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On your own, together: Regional perspectives on community resource-sharing for disaster preparedness in Washington state

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ABSTRACT

When disasters isolate communities from external support, their members must turn to each other for mutual assistance. This study explores (1) resource management, (2) information sharing, and (3) community leadership and civic participation as dimensions of peer-to-peer sharing for more efficient distribution of local resources under “islanded” conditions. Interviews with members and leaders of three neighborhood-scale communities in Washington state revealed concerns about household preparedness and stockpiling of resources, but also the potential to lever individuals’ community knowledge, social networks, and willingness to participate. Future interventions might include enhancing place-based social infrastructure for resource and information sharing; online local databases and applications that normally maintain privacy but “unlock” important household information for community use in emergencies; and programs that help individuals access and adopt leadership and participation roles. Satisfying these requirements for successful disaster preparedness also aligns with the goals of everyday community-building and strengthening of collective capacity.

KEYWORDS

Resilience; neighborhood; emergency management

Intra-community resource-sharing: A challenge for both disaster resilience and place-based community strengthening

Disaster preparedness and emergency management is conventionally viewed as a matter of planning for rare events, but it increasingly intersects with more ongoing objects of urban policy such as sustainable development, social vulnerability reduction, community-building, and the provision of equitable and accessible social infrastructure (Klinenberg, 2018). Disaster events that isolate communities—by disrupting transportation and communications infrastructure—shine a spotlight on how well society is meeting these ongoing policy goals. By defining infrastructure broadly to include social and natural assets as well as built ones, the task of disaster response and recovery becomes a matter of leveraging the diverse range of capital available to a community, often by substituting one source of well-being for another that is compromised, and doing so within a limited spatial extent (Freitag et al., 2014). The ability of a community to make these substitutions is a test of both the diversity and robustness of its assets and the strength and inclusiveness of its social relations. Increasingly, and especially following COVID-19 pandemic lockdowns, planning and policy concepts like the “15- [or 10- or 20-] minute city” that promote accessibility to resources for all households within a certain, usually walkable, distance have gained attention for their relevance to disaster resilience (Giles-Corti et al., 2023; Khavarian-Garmsir et al., 2023; Logan et al., 2022).

In this article we focus on the challenge of how communities respond to isolating natural disasters, and present insights from conversations with community partners concerned with hazard mitigation and emergency management in both urban and rural settings of varying

densities, regarding resource management, information sharing, and community-based participation and leadership. We argue that these elements of disaster preparedness and emergency management must be integrated with ongoing place-based community development, including policies that enhance accessibility, reduce vulnerability and harm, and increase collective capacity for adaptive decision-making and transformative action more broadly. In this context, community self-reliance in times of isolation should be viewed as a test of inclusive social well-being within a multi-scale (social-ecological) system of governance, not an excuse for government to leave residents to their own devices (Bärnthaler et al., 2020; Carvalhaes et al., 2021; Feinberg et al., 2020).

Emergency management in the United States relies on a combination of governmental, civic organizational, and personal preparedness to connect affected people to needed resources (e.g., food, water, first aid, shelter) and prioritize the response given limited resources (Carr & Jensen, 2015; Lindell, 2013; Tierney et al., 2001), as well as a relatively loose and diverse set of protocols for coordination between these formal and informal response agents (Drabek, 2018). However, hazards like earthquakes, tsunamis, wildfires, severe storms and flooding can pose a considerable threat to critical infrastructure such that the usual movement of people, supplies, and information is cut off, leaving communities largely to fend for themselves (Dong et al., 2021; Nishikawa, 2011; Sheller, 2013).

In many disaster situations community leaders and volunteers, faith-based organizations, non-profits, and other community groups and individuals initiate immediate response activities and organize their communities in the absence of government leadership (Lindell et al., 2006; McEntire, 2015). Recognizing this, state and federal guidance increasingly calls for increased horizontal (peer-to-peer) resource sharing by communities' own residents and community-based organizations, such as neighborhood watch groups and churches, and less reliance on vertical (top-down) support by federal or state agencies bringing external aid into communities (Berke et al., 1993; Joshi, 2010). A widely used, frequently updated system for peer-to-peer sharing in theory can be responsive to the heterogeneity of emergency resources available in a community; households that have complementary surpluses (e.g., House 1 has no food but extra water and House 2 has no water but extra food) may be more able and willing to share among one another if they are knowledgeable about these surpluses and deficiencies before a disaster and have strong and trusting local relationships and social capital (Nguyen et al., 2023).

The positive impact of social capital and networks in effective community-scale sharing of resources and information among individuals and organizations is well-documented for disaster response and recovery (Aldrich & Meyer, 2015; Aldrich & Sawada, 2015; Berke et al., 1993; Hossain & Kuti, 2010; Klinenberg, 2015; Meyer, 2018; Setiawan, 2016; Vachette et al., 2017; Wong & Shaheen, 2019). However, there are exceptionally few studies of how social capital has influenced neighbors' pre-disaster willingness to share privately held resources in a disaster. Idziorek et al. (2023) found that such willingness is strongly dependent on trusted relationships, but also mediated through broad societal and cultural attitudes toward governmental responsibility and efficacy (see also Joffe et al., 2013). Most studies of disaster preparedness focus on individuals' or households' intentions to prepare, mainly based on their perceptions of risk and the likely efficacy of taking protective action on their own (Joffe et al., 2013, 2019; Paton et al., 2010, p. 779). Nguyen et al. (2023) found in Seattle that when accounting for different types of social capital—bonding (among people with shared social identities, kinship, or spatial proximity); bridging (among people with different social identities but specific shared interests); and linking (among people with different positions of power and responsibility)—households with greater bridging social capital and longer neighborhood tenure are more aware of disaster risks and better prepared with stockpiled supplies, and all types of households are more prepared if everyday resources are considered as available and shareable for disasters. However, in neighborhoods with greater precarity of tenure, lower incomes, and higher racial, ethnic and linguistic diversity, lower levels of trust and other unknown factors seem to make bonding social capital a less clearcut predictor of preparedness, even when accounting for sharing of resources.

Contribution of this study

This paper reports semi-structured qualitative one-on-one interview-based findings from participants and stakeholders in a series of previous quantitative survey-based studies and practical community-engaged action research on community adaptive capacity at municipal and neighborhood scales in urban and rural settings (Abramson et al., 2019; Idziorek et al., 2021). While Idziorek (2021; Idziorek et al., 2023) report on determinants of households' willingness to share resources in a disaster across three neighborhood-sized communities, this study presents the views of key leaders and residents of those same communities on what opportunities, needs, and constraints they face in implementing a resource-sharing system. The topic of how to enable peer-to-peer resource sharing emerged inductively from the interviews. We address two questions: (1) What is the anticipated role of community in resource management, information sharing, and leadership in a disaster that cuts off individuals from non-local support (such as government agencies and charitable aid), and (2) how can a community's resource sharing capabilities be leveraged and strengthened to improve its self-reliance in a disaster? With effective community resource sharing, we expect the households that comprise a community will have access to a greater diversity of resources than an emergency response agency will be able to provide, and the community will be able to share resources more quickly and within shorter distances (Idziorek, 2021).

