



Participatory Research Methods for Examining Lessons from COVID-19 about Local Food Systems Vulnerabilities to Exogenous Shocks

ACTION-RESEARCH

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ABSTRACT

Participatory processes are integral to sustainability and resilience planning; involving diverse stakeholders ensures planning practices and outcomes are grounded in local social, economic, environmental, and cultural contexts and realities. It follows that research and tools supporting planning processes should also be participatory, and such research approaches can lead to useful knowledge for developing appropriate, place-based approaches for addressing critical sustainability issues. Using the Fraser Valley region (British Columbia, Canada) as a case study, this research experiments with participatory research (PR) methods and tools for supporting long-term food systems planning by examining regional food vulnerabilities and opportunities/needs for building resilience to exogenous shocks. The research involved a survey and a series of workshops supported by an online collaboration platform, CoLabS, which engaged different food system stakeholders to first, reflect on what COVID-19 has revealed about regional food systems vulnerabilities, and second, discuss how these insights can be used for integrated long-term planning and increasing food resilience in the face of a variety of environmental and socioeconomic hazards. Strengths of this research include its place-based approach, relationship development and reciprocity aspects, multi-dimensional exploration of vulnerabilities and issues, and the use of dynamic digital tools. Limitations of the research include its lack of comprehensive participation and representation, capacity limitations of potential participants, influence of current real-world issues on research activities, and limited functionality of some online tools. Lessons and insights from this research demonstrate the importance of employing adaptable and flexible methods and tools when conducting PR on sustainability issues.

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INTRODUCTION

The COVID-19 pandemic has highlighted numerous vulnerabilities in local and regional food systems (Clapp & Moseley, 2020). These vulnerabilities are not exclusive to the pandemic; they relate to other exogenous shocks such as climate change, which presents a need for comprehensive, integrated approaches to planning and resilience (Newell & Dale, 2021). Accordingly, Carey et al. (2021) argues that communities should examine the lessons provided by the pandemic to identify and recognize food systems vulnerabilities and devise ways for increasing local resilience. Similarly, Hobbs (2020) notes that food systems stakeholders should reflect upon where food supply chains remained robust during the pandemic and where failures occurred. However, as there is no one-size-fits-all approach to food systems planning and development (Knezevic et al., 2017), communities devise place-based solutions and ways of working appropriate to the local context.

The comments by Carey et al. (2021) and Hobbs (2020) about learning lessons from COVID-19 suggest that local governments and food systems stakeholders (i.e., the range of organizations and community actors involved in local food systems) should engage in exercises where they examine and reflect on what the pandemic has revealed about food systems vulnerabilities and ways toward resilience. Such reflective exercises are best facilitated through the use of participatory research (PR) approaches that center on real-world issues and aim to generate solutions to problems in collaboration with those affected by them (Trimble & Berkes, 2013). PR has a long history in health and social sciences (Israel et al., 1998); however, it also has been applied in broader and wider-ranging contexts, including food systems. PR is a valuable approach to researching complex sustainable issues as it draws from diverse knowledges and experiences (Newell et al., 2020) and facilitates capacity-building for addressing a particular issue (Greenhalgh et al., 2016), making it a useful research approach for examining the complexities around local and regional food systems challenges. Examples include Jacobi et al.'s (2019) work on developing and conducting a food systems mapping process with stakeholders in Kenya and Bolivia. Other examples include Domingo et al.'s (2021) research done in partnership with the Williams Treaties First Nations in Ontario, Canada, on the challenges and approaches for increasing local access to nutritious and culturally-relevant foods. Both examples demonstrate how PR can be used to comprehensively explore food systems considerations, including those related to health and nutrition, cultural values, agricultural production, environmental health, food economies, and others.

During the COVID-19 pandemic, using PR to engage in reflective exercises was challenging due to the nature of the health crisis and its public health measures. The need for physical distancing prevented in-person gathering, and as PR requires researcher-practitioner collaboration

and stakeholder engagement (Greenhalgh et al., 2016; Hacker et al., 2012; Moldenhauer & Sackey, 2016; Newell et al., 2020), these measures create complications for the development of relationships and for data collection. In response, online and remote engagement research innovations have been developed (Newell & Dale, 2021), which can be applied in PR efforts where in-person engagement is not possible. Such online engagement continues to be relevant as researchers, practitioners, and stakeholders explore ways of collaborating on sustainability research while also attempting to (for instance) reduce transaction costs and travel-related greenhouse gas emissions (Jost et al., 2021). It is thus important to experiment with innovative new ways of conducting PR on complex sustainability issues, such as food systems vulnerabilities, both through online and in-person methods to better understand the opportunities and challenges around such research exercises.

This paper documents a study that responds to both the opportunity (or need) for communities to examine lessons from COVID-19 regarding food systems vulnerabilities (Carey et al., 2021) and the need for innovative approaches to PR that harness online technologies. The study was conducted in the Fraser Valley region, British Columbia (BC), Canada, and it engaged local and government, non-governmental organizations, food system stakeholders, and community members in an exploration of food systems vulnerabilities through a series of workshops and a survey. The research was conducted remotely, with the workshops being facilitated with the use of the CoLabS online engagement platform. This paper details the online methods used, successes and shortcomings of the study, and lessons for future PR work on complex sustainability issues.

THE PARTICIPATORY RESEARCH APPROACH

There are a variety of terms that describe participatory approaches to research, such as participatory action research, action research, collaborative inquiry, and community-based research. These terms commonly describe an approach to research inquiry that involves participants as co-researchers or collaborators (Savan & Sider, 2003); however, the degree and nature of participation can vary depending on the approach used. For example, community-based participatory research is described as involving community members in all aspects of the research process, from design to dissemination, whereas community-engaged research is a broader term that refers to the use of academic-community partnerships in studies of issues which impact a community's wellbeing (Vaughn & Jacquez, 2020). PR involves community members in a range of research activities, such as the design of the research instruments (e.g., Moldenhauer & Sackey, 2016) and

selection of stakeholder participants (e.g., Ciaccia et al., 2019). However, depending on the method used, PR can also involve researchers taking a more prominent role in certain activities such as workshop facilitation (e.g., Jacobi et al., 2019; Picketts et al., 2012) and data analysis (e.g., Domingo et al., 2021) in effort to support communities in their explorations of local challenges. In light of the wide range of PR methods, it is important to identify the degree and nature of participant involvement when reporting on PR studies.

This research best aligns with Vaughn and Jacquez's (2020) description of community-engaged research, meaning it falls under a broad umbrella of research approaches that involve researchers, stakeholders, and community members working together to co-produce knowledge on issues affecting the community. In this work, researchers led activities, such as facilitation of workshops, initial drafts of reports, data analysis, and drafting survey; however, community input was involved throughout the process in multiple ways. The project was initiated through a collaboration with regional government collaborators, and discussions with the collaborators informed the research design. In addition, research instruments and analyses, such as survey and systems maps, were developed based on the discussions in and input from workshop participants. Furthermore, rather than predefining workshop designs and activities at the beginning of the project, the content and foci of workshops (following an initial workshop)

were based on thoughts, interests, and food systems concerns expressed by participants in previous workshops. Workshop participants were also invited to bring forward ideas for what to explore in subsequent research activities. Finally, knowledge outputs (i.e., reports) were circulated to workshop participants to receive and incorporate their input before publishing, and participants also contributed to research dissemination by distributing the reports among their networks. Accordingly, the research aligns with PR approaches in that the relationships between researcher and participant differ from that of traditional science, with traditional science being more expert-driven and this project involving a more collaborative exploration of issues and co-production of knowledge (Savan & Sider, 2003).

REGIONAL CONTEXT

The Fraser Valley region is in the southwest of the Canadian province of BC (Figure 1), and it has a population of over 340,000 people (BC Stats, 2021). The region encompasses six municipalities, 30 First Nations bands, and eight electoral areas (Fraser Valley Regional District [FVRD], n.d.-a., n.d.-b), with Abbotsford being the largest of the municipalities/communities. The region is located adjacent to Metro Vancouver, which is the largest urban centre in the province and supports a population of nearly 2.8 million people (BC Stats, 2021).

