to work? \_\_\_\_\_ (days)

travel to school to take classes? \_\_\_\_\_ (days)

**19. How far do you travel to get to...**

*If you do not travel to get to work or school, please answer "0."*

work? \_\_\_\_\_ (miles)

school (to take classes)? \_\_\_\_\_ (miles)

**20. How many people live in your household (including yourself)?** *By "household" we mean "people who live together and share at least some financial resources." Roommates are usually not considered members of the same household.*

Number of children 0 – 5 years old \_\_\_\_\_

Number of children 6 – 17 years old \_\_\_\_\_

Number of adults 18 – 64 years old \_\_\_\_\_

Number of adults 65+ years old \_\_\_\_\_

**21. How many people in your household drive (including you)?** \_\_\_\_\_ people

**22. How many vehicles does your household have?** \_\_\_\_\_ vehicles

**23. How many bicycles does your household have?** \_\_\_\_\_ bicycles



**24. How many people in your household have physical or mental conditions which prevent or limit them from...**

Driving? \_\_\_\_\_

Taking public transit? \_\_\_\_\_

Walking? \_\_\_\_\_

Riding a bicycle? \_\_\_\_\_

**25. Which best describes the type of dwelling unit in which you currently live?**

☐ stand-alone house

☐ attached home/townhouse

☐ condo/apartment

☐ other (please describe) \_\_\_\_\_

**26. Do you rent or own your house/condo/apartment?**

☐ Rent

☐ Own

☐ Provided by somebody else (e.g., relative/employer)

**27. What languages are spoken in your household?** \_\_\_\_\_

**28. For how many years have you lived in... Please round to the nearest whole number.**

Your current home? \_\_\_\_\_

Laurelhurst? \_\_\_\_\_

Seattle? \_\_\_\_\_

The Pacific Northwest? \_\_\_\_\_

**29. In what year were you born?** \_\_\_\_\_ (e.g. 1975)



## COMMUNITY RESILIENCE IN LAURELHURST

**30. Knowing more about where you live will help us to put your disaster preparedness choices and options in context. Please provide the closest intersection to your home location:**

Street 1: \_\_\_\_\_

Street 2: \_\_\_\_\_

**31. What is your gender identity?**

- ☐ Female
- ☐ Male
- ☐ Other
- ☐ Prefer not to answer

**32. Which of the following social media tools do you use MOST often – on a daily basis or several times a week – to obtain news about events affecting your community? Please check all that apply.**

- ☐ Facebook
- ☐ Instagram
- ☐ Twitter
- ☐ NextDoor
- ☐ Other (please explain) \_\_\_\_\_
- ☐ I do not use social media very often or at all.

**33. What is your educational background? Check only the highest level attained.**

- |  |  |
|--|--|
| <input type="checkbox"/> Some grade/high school        | <input type="checkbox"/> Completed bachelor's degree/s |
| <input type="checkbox"/> Completed high school or GED  | <input type="checkbox"/> Some graduate school          |
| <input type="checkbox"/> Some college/technical school | <input type="checkbox"/> Completed graduate degree/s   |

**34. Please select the category that contains your annual household income before taxes.**

- |   |   |   |
|---|---|---|
| <input type="checkbox"/> less than \$25,000   | <input type="checkbox"/> \$50,000 to \$74,999 | <input type="checkbox"/> \$100,000 to \$149,999 |
| <input type="checkbox"/> \$25,000 to \$49,999 | <input type="checkbox"/> \$75,000 to \$99,999 | <input type="checkbox"/> \$150,000 or more      |

**35. Please tell us about your familiarity and involvement with LEAP (Laurelhurst Earthquake Action Preparedness). Check all that apply.**

- ☐ I am an active member of LEAP and attend LEAP meetings.
- ☐ I have participated in several LEAP activities.
- ☐ I have participated in one or two LEAP activities.
- ☐ I have heard of LEAP, but I have never participated in any of their activities.
- ☐ I had never heard of LEAP before participating in this study.





## COMMUNITY RESILIENCE IN LAURELHURST

### Contact information

If you are willing to be contacted further about this topic, please provide the following information. We will only use this information for the purposes you authorize.

**You may contact me for the following purposes:** *Check all that apply.*

- ☐ To send me a \$5 Amazon gift credit for completing the questionnaire (you must include your email below)
- ☐ If you have any questions about this study
- ☐ For a follow-up interview
- ☐ To send me a report of the study results

**How would you prefer to be contacted?** *Please provide all that apply:*

Telephone \_\_\_\_\_

Email address \_\_\_\_\_

Mailing address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**We would value any additional comments you may have about the content of this questionnaire. Please write them in the space below, and/or attach another page.**

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Thank you for your participation!

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