The study highlights three aspects of community self-reliance for disaster resilience: *resource management*, *information sharing*, and *community leadership and civic participation*. The resource management section assesses the potential of peer-to-peer sharing and highlights a variety of barriers affecting the resource management abilities of households, communities, and governmental agencies. In exploring community-wide information sharing we learn about the devices and platforms used to communicate every-day and disaster-relevant information, between neighbors and across communities and agencies, and associated concerns about trust in personal information sharing. We note that some personal information (e.g., illness and prescriptions needed) can be extremely important during a disaster for accessing care promptly. Finally, we investigate the perceived role of community-based leaders and participants in disaster scenarios, especially in the context of facilitating matching between those who need a resource and those who have it; participants' expectations of community-based leadership; their own willingness to engage in such roles; and the barriers that might affect their participation.

Participants' perspectives on resource sharing and collaboration with other community members in times of disaster help establish a more complete picture of "community's" role in bridging individual and agency capabilities. The regional context of these perspectives is important, as disaster risk reduction policy in this region has chosen to mitigate a range of hazards with an exceptionally wide spread of recurrence intervals and severity of impact, from seasonal flooding, wildfires and landslides, to subduction megaquakes and tsunamis that occur only once in approximately 300–500 years, as well as even more locally destructive crustal fault earthquakes that occur even more rarely, once in 5,000–15,000 years (Goldfinger et al., 2016; Kulkarni et al., 2013; Lindh, 2016; Resilient Washington Subcabinet Project Team, 2017; Seattle Office of Emergency Management, 2019, Table 5–2). This is the only region in North America where local community initiatives have led to the building of tsunami vertical evacuation structures, for example (Washington State Emergency Management Division, 2018, 2023a). This range of considered hazards presents a kind of heuristic robustness test for our findings, as stakeholders discuss how resource-sharing is important both for chronic, frequently experienced threats as well as for catastrophic events whose suddenness and timing is unpredictable.

Public agencies and popular media in the region are especially sensitive to the challenge of local self-reliance under conditions of isolation due to numerous mountain ranges and waterways, and a paucity of alternative land routes; collapse of bridges and blockage of roads from ground motions, liquefaction, landslides, flooding, and (increasingly) wildfires threatens to turn communities into "islands" (Crow & Schmit, 2023, Farley, 2017; Snohomish County Emergency Management, 2023). While local emergency managers use these "population islands" to locate and prioritize sites for community points of distribution (CPODs) for supplies and information, Washington State's

Participants in the study

Both Laurelhurst and South Park are vulnerable to especially constricting “islanding” effects of



Table 1. Characteristic comparison of case communities.¹

	Laurelhurst/Sandpoint ²		South Park		Westport	
	Estimate	% Community Population	Estimate	% Community Population	Estimate	% Community Population
Community Overview						
Total population	4,159 ³	-	3,719	-	1,817	-
Total occupied housing units	1,753 ⁴	-	1,413	-	844	-
Residents/sq. mi.	3,718 ⁴	-	3,381	-	491	-
Median household income (dollars)	\$122,333	-	\$35,120	-	\$42,439	-
Language other than English	1,685	16.0	1,040	32.0%	28	1.6%
Disability status	924	8.3%	362	10.0%	399	22.3%
Gender and Age						
Male	5,503	49.5%	3,719	54.5%	1,011	55.6%
Female	5,615	50.5%	1,691	45.5%	806	44.4%
Median age (years)	38.7	-	34.1	-	49.7	-
65 and over	1,762	15.8%	350	9.4%	372	20.5%
Race and Ethnicity						
White	8,830	79.4%	1,697	45.6%	1,718	94.6%
Black/African American	393	3.5%	200	5.4%	1	0.1%
American Indian/Alaskan Native	0	0.0%	17	0.5%	5	0.3%
Asian	1,271	11.4%	362	9.7%	15	0.8%
Native Hawaiian/Pacific Islander	16	0.1%	156	4.2%	0	0.0%
Hispanic/Latino (of any race)	204	1.8%	1,285	34.6%	78	4.3%
Two or more races	581	5.2%	762	20.5%	78	4.3%
Housing						
Owner-occupied units	2,891	67.7%	561	39.7%	527	62.4%
Renter-occupied units	1,381	32.2%	852	60.3%	317	37.6%
Vacant housing units	224	5.0%	128	8.3%	738	46.6%
Median value (dollars)	\$908,950	-	\$287,100	-	\$188,900	-
When isolated due to CSZ M9 earthquake⁵						
Area of “population island”	2.5 square miles		0.75 square miles		20 sq.mi.	
Nighttime “island” population	11,018		2,250		66.38 sq.mi. w/forest roads 5,197	

single-family residential, with few commercial services except at its edges, but is abundant in greenery and is centered on a park with a community center established in 1920. In response to the threat of isolation in a major earthquake, primarily from liquefaction and damage to roads that separate the neighborhood from the rest of the city, a residents group, LEAP—originally founded as “Laurelhurst Earthquake Action Plan” in 2016, but then broadened to “Laurelhurst Emergency Action Plan”—has been active in organizing the community to participate in the Seattle Emergency Hubs program, a volunteer-led effort to educate and organize Seattle neighborhoods for disaster preparedness, and establish predetermined locations where community members can gather to share information and resources in an emergency Laurelhurst Emergency Action Plan, (n.d.). There are currently 135 hubs already designated across Seattle (Seattle Office of Emergency Management, 2021). Using the Seattle Emergency Hubs initiative as a framework, LEAP has further pushed for the neighborhood to organize into clusters, roughly one or two streets of homes, and identify “cluster captains” for each. Cluster captains serve as key informants between cluster residents, LEAP itself, and city or county agencies. LEAP’s activism has almost exclusively focused on preparing for rare but highly consequential events.

By contrast, South Park faces a greater range of hazards exposures, many of them chronic, in addition to a CSZ megaquake. In the industrial southern end of the city of Seattle, the neighborhood is bisected by the four-lane U.S. Route 99 which has a number of points of overpass in the community, and is bordered to the west by the five-lane Washington State Route 509 highway, and to the east by the Duwamish Waterway and the King County International Airport-Boeing Field, one of the busiest airports in the United States for its size, seeing over 180,000 takeoffs and arrivals annually (King County, 2019). The waterway itself is the site of the Lower Duwamish Waterway Superfund site. All of these conditions intersect, not coincidentally, with significantly lower property values and life

expectancy, and higher language diversity, housing precarity and displacement risk than most neighborhoods in the city (Cole & Abel, 2021). Increasingly frequent and severe flooding has led neighborhood activists to focus more on climate change impacts than seismic hazards, and industrial and other environmental health impacts are also a high priority (City of Seattle, 2018). While a CSZ megaquake would likely isolate the neighborhood with liquefaction, bridge and overpass collapse, and some tsunami inundation, the neighborhood also experiences relative isolation on a daily basis due to poor transit service, few commercial services, and the low walkability of the surrounding industrial cityscape.

In response, the South Park neighborhood has undertaken a rich array of place-based mutual aid and other initiatives to improve residents' access to resources, including the establishment of a food collective, community refrigerators, a free and market-rate farmers market, an allotment food garden; services in Spanish language that offer a variety of health and safety programs, including initiatives to foster community leadership, efforts to provide culturally-sensitive health resources, and assistance navigating systems such as food assistance and human services; and a new local empowerment-focused Resilience District "to coordinate investments in infrastructure related to affordable housing, parks, and climate change adaptation; prioritize the participation and decision-making of local residents and businesses, with a focus on building power and wealth for people of color and individuals with low incomes; and foster health and equity by identifying sustainable funding sources and equitable investment mechanisms, including value capture" (Zehner, 2021).