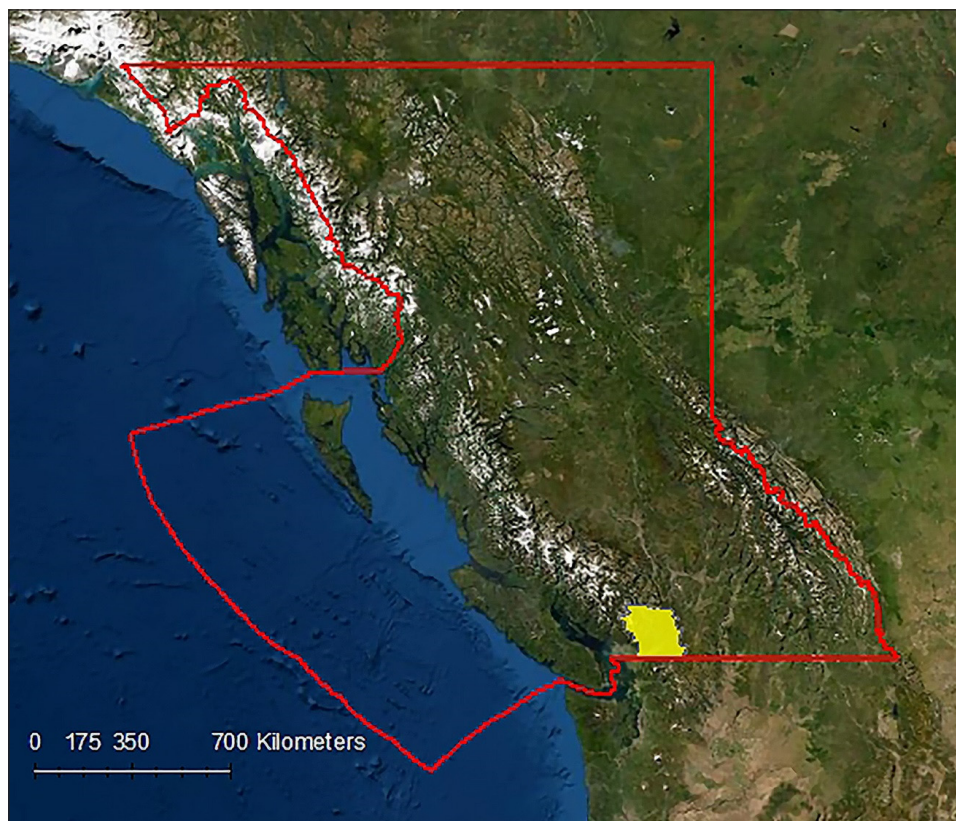


Figure 1 Location of the Fraser Valley Regional District (yellow) within BC (red).

Note: Data sources: BC Data Catalogue, Esri, DigitalGlobe, GeoEye, Earthstar Geographies, CNES/Airbus DS, USDA, USGS, AeroGRID, and ISN.

The region makes for an interesting case study for research on food systems, as it is one of the most agriculturally productive areas in Canada. Over 71,000 hectares of FVRD's land are within BC's Agricultural Land Reserve (BC Ministry of Agriculture, 2016), and the combination of nutrient-rich soils, agriculturally-favorable climate, and proximity to lucrative markets (e.g., Vancouver) have resulted in a thriving local agricultural industry (FVRD, 2017). The Abbotsford Chamber of Commerce (2022) estimates that in Abbotsford alone, agriculture is responsible for \$3.8 billion of economic activity. The significance of agriculture to the region has shaped the economic and sociocultural identities of the communities within the region, with food systems being central to said identities (Newman et al., 2017).

The approach taken in this study involves aligning the research with previous local efforts and initiatives, as done in other PR work (Newell et al., 2021). To this end, the study built upon previous and existing work toward enhancing local food systems resilience, such as the Fraser Valley agriculture and climate change strategy (Climate Change Adaptation Program, 2015) and Clean Economy in the Fraser Valley report (FVRD, 2019). The region has numerous food assets, relating to all aspects of food systems from production to consumption, including food banks, community meals, a food hub, food retailers, processors, and a variety of farms.

METHODS

The research consisted of three virtual workshops and a survey delivered from July 2021 to March 2022. The main objectives of the research were (1) to explore local food systems vulnerabilities and impacts related to COVID-19, (2) to map and assess food systems vulnerabilities and potential impacts from multiple environmental, socioeconomic, and political hazards (e.g., flooding, fires, rapid population growth, economic recession, etc.), and (3) to enhance food systems resiliency through analysis of the region's infrastructure, programs, and environmental features.

The workshops gathered food systems stakeholders and community members, and the numbers of participants for each workshop were: 25 in Workshop 1, 22 in Workshop 2, and 12 in Workshop 3. Note that the first workshop was conducted in two sessions, as there were community members that expressed interest in joining but were unable to attend the first date; however, for disambiguation, the two sessions will be collectively referred to as Workshop 1. Though groups were small, the participants included people with specific knowledge and involvement with different aspects of food systems, and in this way, the research follows a purposive sampling approach (Etikan et al., 2016) and is similar to other work that employs small focus groups of people

with specialized knowledge (Onwuegbuzie, et al., 2009). Participants included representatives from regional and local government (elected officials and staff), the regional health authority, community development not-for-profit organisations, social services, community food programs (e.g., food banks), research, and local and regional food network organisations. With respect to the latter, researchers (i.e., first and second author) also joined two of these network organizations, namely the Abbotsford Fresh Network and the Mission Food Coalition. The researchers' participation within these networks involved attending regular network meetings to share ideas on how research (including this project) and education at the local university, the University of the Fraser Valley, could better support local and regional food systems goals. At the time of the project, the authors were researchers based at this local university, and they contributed to network discussions by sharing their knowledge and expertise respectively on integrated community sustainability planning (i.e., first author) and food systems planning and food justice (i.e., second author).

As noted above, an aim of this research was to explore ways of engaging in PR, while following public health guidelines around physical distancing. To this end, the workshops were conducted online, using the Zoom virtual conferencing application for the workshop discussions and the CoLabS platform for workshop activities. CoLabS is a Drupal-based platform for supporting online collaboration on sustainable development issues and challenges (www.changingtheconversation.ca/colabs). It was designed as a flexible platform, with the ability to change its structure and add/embed different tools to meet needs of a particular project or group (Jost et al., 2021). The CoLabS space for this project was customised with a series of virtual working tables, which used Padlet widgets that allowed for participant input in different ways, depending on the activity (Figures 2, 3, & 4).

Acknowledging the limited number of participants in the workshops, and the research needs of the FVRD, the project included a survey questionnaire. Survey questions were designed to align with activities and outcomes from Workshops 1 and 2. The survey was delivered to residents living both in the Fraser Valley and Metro Vancouver regions (i.e., the Lower Mainland). The case study region was broadened for this particular activity due to the Metro Vancouver and Fraser Valley regions being interconnected in terms of food flows and economies, as well as how workshop participants referred to both regions multiple times in the discussions of local food systems issues.

The timings of the research activities are noteworthy. In addition to the COVID-19 pandemic, a series of different food systems shocks coincided with the workshops. Workshop 1 was conducted in the summer of 2021, when the Pacific Northwest area was experiencing an extreme heat event. Workshop 2 occurred in the fall of 2021, during a severe flooding event in Abbotsford. Workshop

3 and the survey delivery occurred in early 2022, when the conflict in Ukraine began and supply chain disruptions were anticipated/emerging. Therefore, although the purpose of the exercise was to reflect on the lessons that emerged from COVID-19 in terms of vulnerabilities to broader range of shocks, the participants were able to draw from current experiences (rather than hypotheticals) when considering some of these other shocks.

For each workshop, participants were provided with a letter of consent. They were given the letter prior to the session and signed/returned electronically to indicate their consent to participate in the study, and at the beginning of the workshop, they were invited to ask questions about the consent letter. Survey participants were given a letter of informed consent, provided through a link to a PDF version found at the beginning of the survey. The research project and letters of consent were reviewed and approved by the Human Research Ethics Board at the University of the Fraser Valley in May 2021 (file number: 100755).

Following each workshop, a report was prepared for participants to summarize the main outcomes of the workshop and identify next steps. Each report was first sent to the workshop participants for review, and then after incorporating participant comments, the reports were made publicly available. A report was also prepared on the outcomes of the survey study.

The focus of this paper is the PR approach, and the following sections provide more details on the research activities and process. The findings reported in this paper relate to the strengths and shortcomings of the research approach designed and employed here. For more information on findings from the research itself (i.e., the study on food systems vulnerabilities and ways to increase resilience), refer to the reports prepared on the workshops (Dring & Newell, 2021, 2022a, 2022b) and survey (Newell & Dring, 2022).

WORKSHOP 1

Workshop 1 was held in two sessions in the summer of 2021 (July 29 and September 2), engaging a total of 25 participants and running for approximately two hours per session. Its purpose was to explore local food systems vulnerabilities and impacts related to COVID-19 in the Fraser Valley region to harness the opportunities for lessons learned. The food system framework of the Initiative for a Competitive Inner City (ICIC) was adapted and used in the workshop, which is a framework that categorizes food systems into four different areas: food processing, food distribution, food access, and government policies and practices (Zeuli & Whalen, 2017). As ICIC's framework focuses on urban environments, it excludes food production due to (generally speaking) the lack of farmland in these spaces. This study however added food production due to the importance of agriculture to the communities, economies, and cultural identities

in FVRD. The modifications also included reframing the government policies and practices as "government response" to broaden and better capture the nature of government interventions toward COVID-19, that is, as a response to a public health crisis and its related impacts.

Researchers and scholars in the areas of food systems resilience (e.g., Carey et al., 2021; Savary et al., 2020) and sustainability planning (e.g., Ling et al., 2009) discuss the importance of examining issues through a temporal lens to be able to facilitate long-term planning. Accordingly, Workshop 1 explored how COVID-19 exerted impacts and revealed vulnerabilities across different timeframes, as well as how various issues, responses, and adaptations emerged in said timeframes. The timeframes examined in the workshop included short (0–3 months), medium (0–12 months), and long-term (>12 months) periods.

Workshop 1 examined impacts to and vulnerabilities of each component of the food system framework with respect to short-, medium-, and long-term timeframes. Virtual breakout rooms for each food system category were created, and workshop participants joined the room for whichever component they wished to examine. The activities used a Padlet-based working table for each food component where participants posted their thoughts/observations on food systems vulnerabilities and impacts for each of the three timeframes (Figure 2). The activity was conducted in two 20-minute rounds, allowing participants to explore multiple food system categories.