To understand how communities with much lower population densities in rural areas conceive the challenges of local resource and information sharing under conditions of isolation, we also interviewed stakeholders in Westport, on the tip of a peninsula on Washington's Pacific coast. The peninsula has an important fishing port, seafood processing plants, recreational marina and tourism industry, with a number of hotels and restaurants but only a single supermarket that serves both the approximately 2,000 residents plus workers and visitors of the city itself and also all the neighboring South Beach area communities of unincorporated Grays Harbor and Pacific counties. The nearest hospital is more than a 30-minute drive. Reached by only one state highway crossing multiple bridges and liquefaction or landslide-prone terrain, this stretch of coast is vulnerable to isolation in a CSZ megaquake and as well as more frequent storms. The likely "population island" a CSZ event would create around Westport would have an approximate nighttime population of just over 5,000 people, spread out over an area of 20 square miles, much of which borders forested uplands with steep terrain and unreliable forest roads. Just beyond this area, South Beach is also home to the Shoalwater Bay Indian Tribe, a sovereign tribal nation approximately 15 miles south of Westport. The Tribe reports 311 enrolled community members, of whom just under 100 live on the reservation or off-reservation trust lands (Shoalwater Bay Tribe Office of Emergency Management, & Shoalwater Bay Tribe, 2019; United States Census Bureau, 2019). While the census shows relatively little racial, ethnic and linguistic diversity in Westport itself (Table 1), the Ocosta School District, which serves all of South Beach including Westport and the Tribe, reported in 2022–2023 14.3% of its total 584 students were nonwhite and 24.3% were Hispanic/Latino of any race; moreover 62.2% were low-income, 20.5% were homeless, and 14% had disabilities (Washington Office of Superintendent of Public Instruction, 2023).

Westport itself is home to a sizable retired population; the city's median age of nearly 50 is more than a decade older than in Laurelhurst or South Park. In addition to having an older resident-base, Westport also comprises the highest rate of residents with any disability status of the three communities at 22.3%. Its median household income is only 54% that of the state overall. An estimated 27–40% of its population over the course of a year lives in recreational vehicles (RVs), trailers, manufactured home parks, campgrounds, and motels—a population that includes a diverse and difficult-to-count mix of long-term residents, vacationers, and seasonal workers from Latin American and Slavic countries as well as other parts of the region and U.S. The coastal environment is increasingly attracting wealthier nonpermanent residents with second homes and vacation properties, especially since the COVID-19 pandemic. Almost half of the community's habitable units, 46.6%, are chronically or intermittently vacant. Westport's emergency response services include a police department with

seven officers deputized by the county Sheriff's office to respond to calls outside of the city limits, though often there are just two on a single shift; and the South Beach Regional Fire Authority (SBRFA) whose 11 career fire fighters and additional volunteers provide fire and EMS services throughout South Beach. One SBRFA representative estimated that the agency serves about 6,000 individuals across a 32 square mile area.

Although sea level rise and other gradually worsening climate change impacts are increasingly a concern of local leaders, the threat of a sudden CSZ earthquake and tsunami has been the city's highest priority risk for most of the past decade (Grays Harbor County Department of Emergency Management, & Bridgeview Consulting LLC, 2018, Table 10–7). State agencies' maximum considered case of a CSZ tsunami would inundate all of Westport except a few ridges of higher ground (Washington Geological Survey, 2019; Washington State Emergency Management Division, 2012). Washington state communities on longer and lower-elevation peninsulas such as Long Beach and Ocean Shores face even more extreme isolation in an earthquake and exposure to tsunami inundation. Awareness of tsunami hazards is relatively widespread in Cascadia coastal communities, but individual and household levels of preparedness are low (Johnston et al., 2005; Lindell et al., 2022, 2023). The Great East Japan Earthquake and tsunami of 2011 seems to have had some impact on community and individual awareness and willingness to act, though this has not been studied. In 2013, after a coastwide effort to plan for vertical evacuation routes and structures in all tsunami-threatened communities in 2010–2011, voters in the Ocosta School District passed a property tax levy to incorporate a tsunami vertical evacuation structure (VES) in the reconstruction of its elementary school (Doughton, 2013; Mittan, 2015; Washington State Emergency Management Division, 2018, 2023a). Local support for this project is remarkable; it is North America's first such structure and built entirely with local property owners' taxes. Since then, the Federal Emergency Management Agency (FEMA) established a funding program to subsidize tsunami VESs. In 2022 the Shoalwater Bay Tribe became the first community to build a VES under this program. Despite these accomplishments and new sources of federal support, other communities in the region have failed to pass tax measures that would incorporate VESs in their schools (Scigliano, 2022). Meanwhile, efforts at an extreme form of individual tsunami preparedness have gained some attention, through the promotion and development of "tsunami survival pods," which are advertised especially to residents of Ocean Shores and Long Beach where options to evacuate are especially limited (Bernard, 2023; Doughton, 2017).

Further studies are needed to understand broad popular sentiment toward both collective and individual approaches to surviving catastrophic hazards in Cascadia. On the coast, tsunami evacuation has received special attention, perhaps due to the extreme severity of the hazard. Relatively little public discussion has addressed what community members can do either on their own or with their immediate neighbors after the initial threat has passed. This study focuses on a particular form of collective survival: the sharing of resources among individuals who find themselves together, but largely isolated from the rest of the region.

Research approach

Our goal in this study was to understand more deeply the nuanced thinking, beliefs, and perspectives of participants in a prior series of community workshops, household surveys, and focus groups about resource sharing, communications and transportation under conditions of isolation for days to weeks, due a range of possible disaster events from severe storms to a Magnitude-9 CSZ megaquake (Abramson et al., 2019; Idziorek, 2020, 2021; Idziorek et al., 2021, 2023). This study employed a content analysis of qualitative data from semi-structured interviews with 14 of these participants: six community members—two each from Laurelhurst, South Park, and Westport—who previously participated either in focus groups or random-sampled surveys; and eight community leaders including four local emergency services staff from Westport; an official at the Washington State Emergency Management Division; and three steering committee leaders from Laurelhurst Emergency Action Plan

(LEAP). The total number of interviewees is consistent with similar research on specialized policy questions and the perspectives of key informants and invested stakeholders (Lindell & Prater, 2010).

We had previously been in direct contact with all community leaders and the Westport community members. Prospective participants from the South Park and Laurelhurst neighborhoods were shared with us through voluntary emailing lists generated for a random sample survey on willingness to share (Idziorek, 2020). Five of the six community leaders we initially contacted responded to either an initial e-mail or a follow-up e-mail sent a week later. Two of the three prospective participants from Westport, who were contacted via direct e-mail, responded to the initial invitation and went on to be interviewed. Participants from both the South Park and the Laurelhurst neighborhoods were contacted via mass-e-mail; the South Park mailing list consisted of 33 individuals and the Laurelhurst mailing list consisted of 96 individuals. Two residents from the South Park neighborhood responded to the invitation and both prospective participants were interviewed. Ten individuals from Laurelhurst responded to the initial invitation. We initially contacted four of the ten respondents to schedule an interview. Two of the four respondents confirmed interview times.

We conducted 90-minute one-on-one interviews, using the teleconferencing platform Zoom for community members, and using phone or Zoom for community leaders. We interviewed the three LEAP leaders together as a focus group and treated their responses as a single interview for coding and analysis purposes. We used separate protocols for community members and leaders (Appendix A). While the interviews were framed by the interviewees' prior participation in discussions of the spatially isolating effects of major disaster events, the interview itself did not refer explicitly to any specific disaster scenario, but generally to "a disaster" or "an emergency."

The transcribed interviews produced 185 single-spaced pages of text, which we analyzed with the qualitative data analysis software program, MAXQDA (Figure 2). For the part of the community member interviews that addressed personal information sharing (Appendix A, Community Member Protocol, Section F), we also used the visual collaboration platform Miro over Zoom to gather and retain responses (Figure 3). Going through each of the individual-types, participants were asked to indicate what types of information they would not be comfortable sharing with different types of people in a disaster or emergency (for example, participants were asked "What pieces of information would you not be comfortable sharing with close friends and family?"). Once the exercise was completed and participants were satisfied with their responses, the interviewer then introduced the concept of block-chain, roughly summarized as a technology that ensures information could not be

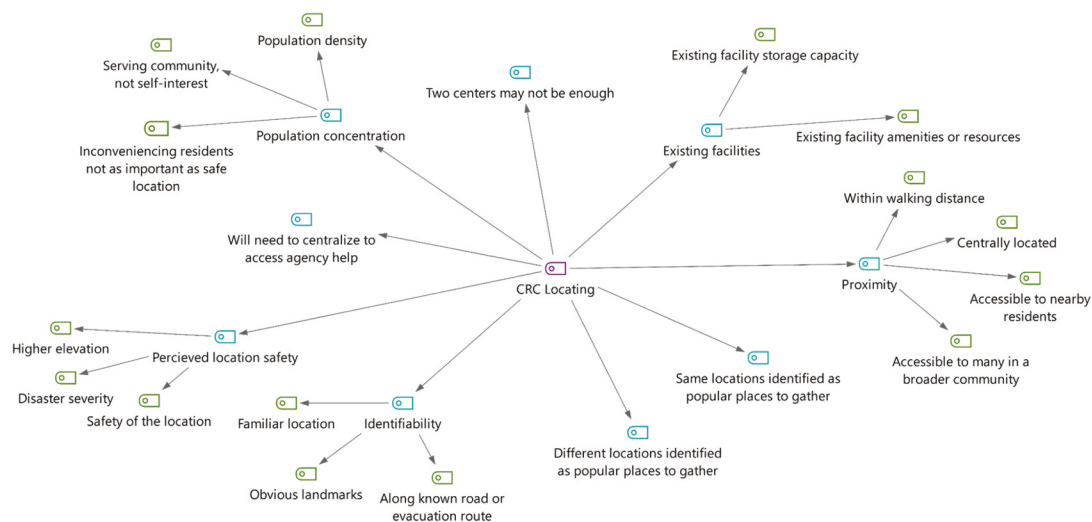


Figure 2. Code network for "Community Resource Centers" in MAXQDA.

"I am not comfortable sharing..."

Personal Information Sharing			
1. Name	2. Date of Birth	3. Sex/Gender	4. Phone Number
5. Allergies	6. Prescriptions	7. Home Address	8. Email Address
10. Insurance Information	11. Medical Health Record	12. Household Demographics	13. Socioeconomic Status
14. Pet Ownership			

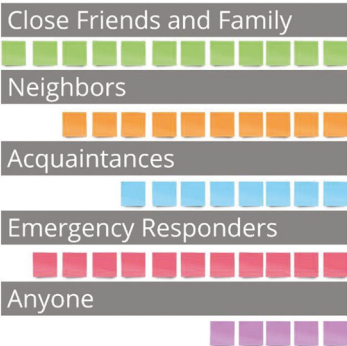


Figure 3. Miro board used for personal information sharing focus group exercise.

visible even to the app’s controller or the servers, even in the case that a disaster had been declared. Participants were asked to reflect on the impacts a technology like that might have on their willingness to share personal information. The relevant factors explored with this exercise related to the type of information being shared; when the information would be shared; the perceived security of the storage device, and the relationship between the participant and a potential accessor of that information. Finally, participants were asked to reflect on their willingness to download and use disaster-specific communication platforms.

For analysis, we employed both structural and open coding (Saldaña, 2009). We used structural codes in the first round of coding, to break up and organize the data according to our three predefined areas of interest in (1) resource management, (2) information sharing, and (3) community leadership and civic participation. We then performed open coding in the second round of coding, wherein we further split the data, analyzing smaller sections of information within previously lumped sections (rereading a paragraph labeled “Resource Management” and coding a single sentence with “Identifiability,” for example). Once the coding was completed we moved to conceptual development, grouping codes together according to themes or concepts that emerged while coding and using memos to define, clarify, and explain those themes or concepts (Saldaña, 2009).

Findings and discussion

Table 2 summarizes the interviews’ key findings according to five areas of policy, technology, and action: community resource centers; communication platforms; personal information sharing; leadership and participation; and resource planning and matching. The text below organizes the findings more broadly by theme as discussed above: (1) resource management, which includes storage and distribution of resources as well as systems to match resources and needs among community members; (2) information sharing, which includes communication platforms and applications that may facilitate resource-matching while addressing privacy; and (3) leadership and civic participation, which addresses trust, authority, and inclusiveness in community relationships.

Resource management

All community leader interviewees made it clear: their agencies and organizations are not in a position to provide sufficient emergency resources to their communities in the event of an isolating disaster. As one community leader explained, “We’re not prepared at the moment to provide much by way of resources. So we don’t have, for example, additional bottled water . . . we don’t have beds and blankets.” Though a variety of factors were discussed to explain these apparent shortcomings, the most frequently raised were challenges securing funding and a lack of physical capacity. As that

Table 2. Summary of interview findings by area of interest.

To be effective in disasters that isolate communities spatially, systems of resource management, information sharing, and fostering of leadership and participation need to have:	
• place-based, local location(s)-specific interfaces with the community; • function for daily life and local relationship-building.	
Community Resource Centers	
• Locations should be central, familiar, and accessible by multiple modes, including on foot. • Facilities should be identifiable, and function as landmarks in the community, both to residents and visitors.	
Communication Platforms	
• Emergency information sharing needs to account for the variety of communications platforms, media and languages that community members use, including non-digital media and face-to-face interaction. • Digital platforms should be robust to disruptions in regional networks while functioning seamlessly with regional networks under “blue skies” conditions; integrate with older, more robust communications technologies such as HAM and low-power FM radio	
Personal Information Sharing	
• Trust in social relationships and in information technology are important mediators in what information people are willing to share, and with whom. • Digital mediators of information flow such as blockchain are currently unlikely to facilitate increased sharing of personal information. • Community leaders need to be trusted, and know households’ location, resident composition, and preparedness capabilities before a disaster.	
Leadership and Participation	
• The more diverse a community is, the more diverse its approaches to fostering local leadership and participation must be. • Some of these approaches will be place-based (e.g., “blocks” with “block captains”); others will operate through spatially dispersed networks (e.g., language groups, affiliations, etc.).	
Resource Planning and Matching	
• Interpersonal relationships across disaster leadership can result in faster delivery of aid • Effective resource matching will be a direct result of relationships between community members, community leaders, and agency leaders	

interviewee put it, if individuals don’t have enough for themselves, they can’t share with others; and if they think others have enough, they may not prepare themselves. For these reasons, community leaders place considerable emphasis on households being knowledgeable about their risks and being adequately prepared themselves. However, they also recognize that household-level preparation is a challenge. The idea of sharing involves making use of the possibility that some individuals have more than they need of one type of resource, but not enough of another, and that they can then share complementary surpluses. Pre-conditions for sharing include knowledge of what others have and need, and a means of transferring resources among community members.