The workshop concluded with a 30-minute plenary discussion, supported by questions and prompts) to expand on the outcomes of the breakout sessions and explore the implications of the impacts and vulnerabilities identified. In addition (and to facilitate a PR approach), participants were asked to identify further research and workshop directions and topics within the scope of the research. The workshop closed with a synthesis of the main outcomes of the workshop and an explanation of proposed next steps for the project.

WORKSHOP 2

Workshop 2 was held in November 2021, and it served to broaden the perspective of food systems vulnerabilities beyond the COVID-19 context by mapping said vulnerabilities from multiple hazards and exogenous shocks. The hazards were identified based on the discussions from the previous workshop and documents produced on food systems resilience in the FVRD (e.g., Climate Change Adaptation Program, 2015), and the final selection of hazards was supported by relevant literature (Balfour & Keenan, 2007; Biehl et al. 2017; Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, 2019; Jahn et al. 2018). As shown in Table 1, 10 hazards were explored in the workshop, with each falling under one of two categories: (1) environmental hazards, and (2) socioeconomic and political hazards.

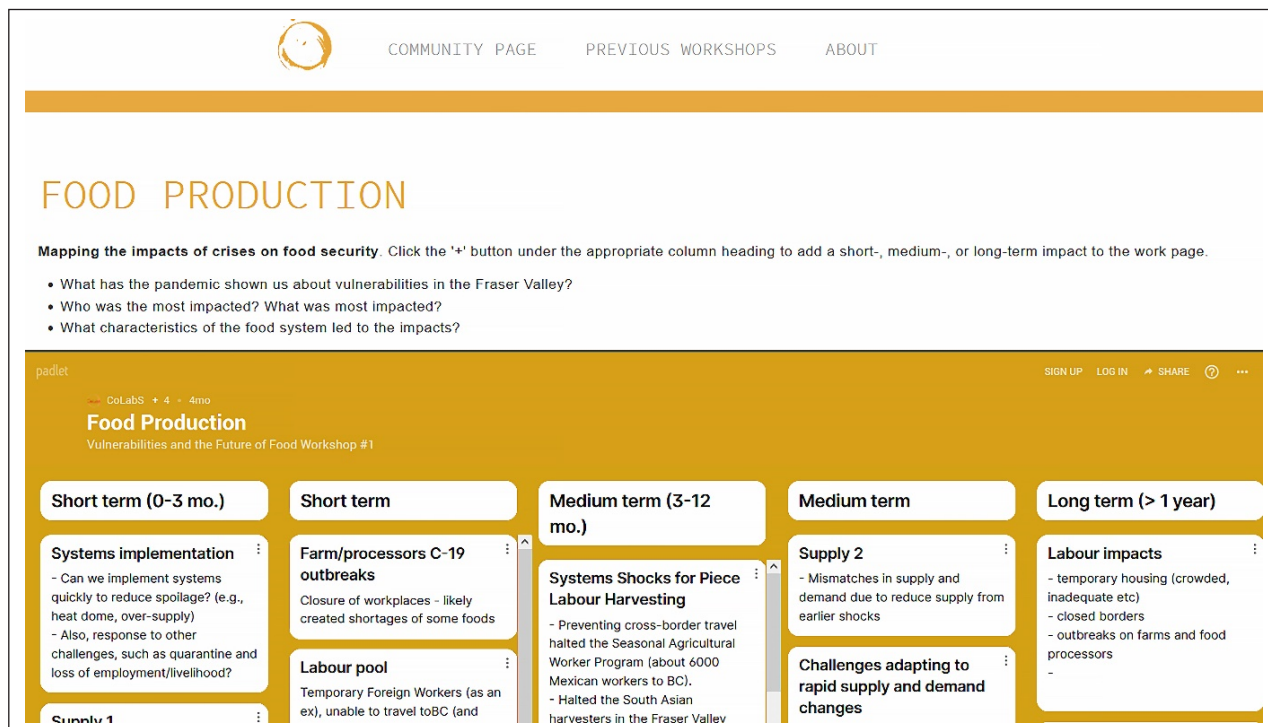


Figure 2 CoLabS Screenshot of the First Workshop’s Working Table.

TYPE OF HAZARD	HAZARDS
Environmental	Flooding; Wildfire; Extreme heat and drought; Air pollution; Water pollution; Loss of wildlife habitat and ecosystems
Socioeconomic and political	Rapid population growth; Rapid population decline; Threat of war, conflict, or invasion; Economic recession and market failure

Table 1 Food System Hazards Explored in the Second Workshop.

A total of 22 participants joined Workshop 2, with 16 of the participants being people who attended the first workshop (i.e., about 73% were returning participants). Participants were provided with a copy of the Workshop 1 summary report prior to the second workshop, and Workshop 2 began with a presentation that referenced this previous work and its outcomes. Participants were then instructed on the activities to be performed in Workshop 2, which included systems mapping and spatial mapping exercises.

For the systems mapping exercise, a series of CoLabS pages were equipped with a Padlet-based concept mapping tool that allowed participants to create posts and links between the posts (Figure 3). Workshop participants were randomly assigned to breakout rooms centered on different hazards, where they engaged in an activity that involved mapping hazard-impact relationships. Participants first identified direct impacts from the hazards by posting an impact and drawing a connecting line between the hazard and impact. Then, participants identified indirect impacts by posting a secondary impact occurring from the direct impact and drawing the appropriate connecting line. Two 20-minute rounds were held for the environmental hazards, allowing participants

to explore multiple hazards. One 20-minute round was held for the socioeconomic and political hazards due to there being fewer hazards in this category (and because the workshop was running behind schedule).

For the spatial mapping exercise, participants located food system components/assets that they considered to be vulnerable to exogenous shocks (e.g., highways, food banks, the Fraser River, farms, etc.). The exercise was supported with a CoLabS page equipped with a Padlet-based mapping application tool, which allows users to place point data markers and captions on a Google base map (Figure 4). In the captions, participants were asked to provide three pieces of information: (1) the name of the food system component/asset, (2) the hazard(s) threatening or impacting the component/assets, (3) reasons why the food system component is vulnerable to the hazard. Although the activity centred on the FVRD, participants were allowed to identify components located outside the region’s jurisdictional boundaries, if they felt the component was relevant to local food systems.

The workshop concluded with a 30-minute plenary discussion, where participants were asked to reflect on the exercises and explore how the systems and spatial mapping activities exhibit linkages among a variety of

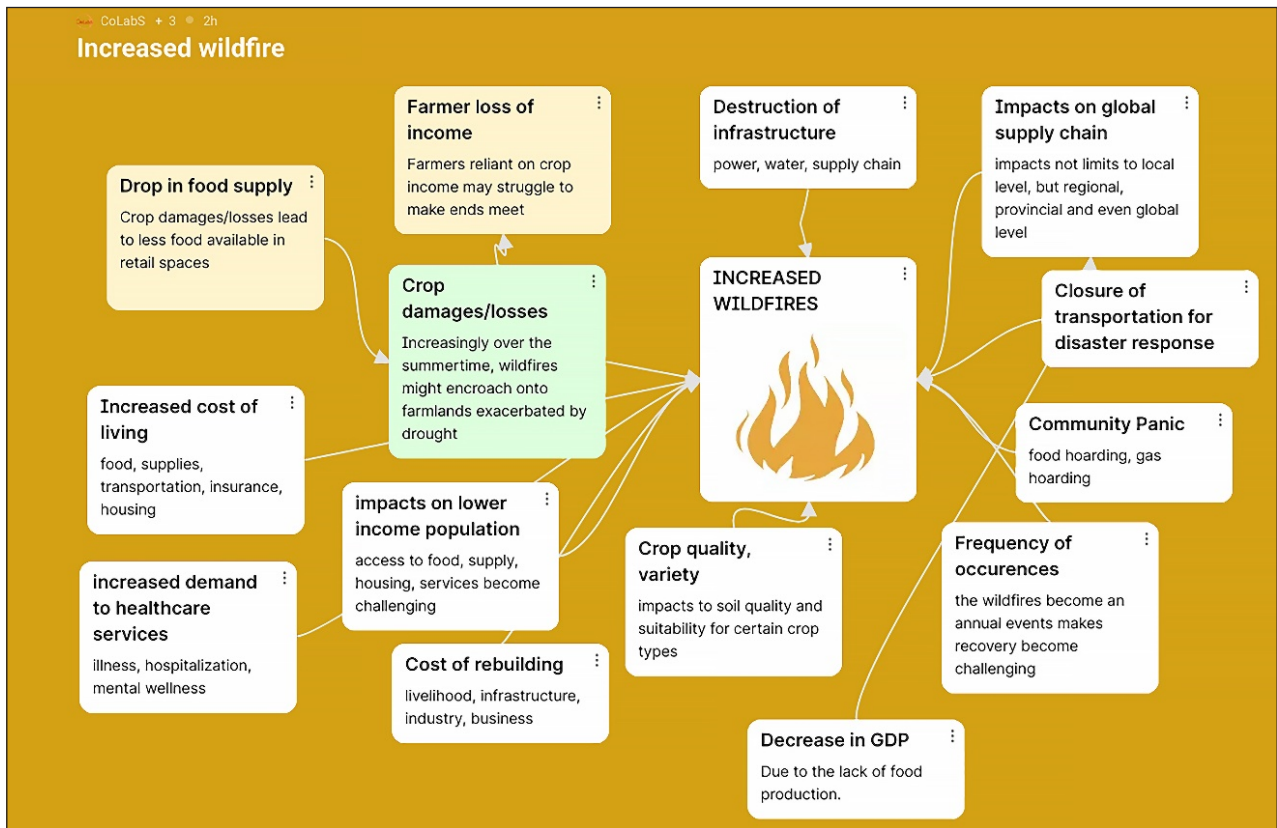


Figure 3 CoLabS Screenshot of the Second Workshop’s Hazard-Impact Mapping Working Table.

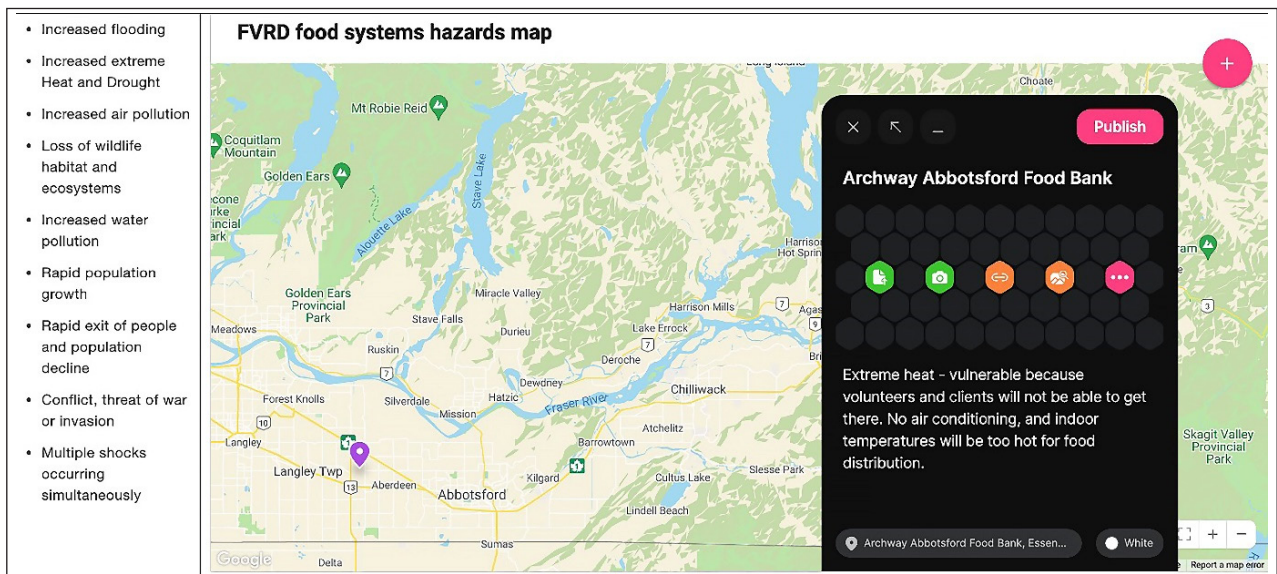


Figure 4 CoLabS Screenshot of the Second Workshop’s Spatial Mapping Table.

hazards and food system impacts. The group discussed how certain impacts emerged through various hazards, as well as how multiple food system shocks contribute to increased vulnerability. Similar to Workshop 1, the workshop closed with a summary of main outcomes from the workshop and a discussion on the next steps, including future activities and topics to be explored in the project.

As done following Workshop 1, a summary report was prepared on the Workshop 2 outcomes (Dring & Newell, 2022a). However, in addition to a synthesis of comments

and ideas presented in the workshop, the Workshop 2 summary report included an analytical component. Data from the systems maps were tabulated to identify nodes (i.e., hazards, direct impacts, secondary impacts) and connections/edges between nodes. The data were coded to create consistent terminology for those identifying the same impact (for instance, “habitat degradation” could also be described as “reduced habitat quality”). Then, data were imported into the Gephi (v. 0.9.2) network visualisation and analysis software, and the full hazard-

impact system was analysed to identify impacts with numerous connections to hazards and other impacts (see Dring & Newell, 2022a).

Outputs from the spatial mapping exercise were analysed to see where concentrations of vulnerable food systems assets were located by participants by calculating the numbers of markers placed within certain jurisdictions (i.e., within municipal, electoral area, or community boundaries). Numbers and percentages of markers that referred to either environmental or socioeconomic/political hazards were also calculated. In some cases, marker captions referred to larger geographic areas, rather than specific sites, with respect to both the scales of impact and hazard activity; however, these vulnerabilities were still represented by point data markers, as this was the only data input type available, using the Padlet-based mapping application.

SURVEY

The survey was launched in February 2022, before Workshop 3, and its purpose was to broaden the engagement in the project and to confirm responses generated in Workshops 1 and 2. The survey was delivered through Decision Point Research (a Canada-based data collection company), and it specifically targeted people aged 18 or older, who live in the Lower Mainland in BC. The initial dataset consisted of 220 responses; however, six entries were removed due to the respondents noting their place-of-residence to be a community outside of the Lower Mainland or were unclear about its location, resulting in a final sample size of 214 in a total (i.e., the Lower Mainland's) population of over 3 million people (Newell & Dring, 2022). Although not a large enough sample to be considered representative of the Lower Mainland, the survey gathered useful demographic and place-of-residence information for gaining insights about people's experiences and concerns about local food systems based on who they are and where they live.

The survey consisted of four sections: (a) demographic questions, (b) food systems concerns revealed by COVID-19, (c) food systems impacts experienced due to the pandemic, and (d) concerns and thoughts about impacts arising from a variety of environmental, socioeconomic, and political hazards. The survey questions were designed to align with the workshop series in that they explored the same issues (i.e., food system impacts and hazards) discussed in Workshops 1 and 2, and through systems-based and temporal lenses. For example, the survey posed questions about concerns regarding local and regional food systems vulnerabilities to the pandemic and same environmental, socioeconomic, and political hazards explored in Workshop 2, and using a similar approach to Workshop 1, respondents were asked to present the concerns in terms of different timeframes. In addition, the questions asking respondents about their concerns and experiences with food systems vulnerabilities and impacts

during the pandemic were based on topics discussed and outcomes from the workshops. A full copy of the survey and more details on the methods and results can be found in Newell and Dring (2022).

WORKSHOP 3

Workshop 3 was held in March 2022, and it ran for three hours. It was attended by 15 participants, all of whom had attended previous workshops. Its goal was to stimulate thinking on how to build long-term food system resilience in the face of current and future shocks. The main objectives were to identify gaps in and ways to scale-up/enhance existing food system initiatives, programs, and assets. Building on previous workshops, Workshop 3 began with a presentation that summarized and reviewed the insights on local food systems vulnerabilities produced through Workshop 1 and 2 and the analyses of the survey and hazard-impact system data (see Dring & Newell, 2022a; Newell & Dring, 2022).

The first activity of the workshop involved the facilitators introducing a food system future scenario (Figure 5). The scenario was designed as a worst-case situation that could occur twenty years in the future (i.e., 2042), and it was developed from discussion topics and outcomes from the previous two workshops. This approach was taken instead of identifying an idyllic scenario, as it provided a method of building on the previous work done in the study by synthesizing and contextualizing the concerns and issues identified in the previous workshops. In this case, the scenario activity did not involve selecting an optimal or most desirable scenario, as typically done in scenario planning (Amer et al., 2013); rather, it involved thinking about how to build resilience in ways that address and avoid the concerns and issues outlined in the worst-case scenario.

Workshop 3 activities employed similar Padlet-based tools embedded in the CoLabS platform. The first activity involved participants posting comments and providing thoughts on the plausibility of the scenarios and additional elements and/or missing food system impacts that may occur in the scenarios. Participants were also asked to identify the kinds of strategies and interventions that might be employed by food system actors in the future scenario. The activity concluded with a plenary discussion, where participants examined, elaborated on, and further discussed the posted comments and topics.

The second activity conducted in Workshop 3 involved participants examining key assets, gaps, and needs for food systems (Figure 6). The activity was structured into two parts: physical infrastructure and environmental features, and programs, initiatives, and policies. In both parts of the activity, participants were asked to identify the existing food systems assets (e.g., infrastructure, environmental features, policies, programs, or initiatives) that are critical for preventing the worst-case scenario, explaining how the asset needed to be protected and/

or maintained to prevent the scenario. Participants were also asked to identify possible ways of changing or enhancing the assets to improve chances of preventing the scenario. Finally, participants identified gaps in infrastructure, environmental features, policies, programs, and initiatives to highlight areas of concern with respect to how future hazards may result in food systems impacts, if said gaps are not addressed.

As done in the other workshops, Workshop 3 concluded with a final plenary session, where the group further discussed ideas and insights that emerged throughout the session. In addition, as all the Workshop 3 participants had previously engaged in the research, the plenary discussion also involved reflecting on the research process. The workshop concluded with a discussion on the next steps, including the preparation and release of the final workshop and survey reports (i.e., Dring & Newell, 2022b; Newell & Dring, 2022) and plans for bringing the research knowledge into meetings and planning sessions hosted by participating local food network groups.

RESULTS

The findings in this paper shares lessons for future PR work that focuses on complex sustainability issues and that use online engagement methods, by presenting

successes and shortcomings of the research approach. As discussed previously, the workshops included discussions with participants about the research process (including potential directions), and the findings presented in this research are based on both comments from the participants and participant observations. Accordingly, this section is structured following a thematic approach (Clarke et al. 2015), the findings and insights are presented through a series of themes (Table 2).