Given agencies’ limited capacity to offer emergency resources, leaders emphasize individual preparedness, and helping those around you, in their messaging out to community members. For a household, preparedness includes activities like discussing gathering points with family members, making important personal information available to others, and having appropriate levels of emergency resources for a disaster scenario. As one Laurelhurst community leader underscored this need for individuals to be prepared: “There’s no provision for food and water being provided by anyone. [Seattle’s] not going to do it, therefore nobody’s going to do it. So, it is completely dependent on neighborhoods and individuals to be prepared.” Despite best efforts, however, leaders are aware that community members are not as prepared as they should be. When asked if it concerned him that the community may still have a level of dependency on his agency in a disaster scenario, one Westport leader quickly retorted, “Well the answer to that is a resounding yes.”

One potential intervention to facilitate greater peer-to-peer sharing in a community is a centralized gathering location. In a disaster, having designated locations for sharing critical emergency information and resources can both enable community members and local agencies to disseminate what they do have, and centralize the distribution of external aid if and when it arrives. As one Westport participant reflected, “If it was a large regional catastrophe . . . I would feel like, in order to receive any sort of help from the State, I would have to definitely take myself to a gathering area because I wouldn’t expect them to come find me. . .!” When given the opportunity to place two such centers in their communities, participants identified a number of factors that contributed to their thinking and

recommendations for potential locations (see [Figure 2](#)). These factors included proximity, identifiability, perceived safety, population concentration, the benefits of existing facilities, and a location's potential as a future gathering space.

The most common consideration raised by participants was the distance any one facility might be from future users. The notion of centrality was brought up by four participants, at least one from each community. Participants seemed to relate centrality with general accessibility; as one participant from South Park described a clinic in another area of the community, “[it] is down in a different geographical area so that might provide access pretty equidistant for all residents.” In addition to its placement relative to community members, *the ability to find a community resource center when necessary is just as important.* Familiarity with both the community at large, and the buildings and services within it, was a major factor considered by all participants. As one South Park participant jokingly remarked, “You want people to know . . . where *where* is!” Finally, community members also mentioned that resource centers should be recognizable to people as distinctive landmarks in the community, identifiable by both residents and tourists. In small rural communities such as Westport even a humble building with a unique and critical function, such as the community's one supermarket or its main church, may serve this function (though this may not serve the town's many tourists). As one of Westport's community leaders put it, in the event of an islanding disaster, “When it's all going sideways, the average person . . . they'll just panic and run to the grocery store.” Such remarks not only echo survey findings from all the case communities (Idziorek et al., 2023); they also suggest that established urban design attention to “imageability” in the built environment is relevant to disaster resilience (Sreenivasan, 2019). Compared to denser urban neighborhoods, rural communities have greater challenges locating resource centers at walkable distances from all their residents. Defining sub-areas (“blocks” or “clusters”) that are meaningful to residents and that have identifiable central locations is also difficult. Communities with more diverse ethnic and linguistic populations may need to organize resources through social networks that are more dispersed and less spatially defined.

Information sharing

Communication modes used by communities and agencies, and their limits

In a disaster scenario, simple acts like sharing basic personal information with others may become difficult or impossible for extended periods of time. For example, if a diabetic individual who lives alone is in some way incapacitated or injured during a disaster, and they had not shared their medical needs with neighbors or first responders prior, that individual risks being unable to contact someone for help and no one outside of their home knowing their needs. Personal information sharing can improve the speed and efficiency of response during a disaster, whether that response comes from trained first responders or active neighbors and community members. While some information can be easily discovered if you know what to look for and where, more sensitive information like medical health records, allergies, and prescriptions are less likely to be widely shared and available in a disaster. This type of information, however, could be particularly important in disaster response as time and resources are often of the essence for medical emergencies.

Individuals in a community use a variety of platforms to communicate with others, near and far. One common mode of communication for individuals and agencies of the same locale is printed media, such as fliers, posters, mail-outs, or newsletters. Print media can help keep vulnerable populations (e.g., the elderly) who may not have access to or comfort with digital platforms informed about developments in their community. While its accessibility to vulnerable populations is a benefit of printed media, hard copies of information can be costly to produce and present logistical challenges when information becomes outdated and needs to be updated. An alternative mode for communication is digital or social media. These platforms, such as e-mail, apps like Twitter, Facebook, or Nextdoor, and texting can be used to share information with more people—more quickly—than printed media. However, the use of digital media presents a number of barriers to populations who are not comfortable learning or using a new technology or to those without stable access to a computer or

smartphone. Most participants shared that they use a variety of digital platforms to communicate with others in their communities, including combinations of emailing, phone calls, texting, and social media like Facebook, and Nextdoor. These modes of communication were generally spoken of positively, both in the sense that the platforms functioned in ways that served participants' needs, and that using multiple platforms offered flexibility in accommodating different communication preferences across individuals.

However, many participants expressed a strong disapproval of the way certain platforms are actually used by their communities, particularly community surveillance and the overwhelming negativity present on social media, especially Nextdoor. As one participant from Laurelhurst shared, "I feel like everybody just complains and then it can get pretty mean pretty quick; I think because people feel like there's anonymity there and I just think it gets pretty mean. I don't know; nobody feels that they should be polite I guess." This pervasive negativity drove a number of participants off Nextdoor altogether. Participants from lower income and more linguistically diverse communities expressed a disinterest in communicating via digital platforms at all. One South Park participant shared, "I've never had a Facebook; why would I? That's not how I communicate or gather information." Another from Westport offered, "It's a smaller community; if I run into [a neighbor], I don't mind talking to them. I am not one to talk on the phone that much; I don't like it, it's impersonal." Both of these participants shared that they would rather opt for traditional media like community newsletters, or simply face-to-face interactions with neighbors. Another participant from South Park admitted that he had apps like Facebook and Nextdoor, but he never actively engages with his community members through those platforms. Rather, he uses them to stay passively informed about the goings-on in his neighborhood.

Much like most community members, community leaders were found to make regular use of phone calls, e-mails, and radio to communicate within and across agencies when not in a disaster context. However, in the event of a large-scale disaster that might affect multiple communities in a given region, communication between agencies is coordinated and facilitated through an emergency operation center (EOC). In responding to a disaster, the EOC receives a digital message from an affected local leader requesting some specific support or resource for their community. As a state agency leader explained, "[A] request comes in either straight through webEOC (an online request portal), or they fill out the 213RR form and they e-mail it to us and then we enter it in." This system suffers from the same vulnerability of other digital communication methods: the loss of power or the destruction of infrastructure used to provide cell service, radio coverage, or internet can render the EOC inoperable for an extended period. The same state level leader shared, "But if the internet is down, and they were, I guess, going to [have to] call us and tell us what they needed, that would certainly slow things down. And if the phone lines were down as well, suddenly that becomes almost... not impossible, but it becomes so much more complicated." These complications can produce catastrophic outcomes, such as not receiving urgently needed medical supplies or the delay of time-sensitive search and rescue efforts.