STRENGTHS

Place-Based Approach

The research used a place-based approach engaging participants living and working in the Fraser Valley region and centred the exploration specifically within the context of food systems issues and needs related to the region. Many of the issues and ideas presented through the workshops have broad applicability, such as, loss of livelihoods and overburdened social and health care systems (see Dring & Newell, 2021); however, the approach was still useful for identifying how issues commonly experienced in communities across the country and world occur in the local context. In this way, the research was effective in developing local, contextualized knowledge. For example, increases in food insecurity and (thus) usage of food banks were commonly observed issues in many communities during COVID-19

The screenshot shows a web page with a navigation bar at the top containing a logo and links for 'COMMUNITY PAGE', 'PREVIOUS WORKSHOPS', and 'ABOUT'. Below the navigation bar is a large orange horizontal bar. The main heading is 'FUTURE SCENARIO' in orange. The text below the heading reads: 'In the first workshop, we explored vulnerabilities to the food system that came about from COVID-19 on short to long term time scales. The second workshop explored ten hazards and their associated food system vulnerabilities. Based on the outcomes of these workshops, a narrative for a potential 'future' has been developed:'. A large orange-bordered box contains the narrative text: 'The year is 2042, it has been a better year than most, although nowhere near as good as it was back in the early 2000s. Heck, each year the dry season gets longer, and the rains only come during a few months in the winter. It's becoming harder and harder to get water for people, the animals, and the crops. Folks are thirsty and hungry. Last year, fires came right through downtown Mission, all the way to the riverbanks, all the supermarkets and homes, gone. Not too sure about rebuilding or if we should focus our efforts elsewhere. People have been right to complain that we could've done something about the dikes back in 2024, when things were better. Now the highways are so damaged we can barely move trucks let alone getting people around the region anymore. It's made it harder to get the inputs we need for farming, fuel, fertilizers, seeds, everything's gotten more expensive which makes food prices go up at the stores. Food imports stopped a couple years back, wildfires and drought in California and Mexico made them stop exporting and putting all their attention on feeding their own folks. We've struggled to meet this new demand and to feed the people coming here from all over the world. It's looking good this year, but I'm not too sure if it'll last. We seem to be on a downward path here, we'll keep surviving though, doing the best we can with a bad situation.'

Figure 5 CoLabs Screenshot of the Future Scenario Narrative used in the Third Workshop.

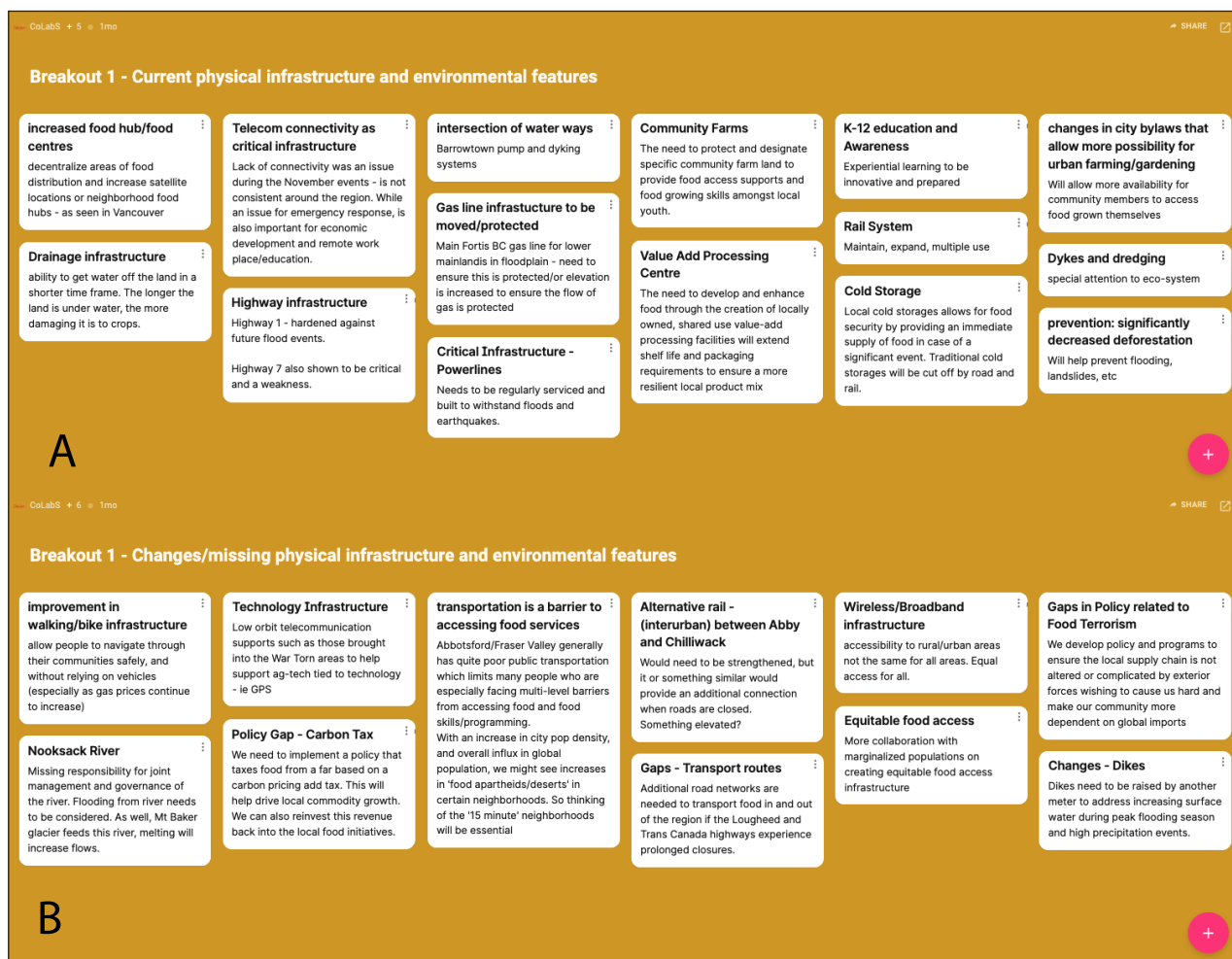


Figure 6 CoLabS Screenshots of Third Workshop’s Working Tables.

Note: CoLabS Screenshots of Third Workshop’s Working Tables on **(A)** current and **(B)** missing/gaps in physical infrastructure and environmental features.

CATEGORY	THEME	DESCRIPTION
Strengths	Place-based approach	The research focused on the Fraser Valley region for developing and advancing contextualized, local knowledge. Extending beyond the administrative boundary to include relationships and interactions between places.
	Relationship development & reciprocity	Relationship building was done by meeting community organizations and stakeholders on their terms and addressing their needs, and by participating in local networks.
	Multi-dimensional exploration	The research involved participants/stakeholders in exercises that explored food systems vulnerabilities through temporal and spatial dimensions.
	Dynamic digital tools	The variety of digital tools created an engaging workshop experience and opportunities for effective individual and group brainstorming.
Limitations	Participation	Comprehensive participation of food system actors (e.g., producers, labourers) and specific social groups (e.g. Indigenous, racialized, people experiencing poverty) was not fully achieved.
	Capacity limitations	Capacity limitations created challenges for certain stakeholders to participate, such as those working in food production and vulnerable groups with limited access to (or comfort with) online technologies.
	Real-world issues	Real-world hazard events influenced topics and focus of workshop discussion and activities.
	Online tool constraints	Some online tools were limiting in terms of the ideas and inputs participants wished to provide.

Table 2 Thematic Findings on Strengths and Limitations of the Participatory Research Process.

(e.g., Higgins et al., 2021), and such an issue was also observed in this work. However, the study also identified important nuances to the issue that were particular to the region, such as gaps in the types of food bank offerings to service to the local, significant South Asian population (Dring & Newell, 2021). As indicated by one participant, the identification of both widely-experienced and locally-contextualised impacts can be useful for understanding local challenges while also gaining insights from other jurisdictions on how to address said challenges.

I think looking at some of the issues that have been identified in the discussion here today and just looking at how others are addressing those issues and just providing that information that can help those dealing with the challenges find the solutions. I think that would be really useful, just one place where people can look, this is the issue and this is how other jurisdictions have been successful at dealing with it, that would be just valuable. (Workshop 1 participant)

Relationship Development

The approach used in this research was effective for developing relationships among the researchers and participants. Relationships were developed and built by meeting community organizations and stakeholders on their terms and addressing their needs, as opposed to parachuting into a community with a specific research agenda and conducting the research in an extractive manner. In this study, the participants were provided space to explore topics of importance to them and their communities. Furthermore, as the work took a broader systems-based perspective, there were little constraints with respect to what was deemed relevant within this examination of local food systems vulnerabilities. One participant indicated feeling safe in the workshops with respect to being able to express the ideas they felt to be relevant and important.

I think the thing I was most impressed with is that I felt really safe and that I could say things that I think and I don't often say some of the things that I said during our meetings in the general public because I think I'm thought of as being a weirdo. And I really appreciate the group and the expertise that was here, and I felt honored to participate. (Workshop 3 participant)

Researchers also built relationships and trust with community members and stakeholders by participating in local food systems networks. Such participation served the project in that it provided researchers with a greater understanding of the local food systems work and key challenges, while providing an avenue for putting research

into practice. With respect to the latter, the researchers attended a strategic planning meeting held by one of the local food systems networks, where they brought forward ideas, analysis, and connections arising from the research to inform food system planning. In addition, researchers strengthened working relationships with participants by producing reports in-between research activities to communicate findings to participants, but also to offer further embellishment and directions for analysis of workshop/survey findings.