Community member information sharing

Personal information sharing can improve the speed and efficiency of response and emergency resource delivery during a disaster, whether it comes from trained first responders or neighbors. While some information can be discovered with relative ease, sensitive information like medical health records, allergies, and prescriptions are less likely to be widely shared and available in a disaster. Such information, however, could be particularly important in disaster response as time and medical resources are often of the essence for emergencies. Trust plays a key role in personal information sharing, especially on digital platforms (Salehan et al., 2018). Trust in the particular platform through which information is shared, and trust in the recipients of a person's information, are especially important (Waldman, 2016). With social media in particular, it has also been found that the presence of social ties among users positively impacts the volume of information a person is willing to share, meaning individuals are willing to share personal information more freely if they have a higher degree

of social connection to others using the same platform (Salehan et al., 2018). Findings from our study reveal three factors which affected participants' information sharing behaviors: recipient factors, information factors, and security factors.

The identity of a potential recipient of someone's personal information was a primary factor that affected participants' sharing behaviors. During the Miro board exercise, participants were asked to indicate what pieces of personal information they would not be comfortable sharing, and with whom (see Figure 3). Of the five information recipient categories presented to participants—family and close friends, neighbors, first responders, acquaintances, and anyone—"family and close friends" were overwhelmingly viewed as a category with whom participants would be comfortable sharing personal information. Most commonly cited was the fact that family and close friends likely already knew the information presented, and that this category of recipients was viewed as a trusted population. Additionally, "first responders"—such as individuals who provide fire, emergency medical services (EMS), and police services—were another category with whom participants were particularly willing to share their personal information. Similar to other participants, one from Laurelhurst made this clear, stating, "I would be comfortable giving any of those [pieces of information] to emergency responders." Participants acknowledged that the information they would be willing to provide to first responders may directly translate into the level or quality of care they may receive in a disaster scenario. Finally, concerns about privacy, the misuse of their information, or the impacts of their personal information being shared with the general public were cited as reasons for hesitation to share with the "anyone" category. In sharing information like their date of birth, many participants raised concerns for possible identity theft if that information could be readily available to anyone in a disaster. As one Westport participant stated, "I wouldn't share my date of birth with just anyone because . . . I feel like that's one of the pieces of information that can be used in identity theft."

Community leadership and civic participation

Community members' perspective toward community-based leaders

While individual community members will likely turn to one another first in a disaster for information and resources, community leaders are a critical node in communication from the government to the community and vice versa. During our interviews, existing community leaders overwhelmingly described their role as one of curators of vital information. One leader from Westport explained, "The community [would] turn to us [expecting us to fulfill] some sort of a . . . public information role, or leadership role; being able to identify when and where resources might appear." Community members had similar expectations as more than half identified communication as a central responsibility of leaders. Leaders serve as a metaphorical switchboard between community members and governmental agencies to create feedback loops that improve the timely distribution of state-coordinated resources (Suzuki, 2006). Additionally, the formation of a relationship between community leaders and government agencies outside of the disaster response window may also contribute to improved community outcomes. The participation of community leaders in government-led emergency planning meetings can give them a clearer understanding of the immediate priorities and capabilities of different governmental entities (Lin et al., 2016). Such knowledge may prepare community leaders to better manage the community's frustration which will inevitably arise from limited communication with the government.

Our interviewees shared concerns that government response to a large-scale disaster would likely be slow and, as a result, unreliable. One Westport participant made it clear that he managed his expectations of government leadership: "[A] timely [response] would be nice! But no, I wouldn't leave it to them. I mean, I have my own responsibilities, I don't want to leave it to them to respond in a timely way when there are things I still need to do myself." Because participants expected that they will be on their own, they also did not expect much governmental leadership, instead emphasizing household-level preparedness and neighborly support. It should be noted that expectations of support from neighbors are not unfounded. As mentioned above, Westport and its surrounding South Beach

communities have demonstrated a strong collective commitment to mutual support, by investing in tsunami VESs. Community participants in workshops that discussed a broader range of resilience strategies in the face of coastal hazards also repeatedly stressed the community's culture of local self-reliance and mutual support (Abramson et al., 2019; see also Hicks & Judkins, 2020). All participants expressed interest in supporting the people around them to varying extents. It is a myth that during disasters people panic and succumb to selfishness; altruism and mutual assistance is more the norm than the exception in disaster situations (Lindell et al., 2006, Chapter 8; McEntire, 2015, Chapter 3). Other studies, including one we conducted in these same communities through a household survey, support the claim that community members turn to their social networks and local establishments (e.g., stores) in disaster scenarios, and reciprocate a willingness to share many types of resources (Idziorek, 2021). Despite these findings, community leaders remain concerned that residents who haven't prepared even basic resources for themselves are unlikely to be able to lend resources to their neighbors.

Knowing that community members are willing to share resources with one another, coordinating and organizing those efforts, and collaborating with local government agencies, can improve the speed with which individuals are connected to the resources they need. Some cities have already begun to organize and formalize the collaboration of community leaders and the government, as mentioned above in reference to the Seattle Emergency Hub program (Seattle Office of Emergency Management, 2021). At the state level, work has also been done to provide communities with consolidated preparedness and response information—and toolkit prototypes—in an effort to promote greater neighborhood-level capabilities in a disaster scenario. In Washington the Map Your Neighborhood initiative is designed to facilitate preparedness conversations between clusters of 15–20 neighboring households (Washington Military Department [WMD], 2023b). While programs like this are an important start to collaborative preparedness and response efforts, they often take the form of hard-to-initiate and -maintain lists of steps and resources. Additionally, these programs can be overly dependent on the capabilities of individual community members, who may experience barriers to preparedness such as inadequate time or money.

Barriers to civic participation in disasters

Interview participants also reflected on barriers to participating in the development of these capacities, and to assuming a leadership role in the community, including financial instability and a lack of free time. Three shared they didn't feel they had the right personality type for leadership. One participant was more than happy to support a network of leaders in the community, but she confessed, "I'm kind of more of a helper, that's kind of my style so I'm happy to help, but I don't necessarily want to take on responsibilities and drive things." These differences underscore the need for diverse interests, experiences and skills, and personality types to be accommodated in a leadership framework if increased collective participation is a goal.

At the neighborhood level, some participants shared that their communities struggle with identifying, fostering, and maintaining interest in community-wide initiatives. One from South Park speculated that the neighborhood's high turnover rate for residents and a large population of renters contributed to individuals being less interested in community-building. A Westport community leader theorized that an absence of volunteer culture in the city made it difficult to get any program off the ground. He shared, "We try to encourage citizens to . . . be part of those programs to better their community, their neighborhood. And we can grow those programs if those citizens are interested in doing that. It's just [about] finding the number of people." The pressures of commitment were also identified as barriers to stepping up in a leadership role. While imagining the many responsibilities of a community leader, one South Park participant reflected, "How can you have leadership without any infrastructure in place to accomplish any of these things [we're discussing]?" Participants agreed that having a framework for participation in community-wide disaster preparedness and response initiatives would make picking up an activity easy, and mitigate uncertainties about joining in the first place.