I really enjoyed the tools that you provided and the ability to actually see the reports in between the meetings so that we could kind of see refreshed on what's been happening. And I hope this isn't the end of this. I hope we get to continue with it at some point in time and in some capacity to continue working on solving these wicked problems. (Workshop 3 participant)

Multidimensional Exploration

The research explored temporal and spatial dimensions to stimulate thinking about present and future conditions in terms of food systems issues and initiatives for addressing these issues. Incorporating these dimensions added complexity to the workshop activities and discussions, which presented initial challenges but also resulted in expanded ways of thinking and approaching problem analysis and identification of root causes. This was particularly the case with the temporal component of the research. In the first workshop, participants struggled with the timelines, trying to identify whether impacts were short-, medium-, or long-term. However, in the second workshop, participants (many of whom participated in the first workshop) included temporal perspectives, without prompting, in their comments on impacts of various hazards to food systems. For example, a participant discussed the long-term, intergenerational consequences of an economic recession on local populations. Such findings suggest the research approach used here (i.e., one that directly involved local stakeholders in the examination of complex temporal issues) potentially increased capacity to do temporal analyses, which is important for long-term resilience planning.

With an economic downturn, some people lose their jobs and some kids would be living in poverty. But then I started thinking about the statistics I had heard about the impact it has on a child to grow up in poverty and to not have proper nutritional food. The impact on their education. Their ability as an adult to function their mental health. And, all of a sudden, they don't do well in school because they don't get good food at home. (Workshop 2 participant)

Dynamic Digital Tools and Activities

The use of online tools for facilitating the activities was advantageous in that it allowed for PR while also maintaining physical distancing during the on-going COVID-19 pandemic. Furthermore, workshop participants identified that the online approach held advantages even when physical distancing was not required. Some participants commented on the creative use of the CoLabS space in facilitating workshop activities using a variety of engagement tools. It was also noted that the use of said tools allowed for people to simultaneously engage in different aspects of a workshop, namely individual and group brainstorming, as participants could use the working tables while others were engaging in discussion. These comments suggest that there are particular benefits in running online PR workshops and focus groups.

I thought your CoLabS was very creative and just like, you know, usually as you're brainstorming, which is sort of one person sort of thinking at a time kind of thing and people bouncing ideas off. But it was like, you know, one person can bounce ideas off while other people are writing on the Post-it board and all that kind of stuff. (Workshop 3 participant)

LIMITATIONS

Participation

Although this project involved the participation of stakeholders with diverse involvement with food systems, comprehensive community and cultural representation was not achieved, nor possible. The topic of food system vulnerability is highly complex, and engaging every type of stakeholder and their specific relationships to food systems was not feasible in this project. Rather as researchers, we relied on our established relationships with organizations and individuals in the region. As such, the researchers operated under the assumption that participants exist in their own networks of relationships and engagement. Nonetheless, such challenges in participation resulted in gaps in food system actors, organizations, communities, and social groups that participated in the workshops.

Due to project resource and time constraints, the research did not effectively, and comprehensively, include relationship and trust building processes that are appropriate and sensitive to specific engagement considerations for food system actors (e.g., producers, labourers, processors) and certain impacted groups, such as people with lived experience of poverty or housing insecurity, racialized groups, and Indigenous communities. Such limitations ultimately resulted in conspicuous gaps in participation. The survey broadened participation; for example, unlike the workshops, the majority (77%) of survey respondents identified as being of Asian descent and multiple respondents indicating having

lived experience with food insecurity issues due to the pandemic (Newell & Dring, 2022). However, engagement through a survey is shallower than in the workshops, and it does not enable the bidirectional interaction needed for PR work (Castleden et al., 2012); thus, lack of comprehensive representation was ultimately considered a major limitation of this work.

I just wanted to point out that I don't think we really capture the Indigenous perspective here because many of our First Nations communities still rely on traditional ways and means of accessing food, and we haven't really addressed what all of these environmental impacts will have on that. And I think at some point in time, it will be nice to connect with Elders and Knowledge Keepers from the various communities and see if they can add to this. (Workshop 2 participant)

Capacity Limitations

Capacity limitations of certain food systems stakeholders resulted in gaps in participation. Comprehensive sectoral representation was not achieved in this research, with notable gaps in those directly working in the areas of food production, processing, and retail. Unlike the challenges/issues related to engagement and recruitment noted above, these groups and communities were accessible to the researchers in that representatives were involved in the food networks previously discussed. However, barriers for these groups participating included challenges attending workshops while busy with their work. For example, Workshop 1 was in the summer, which is an extremely busy season for farmers, farm and food labourers, and food retailers. Therefore, although the workshops involved participants that work with various food system actors and organizations, these voices in many cases were not directly involved in the workshops.

The issue with capacity and participation in PR also relates to people's ability to access research activities. As noted, online engagement was necessary for this project, and it carried benefits for the research process. However, it also created barriers to participation for certain vulnerable groups. This became apparent when a participant, who worked in the social services sector, discussed how reliable access to Internet was beneficial for their ability to access food during the pandemic; although this comment was directed toward food access, it also alluded to the ability (or lack thereof) of certain groups to participate in online workshops. Once again, the voices of these groups were represented by proxy (i.e., through social sector representatives), rather than directly.

I think in terms of at least impacts, I would say a massive amount has to do with socioeconomic status. I think about some of my privileges and

what I've been able to do in the pandemic, especially as grocery stores became kind of like a place of threat and a place to avoid and the ability to have Internet access to be able to purchase things online. (Workshop 1 participant)

Real-World Issues

As noted above, the project activities occurred during times where a series of real-world hazard events were impacting food systems, perhaps the most salient example of this being the historic flooding event that impacted the FVRD in the fall of 2021. This synchronicity affected the research in multiple ways. One effect was to reduce workshop participation, as some were unable to attend workshops due to being too occupied with the emergency response to the flood event. Another way it affected the research was by elevating particular topics in the workshop discussions; for instance, although Workshop 2 involved exploring 10 different hazards and their potential impact on food systems, current and recent hazards (i.e., flooding, fires, and heat events) featured more prominently in the discussion, due to being top-of-mind.

We just acknowledged that these are not discrete hazards. They can happen at the same time, in fact, you could argue we're doing that right now with the flood in the middle of the pandemic, for example, freshet season, which is a high-risk flooding season overlaps with the beginning of fire season. (Workshop 2 participant)

Well, I started with flooding [in the spatial mapping activity] because that's where my mind went. (Workshop 2 participant)

Online Tool Constraints

Participants for the most part expressed positive comments about the online activities; however, limitations in the tools were also clearly identified. In particular, a number of participants found the spatial mapping activity frustrating due to both technical and conceptual limitations. In terms of technical aspects, the tool embedded in the CoLabS platform only allowed for point data to be drawn on maps, whereas some participants indicated the issues and impacts that they identified relate to areas rather than specific locations and are better represented through polygon data. The trans-jurisdictional nature of certain vulnerabilities was noted during the workshop, and it was expressed by participants that the inability to identify areas (i.e., polygon data) was a limitation of the activity. In terms of conceptual issues, participants highlighted how certain hazards such as wildfire and conflict have difficult-to-pinpoint origins that exist outside of the provided map

space. In both cases, these issues may not have been experienced in an in-person workshop, where freeform drawing on paper maps could be done. An in-person freeform drawing approach would allow for area/polygon mapping, and it would also enable creative methods for identifying difficult-to-pinpoint, outside-of-map issues such as drawing of arrows on the border of the map pointing inward. However, in the case of this research, the workshop activities were limited by the technical functionality of the tools and applications used.

I wanted to drop a pin and be able to show the effect across a larger area, such as, for example, there are a number of communities in North Mission and out in the electoral area to our east that are susceptible both to flight and to wildfire... a circle function for the map would be nice. (Workshop 2 participant)

Difficult to address environmental hazards that come from outside places like how do I pinpoint an affected area when often, you know, if you're dealing with wildfire in Chilliwack, you're not actually dealing with a wildfire, you're dealing with the smoke? (Workshop 2 participant)

DISCUSSION

The purpose of this project was to reflect upon the challenges and vulnerabilities that the COVID-19 pandemic has revealed about local food systems, ultimately to use this understanding to stimulate thinking about how to increase resilience to a variety of future shocks. Such work involves exploring linkages among different hazards, vulnerabilities, and impacts, which requires systems thinking and integrated planning perspectives. Researchers argue that integrated planning should involve participatory processes (Ling et al., 2009), and by extension, applied research designed to support integrated planning should also be participatory in nature (Newell et al., 2020). Illustrating these points is Jentoft and Chuenpagdee's (2009) comment on governance, noting it to be "more effective if it occurs where the problem is felt (or where the opportunity actually appears), and in co-operation with those who are affected by it" (pg. 557). Instead of conducting vulnerability assessment based on historical environment and socioeconomic data such as done in other research (e.g., Bruno Soares et al., 2012), the PR approach employed in this work draws from both the professional and lived experiences of community members and their fellow community members during shock events. In this way, the study leveraged the expertise of community actors, while also engaging participants as humans and community members affected (or with friends and family affected) by hazards explored in the

study. Such a PR approach enabled community reflections on the lessons COVID-19 provided on food systems vulnerabilities, using diverse expert and personal lenses.

Relationship and trust building are essential, and sometimes challenging activities, for conducting effective PR projects (Hacker et al., 2012). One of the approaches used in this research for building and strengthening relationships involved the researchers participating in local food network organisations. Such an approach was effective in terms of developing interest and engaging participants in the project, as well as for enhancing the potential of the research being implemented into practice (e.g., researchers were subsequently invited to strategic planning meetings). However, the researchers' participation in local food networks may have potentially affected recruitment and representation. Although the research primarily employed a purposive sampling method, inviting members of the food network organisations due to having access to this network could be considered akin to convenience sampling, which is a sampling approach with limitations to participant comprehensiveness (Etikan et al., 2016).

Limitations around participation also occurred due to the nature of the engagement and relationship building activities. Jimmy et al. (2019) discuss how engaging with Indigenous and racialized communities in sustainability issues requires long-term engagement and relationship building, as well as recognition of differences in diverse ways of knowing. Project constraints did not enable sufficient time for long-term relationship building and additional workshops that are based on diverse ways of knowing, and as a result, the research experienced low representation from these communities. This being said, the survey broadened engagement in the project, with stronger representation from racialized groups (Newell & Dring, 2022). However, surveys (particularly quantitative instruments) do not allow for transparent bidirectional engagement (Andrews et al., 2011), which is needed for enabling the co-learning involved in PR work (Castleden et al., 2012). To some degree, the research activities done in this project mirror different degrees of engagement outlined in Arnstein's (1969) ladder of citizen participation, with the surveys fitting within lower "consultation" levels of the ladder and the workshops aligning with higher participation levels. Therefore, although the surveys were useful from broadening input and understanding of community experiences, it is fair to say that this research activity ultimately did little to increase inclusion in actual PR processes.

Another challenge experienced in this research included the real-time occurrence of hazards during the months that workshops were held. Such events created a context where the non-pandemic hazards were explored not as hypotheticals, but as real-world issues that are perhaps of more present concern than COVID-19. As a result, workshops with the initial aim to explore a variety of hazards tended toward particular issues and topics (e.g.,

the flooding in the Fraser Valley region) with respect to the workshop discussion and participant comments. The project ran over several seasons, and it explored a wide variety of locally-relevant environmental, socioeconomic, and political hazards; therefore, a distinct possibility existed that one of these hazard events would occur and be front-of-mind during the course of the research. A key learning here is that researchers who work with communities to examine real-world problems embedded in complex sustainability issues must be flexible in that they allow the focus of their research projects and activities to shift in accordance with current and most critical knowledge needs.

An interesting finding from this research was how the participants initially found the temporal aspects of the first workshop to be a challenge, but then employed temporal thinking in subsequent workshops. Although it adds complexity, exploring food systems issues through a temporal lens is valuable for long-term food systems resilience planning (e.g., Carey et al., 2021; Savary et al., 2020). Scholars that work in the areas of participatory planning and participatory research often discuss the importance of ensuring effective communication and engagement, which avoids overly complex presentation of topics/issues and jargon (e.g., De Bruin & Morgan, 2019; Portman et al., 2012). However, as evidenced by this research, this does not mean shying away from complexity altogether, as non-academic collaborators are able to expand their ability to engage in complex sustainability issues and topics. The challenge for PR work is to design activities and engage diverse team members in discussions in ways that do not overwhelm them with complexity, while also not over-simplifying the problems explored.

In addition to the application of a PR approach, this research experimented with the use of online tools for facilitating engagement and collaboration around a local sustainability issue. The CoLabS platform used in this work was designed to be flexible so that different tools can be embedded depending on the needs of the users (Jost et al., 2021), and this degree of flexibility demonstrated to be useful as the workshops were developed in a manner that built on previous work, which required adding tools as new workshop activities were designed/planned. In addition, the digital platform offered new ways of engaging participants, allowing them to input ideas in the CoLabS space while also participating in online discussions, and this was noted to be advantageous for brainstorming.

The online approach also held shortcomings. This was in part due to limited functionality of the CoLabS tools; however, it is important to recognize that online engagement in PR will ultimately result in the participation of people who are comfortable with Internet technologies and have capacity to work in online spaces, potentially excluding some community members. Conversely, shifting completely to in-person engagement may discourage participation of those particularly vulnerable and concerned about contracting the COVID-19 virus. As the communities and societies

continue to negotiate how to work and live within the new COVID-19 reality, it is important to consider and experiment diverse and hybrid options for engagement that enable higher degrees of inclusivity.

CONCLUSION

Participatory processes are integral to sustainability and resilience planning, as involving diverse stakeholders ensures planning practices and outcomes are grounded in local social, economic, environmental, and cultural contexts and realities (Ling et al., 2009). It thus follows that research designed to support this type of planning should also be participatory in nature (Newell et al., 2021). Accordingly, the project documented in this paper employed a PR approach to gain insights on food systems vulnerabilities and ways of building resilience in the Fraser Valley region. As seen with all research, this work had limitations and challenges. Food systems are complex, and due to time constraints, it was not feasible to engage every actor and stakeholder in local food systems. In addition, the researchers/participants contended with real-world hazard events during the project.

No research effort is perfect, and instead of dismissing the value of the work due to such limitations, researchers should be transparent about the shortcomings to provide appropriate context for knowledge outcomes. For example, the gaps in representation were identified by both researchers and participants in the workshops, as well as in knowledge products (e.g., Dring & Newell, 2021). Moreover, it is important for PR researchers to embrace the 'messiness' of this form of work, meaning their projects should be adaptable and responsive to emerging real-world issues. By taking such an approach, research can be nimble in that it can follow new pathways in pursuit of the production of useful knowledge for a community, as opposed to being rigid and mired in a set plan that does not necessarily respond to changing conditions and local needs.

DATA ACCESSIBILITY STATEMENT

To comply with research ethics protocols, raw data are not made available; however, more details on the research activities, instruments, and outcomes can be found in reports available from the project's webpage: www.ufv.ca/food-agriculture-institute/the-research/integrated-planning/food-systems-vulnerabilities.

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COMPETING INTERESTS

The authors have no competing interests to declare.

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REFERENCES

- Abbotsford Chamber of Commerce** (2022). *Canada's agricultural hub: An economic impact analysis of agriculture in Abbotsford*. Retrieved from https://growthzonecmsprodeastus.azureedge.net/sites//Canadas_Agricultural_Hub_-_An_Economic_Impact_Analysis_of_Agriculture_in_Abbotsford_May-25-2022-Report.pdf
- Amer, M., Daim, T. U., & Jetter, A.** (2013). A review of scenario planning. *Futures*, 46, 23–40. <https://doi.org/10.1016/j.futures.2012.10.003>
- Andrews, J. O., Cox, M. J., Newman, S. D., & Meadows, O.** (2011). Development and evaluation of a toolkit to assess partnership readiness for community-based participatory research. *Progress in Community Health Partnerships*, 5(2), 183–188. <https://doi.org/10.1353/cpr.2011.0019>
- Arnstein, S. R.** (1969). A ladder of citizen participation. *Journal of the American Institute of Planners*, 35(4), 216–224. <https://doi.org/10.1080/01944363.2018.1559388>
- Balfour, R. & Keenan, E.M.** (2007). *Strategic Sustainable Planning: A civil defense manual for cultural survival*. Old City Foundation Press.
- BC Ministry of Agriculture** (2016). Fraser Valley Regional District – Agricultural Land Use Inventory. Retrieved from https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-and-seafood/agricultural-land-and-environment/strengthening-farming/land-use-inventories/fvrd_2011-13_aluireport.pdf