Limitations

The findings related above were limited by the number of interviews conducted for this study and by a lack of diversity among the individuals who participated. Though community representativeness was not a goal of this study, interviewing more individuals—community members in particular—would have generated more diverse, and potentially conflicting, perspectives on the topics discussed. We also acknowledge that the use of convenience sampling in this study meant that individuals with a history of participation in research and projects relating to disaster preparedness and response were the most likely to accept invitations to participate. In future work, it will be beneficial to target outreach to individuals and populations whose perspectives are historically underrepresented in qualitative disaster research, particularly ethnic minorities, individuals who speak English as a second language, and individuals from low or extremely low socioeconomic backgrounds and with more precarious ties to the community.

Conclusions: Broader implications

To be effective in disasters that isolate communities spatially, systems of resource management, information sharing, and fostering of leadership and participation need to have place-based, local location(s)-specific interfaces with the community, and they need to function for daily life and local relationship-building. From this qualitative, small-N, case-based study, we produced contextualized knowledge about a particular region's challenges and need to integrate emergency preparedness with policies that build local community capacity for peer-to-peer sharing on an on-going basis. Washington state's challenges in this regard are highlighted by the especially severe threat of "islanding" it faces from hazard events, while the relative infrequency of the most consequential of those events in turn highlights the region's need for preparedness to benefit daily life as well as hazard survival. While our region presents perhaps an extreme combination of these circumstances, policies everywhere are likely to benefit from the integration of emergency preparedness and local mutual assistance capacity-building. Below are some insights and further questions prompted by this study that may inform both policy itself as well as a generalized or at least replicable approach to researching the broader applicability and desirability of this integration.

The conversations we report about how communities can best prepare for isolation in a disaster are closely related to place-based social infrastructure and "x-minute city" concepts mentioned at the outset of this paper (Henry, 2023). Conversely, those broader concepts should also shape emergency resource management, whether collectively through community points of distribution (CPODs) or individually by household stockpiling. Similarly, preparations for place-based disaster resource management can also inform efforts by cities to address socio-geographic disparities like Seattle's equitable development community indicators program (Seattle Office of Planning and Community Development, 2020). These programs inventory and map a range of amenities, infrastructures, and other assets important to quality of life in neighborhoods across the city, in order to monitor equity and social justice. Emplacing systems to identify needs and match and share resources can help further these goals as well as prepare communities for emergencies.

Coordination between a community and government agency officials, both before and during a disaster, is essential for communities at risk of being cut off from outside aid. It is especially important that communities and agencies have conversations about their own vulnerabilities and preparedness, both agency-to-community and neighbor-to-neighbor. Our findings reveal that even when these conversations are taking place, however, bringing people to the table for collaboration, and keeping them there, is a challenge. Individuals are interested in working together but need support in order for change or progress to occur at the community level. Communities benefit from a framework for participation in disaster planning and response efforts, allowing individuals to contribute their diverse and valuable skill sets freely and easily. Perhaps most importantly, the efforts that community members make to plan and prepare for disasters need to accomplish goals or bring benefits related to on-going everyday life. The social capital and networking that strengthens community resilience to disaster events depends largely on social infrastructure—"palaces for the people"—that enhances community well-being on a daily basis (Klinenberg, 2015,

2018). Thinking of community resource centers, or emergency or resilience hubs, as such “palaces” may help to bridge the gap between planning for the extraordinary and planning for the everyday. The dependence of their disaster functionality on their being central, familiar, recognizable, prominent, and memorable, all require that they also function on an everyday basis. Similarly, relations of reciprocity and trust, and habits of local leadership, are as valuable for general community well-being as they are for resource management and information sharing in a disaster.

For some communities, extensive improvements to resource management, information sharing, and civic participation are long-term goals due to the community’s limited ability to change its institutional, social, spatial, or technological conditions. If this is the case, future research might explore the extent to which targeted improvements in one variable could offset poor performance in another. For example, in a community like Westport where cell and radio service are known to have limited coverage, and improving telecommunications infrastructure can be costly and time consuming, could this challenge be addressed alternatively with improvements to the community’s resource management capabilities? A community struggling to address shortcomings in a single resource sharing variable will undoubtedly struggle to address them all, meaning it is worth exploring the strategies for a community to improve its self-reliance, in part by building a shared knowledge of who has what and who needs what, for the purpose of a community sharing arrangement or to more efficiently target what common resources need to be arranged for.

The Map Your Neighborhood program mentioned above is a step toward realizing this potential, but it needs to be augmented by more dynamic information-sharing and resource distribution mechanisms. The insights respondents shared regarding the use of social media and its integration with a variety of communications platforms intersects with one of the most dynamic and promising areas for further research (Luna & Pennock, 2018; Murthy & Gross, 2017; Van Wyk & Starbird, 2020). The role of these platforms cannot be underestimated in disaster scenarios. They allow groups in the same geographic location to share context-specific information with one another, and allow individuals separated from their communities in a disaster to access and provide information as well (Shklovski et al., 2008). They also offer communities and agencies access to timely, on-the-ground information that might not be available through other communication channels (Simon et al., 2015). While social media can present challenges with the spread of inaccurate or misleading information, an increasing flow of information can be viewed as an important capability for both agencies and community members in a disaster, and can be planned to be used systematically by both groups (Simon et al., 2015). A systematic use of such platforms can facilitate greater connection between a community’s members, leaders, and first responders. For example, as a disaster-time tool, social media is critical for accessing the resources of local volunteer efforts, from organizations like churches and neighborhood associations. Additionally it has been found that one form of “resource mobilization” occurred through digital social networks and blogs in order to solicit assistance and publicize donation events (LaLone, 2012). It has also been observed that social media “provides opportunities for engaging citizens in emergency management,” by getting information out to the public and providing a centralized space for citizens to share their own information and findings (Simon et al., 2015).

In the context of community isolation, reduced mobility, and disruption in cellular networks and Internet access, our findings suggest that the functionality of social media may be preserved, adapted and even enhanced with the assistance of emerging technology for robust and locally controlled cellular networks (Heimerl et al., 2013) and for privacy protection, such as blockchain, in combination with older technologies that coordinate point-to-point communication up to great distances, such as HAM radio (Coile, 1997; L’Hermitte & Nair, 2021), and for community-wide broadcast in a limited local area, such as low-power FM community radio (Sukhwani et al., 2021). All of these communications platforms have the potential for integration with physically accessible place-based resource centers in the community, where in-person interaction and storage of goods can support emergency response and may be able to reduce misinformation. Having a holistic understanding of the roles, benefits, and challenges associated with digital platforms can reveal opportunities to optimize their existing functions for disaster utility or to develop new platforms that improve a community’s resource sharing capabilities. This

knowledge can also inform the ways community leaders develop plans for spreading information in times of disaster, not just within and across their agencies, but to and within the community.

Notes

1. With the exception of values otherwise noted, data for Laurelhurst/Sandpoint and South Park are from the 2013–2017 American Communities Survey and data for Westport are from the 2019 American Community Survey.
2. With the exception of values otherwise noted, Census data for Laurelhurst are only available for Laurelhurst and Sandpoint combined tracts.
3. Estimated by Idziorek et al. (2021).
4. See previous note.
5. For Seattle, estimated with Google Earth measurement tool from Puget Sound Regional Catastrophic Grant Program (2019–2022) map and data for population islands; for Westport, estimated from area of 98595 and 98547 zip codes (United States Zip Codes.org, n.d.) and Ocosta School District Boundary Maps and census data (2011). Note that the neighborhood of South Park is split between two “islands” across a highway. These statistics are for the half of South Park that is coterminous with its own island; the other half is part of a larger island it shares with other neighborhoods.

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Appendix A

Community member interview protocol

Area of Investigation	Goals of Questioning	Relevant Questions
A. Introduction (5 min)	To introduce participants and establish level of comfort	
B. Communication Platform Functionalities (20 min)	- To identify existing digital and non-digital communication functionalities - To explore opportunities to improve or add communication functionalities	
C. Place Making and Value Mapping (20 min)	- To identify nodes of activity across the community - To explore emerging spatial patterns across interviewees	
D. Community-Embedded Leadership (Captains) (20 min)	- To identify preconceived notions of role of captain in terms of activities and commitments - To explore willingness to assume role of captain	
E. Personal Information Sharing (20 min)	To identify willingness to share personal information in terms of sensitivity, with whom it can be shared, and when	
F. Emergency Communication (5 min)	- To identify willingness to access emergency communication technology - To identify the impact of tool ownership on trust and use	

A. Introduction

1. Could you tell me a little bit about how you came to live in your community?
Would you say you are close to your neighbors? Why or why not?

B. Community network functionalities

2. On the topic of neighborhoods, do you use any digital platforms to communicate with your neighbors? This could be anything like calling them on the phone, texting, Facebook, NextDoor, Twitter, ect.
If yes, what services or platforms do you use?
Is there anything these platforms cannot currently do that you wish they could?
OR
If no, why?
What might it take for you to use digital platforms?

C. Place making and value mapping

3. Before the Coronavirus pandemic, what are some locations around your community that you know are popular places for people to gather?

During the pandemic, are these gathering places the same? If not, are there new gathering places? Where?
4. If you had the ability to place two emergency centers (which would be centralized gathering spaces with emergency resources and information) in your community, where would you put them?[map to be presented]

D. Community-embedded leadership (captains)

5. In the event of a disaster, do you think your neighborhood has sufficient leadership? (Tell me what your idea of your community is.)
What activities do you think people in these roles should perform?
What time commitment do you think this entails on an everyday basis? During a disaster?
6. Do you see yourself as one of the people fulfilling this role currently?
If yes, why? In what ways specifically?
OR
If no, what would it take for you to be willing to fulfill that role?
7. Are you confident in your community leaders' abilities to support you in a disaster? [probes to be added if needed]

E. *Personal information sharing*

8. Information Sharing Matrix Exercise

Preface: “We know that people tend to be unwilling to share certain personal information outside of an emergency. Because of this concern, researchers are interested in exploring the impacts different privacy and security technologies might have on a person’s willingness to share that information *before* a disaster, as well as what can be done to help mitigate or eliminate those concerns. We’ll begin with me setting up a hypothetical scenario. Do you have any questions before we get started?

“Here is the scenario. Your community has decided to pilot a new app which you could access either on a phone or a computer. Before a disaster, this app allows you to input a piece of information (e.g., your prescription drugs) and indicate with whom you would be comfortable sharing it under a specific circumstance like a natural disaster. The information you will share will not be visible to anyone including the person you indicate you will share the information with, unless that certain circumstance takes place. However, the information will be known to the server that stores the information.

Would this described technology make you comfortable sharing certain information with others in the event of a disaster? Using the following table, please identify which pieces of information you would be willing to share for questions A through E. You can simply write the corresponding number.”

- (a) Which pieces of information are you comfortable being shared with only **close friends and family**?
- (b) Which pieces of information are you comfortable being shared with **neighbors**?
- (c) Which pieces of information are you comfortable being shared with **acquaintances**?
- (d) Which pieces of information are you comfortable being shared with **emergency responders**?
- (e) Which pieces of information are you comfortable being shared with **anyone**?

Personal Information Sharing			
1. Name	2. Date of Birth	3. Sex/Gender	4. Phone Number
5. Allergies	6. Prescriptions	7. Home Address	8. Email Address
10. Insurance Information	11. Medical Health Record	12. Household Demographics	13. Socioeconomic Status
14. Pet Ownership			

- 9. Would you be willing to elaborate on your unwillingness to share certain information?
- 10. Now imagine that the app was designed so that your information could not be visible even to the app’s controller, even in the case that an emergency had been declared or some disaster triggered the system. This type of data storage means that your privacy would be guaranteed.
What, if any, information would you be more willing to share in this scenario?
- 11. Is there a level of compensation the government could offer that would impact your willingness to share private information?

F. *Emergency communication*

- 11. Are you willing to download an app solely used for emergency communication and resource connection before some future disaster?
- 12. Are you familiar with HAM radio?
Do you know anyone in your community who can operate a HAM radio?
Do you think you would contact a HAM radio operator in an emergency? Why or Why not?

Appendix B

Community leader (official capacity) interview protocol

Area of Investigation	Aims and Goals of Questioning	Relevant Questions
A. Interviewee Background (5 min)	- To establish a rapport and increase level of comfort - To establish basic understanding of interviewee's role and responsibilities	
B. Resource Capability Identification (10 min)	To establish what the interviewee's agency is responsible for, and able to provide in a disaster event	
C. Resource Need Identification (10 min)	To establish what resources the interviewee's agency will need support to provide, deliver, or distribute	
D. Intra-agency Resource Matching Mechanisms (within) (20 min)	To identify how resource matching is performed within the interviewee's agency	
E. Inter-agency Resource Matching Mechanisms (across) (20 min)	To identify how resource matching is performed between the interviewee's agency and others	
F. Functionalities (5 min)	- To identify how matching mechanisms are being coordinated - To explore what opportunities exist to improve/expand use of existing functionalities and develop new ones	

A. Interviewee background

1. Could you tell me a bit about your (work experience) agency and your current role there?
How long have you worked there?
What were your past roles and/or responsibilities?

B. Resource capability identification

2. In the event of a disaster, can you talk me through what resources and support your agency/organization is capable of providing to the affected community?

Are there gaps between what you are capable of providing and what you might be expected to provide? How so?

How would these resources be distributed?

Where are these resources stored across the community?

How would the community's needs be communicated to your agency?

3. In what capacity do you serve on the ground disaster response?

How does your organization plan to function if you are not there/not able to access the affected community?

C. Resource need identification

4. In the event of a disaster, what resources would your agency need additional support in order to provide?
In terms of providing the resource itself?
In terms of the distribution of the resource?
What agencies are providing this support? (Who do you rely on?)
What agencies should be providing additional support?

D. Intra-agency resource matching mechanisms

5. How is (that coordination managed) resource matching coordinated and executed within your agency (between departments)?
What gaps are generated by operating in this way?
How do you think communication and coordination within your agency could be improved?

E. Inter-agency resource matching mechanisms

6. How is resource matching coordinated and executed between/across your agency and others?
What gaps/shortcomings do you think are generated by operating in this way?

How do you think communication and coordination between your agency and others could be improved?

F. Functionalities

7. What platforms do you use to coordinate resource sharing or matching within or across agencies?
What platforms do you use to coordinate and communicate with the community?
8. What might you like to see in terms of new functionalities of a new platform (or to enhance a platform)?
9. What, if any, personal information would be helpful to have from community members before an emergency was declared?
10. How might community leadership, more grassroots efforts at a smaller scale, impact your agency? Would this be beneficial to you?
What obstacles are there to doing this?
What challenges might this bring?