- BC Stats** (2021). *Municipal and sub-provincial areas population, 2011 to 2021*. Government of British Columbia. Retrieved from <https://www2.gov.bc.ca/gov/content/data/statistics/people-population-community/population/population-estimates>
- Biehl, E., Buzogany, S., Huang, A., Chodur, G., and Neff, R.** (2017). *Baltimore Food System Resilience Advisory Report*. Johns Hopkins Center for a Livable Future. Retrieved from <https://clf.jhsph.edu/sites/default/files/2019-01/baltimore-food-system-resilience-advisory-report.pdf>
- Bruno Soares, M., Gagnon, A. S., & Doherty, R. M.** (2012). Conceptual elements of climate change vulnerability assessments: A review. *International Journal of Climate Change Strategies and Management*, 4(1), 6–35. <https://doi.org/10.1108/17568691211200191>
- Carey, R., Murphy, M., & Alexandra, L.** (2021). COVID-19 highlights the need to plan for healthy, equitable and resilient food systems. *Cities & Health*, 5(Suppl. 1), S123–S126. <https://doi.org/10.1080/23748834.2020.1791442>
- Castleden, H., Morgan, V. S., & Lamb, C.** (2012). “I spent the first year drinking tea”: Exploring Canadian university researchers’ perspectives on community-based participatory research involving Indigenous peoples. *Canadian Geographer*, 56(2), 160–179. <https://doi.org/10.1111/j.1541-0064.2012.00432.x>
- Ciaccia, C., Pierro, M. di, Testani, E., Rocuzzo, G., Cutuli, M., & Ceccarelli, D.** (2019). Participatory research towards food system redesign: Italian case study and perspectives. *Sustainability*, 11(24), 7138. <https://doi.org/10.3390/su11247138>
- Clapp, J., & Moseley, W. G.** (2020). This food crisis is different: COVID-19 and the fragility of the neoliberal food security order. *Journal of Peasant Studies*, 47(7), 1393–1417. <https://doi.org/10.1080/03066150.2020.1823838>
- Clarke, V., Braun, V., & Hayfield, N.** (2015). Thematic analysis. In J. Smith (Ed.), *Qualitative Psychology: A Practical Guide to Research Methods*. 3rd ed. (pp. 222–248). London, UK: Sage.
- Climate Change Adaptation Program** (2015). *Fraser Valley: BC agriculture & climate change: Regional adaptation strategies series*. British Columbia Agriculture & Food Climate Action Initiative. Retrieved from <https://bcclimatechangeadaptation.ca/wp-content/uploads/2022/Resources/RegionalStrategies-FraserValley.pdf>
- De Bruin, W. B., & Morgan, M. G.** (2019). Reflections on an interdisciplinary collaboration to inform public understanding of climate change, mitigation, and impacts. *Proceedings of the National Academy of Sciences of the United States of America*, 116(16), 7676–7683. <https://doi.org/10.1073/pnas.1803726115>
- Domingo, A., Charles, K. A., Jacobs, M., Brooker, D., & Hanning, R. M.** (2021). Indigenous community perspectives of food security, sustainable food systems and strategies to enhance access to local and traditional healthy food for partnering Williams Treaties First Nations (Ontario, Canada). *International Journal of Environmental Research and Public Health*, 18(9), 4404. <https://doi.org/10.3390/ijerph18094404>
- Dring, C., & Newell, R.** (2021). *Fraser Valley food system vulnerability workshop: Summary report*. Abbotsford, Canada: University of the Fraser Valley. <https://doi.org/10.13140/RG.2.2.34634.08648>
- Dring, C., & Newell, R.** (2022a). *Mapping food system impacts, hazards, and vulnerabilities in the Fraser Valley region workshop: Summary report*. Abbotsford, Canada: University of the Fraser Valley. <https://doi.org/10.13140/RG.2.2.31197.69604>
- Dring, C., & Newell, R.** (2022b). *Building a foundation to resilient food systems in the Fraser Valley region: Summary report*. Abbotsford, Canada: University of the Fraser Valley. <https://doi.org/10.13140/RG.2.2.33906.79045>
- Etikan, I., Musa, S. A., & Alkassim, R. S.** (2016) Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1–4. <https://doi.org/10.11648/j.ajtas.20160501.11>
- Fraser Valley Regional District** (2017). *Regional Snapshot Series: Agriculture. Agricultural Economy in the Fraser Valley Regional District*. Fraser Valley Regional District. Retrieved from <https://www.fvrd.ca/assets/About~the~FVRD/Documents/RGS/AgricultureSnapshot.pdf>
- Fraser Valley Regional District** (2019). *Clean economy in the Fraser Valley: Resource guide*. Fraser Valley Regional District. Retrieved from <https://www.fvrd.ca/assets/About~the~FVRD/Documents/Clean~Economy/Clean%20Economy%20Resource%20Guide.pdf>
- Fraser Valley Regional District** (n.d.-a.). *First Nations*. Fraser Valley Regional District. Retrieved from <https://www.fvrd.ca/EN/main/about-the-fvrd/first-nations.html>
- Fraser Valley Regional District** (n.d.-b.). *What is the FVRD?* Fraser Valley Regional District. Retrieved from <https://www.fvrd.ca/EN/main/about-the-fvrd/what-is-the-fvrd.html>
- Greenhalgh, T., Jackson, C., Shaw, S., & Janamian, T.** (2016). Achieving research impact through co-creation in community-based health services: Literature review and case study. *The Milbank Quarterly*, 94(2), 392–429. <https://doi.org/10.1111/1468-0009.12197>
- Hacker, K., Tendulkar, S. A., Rideout, C., Bhuiya, N., Trinh-Shevrin, C., Savage, C. P., Grullon, M., Strelnick, H., Leung, C., & DiGirolamo, A.** (2012). Community capacity building and sustainability: Outcomes of community-based participatory research. *Progress in Community Health Partnerships: Research, Education, and Action*, 6(3), 349–360. <https://doi.org/10.1353/cpr.2012.0048>
- Higgins, C. D., Páez, A., Kim, G., & Wang, J.** (2021). Changes in accessibility to emergency and community food services during COVID-19 and implications for low income populations in Hamilton, Ontario. *Social Science & Medicine*, 291, 114442. <https://doi.org/10.1016/j.socscimed.2021.114442>
- Hobbs, J.** (2020). Food supply chains during the COVID-19 pandemic. *Canadian Journal of Agricultural Economics*, 68, 171–176. <https://doi.org/10.1111/cjag.12237>
- Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services** (2019). *Global assessment report on biodiversity and ecosystem services of the*

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. S. Díaz, J. Settele, E. S. Brondizio E.S., H. T. Ngo, M. Guèze, J. Agard, A. Arneth, P. Balvanera, K. A. Brauman, S. H. M. Butchart, K. M. A. Chan, L. A. Garibaldi, K. Ichii, J. Liu, S. M. Subramanian, G. F. Midgley, P. Miloslavich, Z. Molnár, D. Obura, A. Pfaff, S. Polasky, A. Purvis, J. Razzaque, B. Reyers, R. Roy Chowdhury, Y. J. Shin, I. J. Visseren-Hamakers, K. J. Willis, and C. N. Zayas (eds.). Bonn, Germany: IPBES Secretariat.

- Israel, B. A., Schulz, A. J., Parker, E. A., & Becker, A. N.** (1998). Review of community-based research: assessing partnership approaches to improve public health. *Annual Review of Public Health, 19*, 173–202. <https://doi.org/10.1146/annurev.publhealth.19.1.173>
- Jacobi, J., Wambugu, G., Ngutu, M., Augstburger, H., Mwangi, V., Zonta, A. L., Otieno, S., Kiteme, B. P., Burgoa, J. M. F. D., & Rist, S.** (2019). Mapping food systems: A participatory research tool tested in Kenya and Bolivia. In *Mountain Research and Development, 39*(1), 1–11. <https://doi.org/10.1659/MRD-JOURNAL-D-18-00024.1>
- Jahn, M., Jayamaha, J.B., Mulhern, W.S., Ross, D.E., Rose, M.A., and Treverton, G.F.** (2018). Global food system stability and risk at the nexus of defense and development. Retrieved from <https://www.thomsonreuters.com/content/dam/ewp-m/documents/thomsonreuters/en/pdf/reports/global-food-system-stability-and-risk-0718.pdf>
- Jentoft, S., & Chuenpagdee, R.** (2009). Fisheries and coastal governance as a wicked problem. *Marine Policy, 33*(4), 553–560. <https://doi.org/10.1016/j.marpol.2008.12.002>
- Jimmy, E., Andreotti, V., & Stein, S.** (2019). *Towards braiding*. Guelph, Canada: Musagetes Foundation. Retrieved from https://musagetes.ca/wpcontent/uploads/2019/07/Braiding_ReaderWeb.pdf
- Jost, F., Newell, R., & Dale, A.** (2021). CoLabS: A collaborative space for transdisciplinary work in sustainable community development. *Heliyon, 7*(2), e05997. <https://doi.org/10.1016/j.heliyon.2021.e05997>
- Knezevic, I., Blay-Palmer, A., Levkoe, C. Z., Mount, P., & Nelson, E.** (2017). *Nourishing communities: From fractured food systems to transformative pathways*. Cham, Switzerland: Springer International Publishing.
- Ling, C., Hanna, K., & Dale, A.** (2009). A template for integrated community sustainability planning. *Environmental Management, 44*(2), 228–242. <https://doi.org/10.1007/s00267-009-9315-7>
- Moldenhauer, J., & Sackey, D.J.** (2016). Transdisciplinarity, community-based participatory research, and user-based information design research. In A. Marcus (Ed.), *Design, User Experience, and Usability: Design Thinking and Methods*. Lecture Notes in Computer Science (pp. 323–332). Springer: Cham, Switzerland.
- Newell, R., & Dale, A.** (2021). COVID-19 and climate change: An integrated perspective. *Cities & Health, 5*(Suppl. 1), S100–S104. <https://doi.org/10.1080/23748834.2020.1778844>
- Newell, R., & Dring, C.** (2022). *Food systems hazards, vulnerabilities and impacts in the Lower Mainland, BC*. Abbotsford, Canada: University of the Fraser Valley. <https://doi.org/10.13140/RG.2.2.15365.42721>
- Newell, R., McCarthy, N., Picketts, I., Davis, F., Hovem, G., & Navarrete, S.** (2021). Communicating complexity: Interactive model explorers and immersive visualizations as tools for local planning and community engagement. *FACETS, 6*, 287–316. <https://doi.org/10.1139/facets-2020-0045>
- Newell, R., Picketts, I.M., & Dale, A.** (2020). Community systems models and development scenarios for integrated planning: Lessons learned from a participatory approach. *Community Development, 51*(3), 261–282. <https://doi.org/10.1080/15575330.2020.1772334>
- Newman, L., Powell, L. J., Nickel, J., Anderson, D., Jovanovic, L., Mendez, E., Mendez, E., & Kelly-Freiberg, K.** (2017). Farm stores in agriburbia: The roles of agricultural retail on the rural-urban fringe. *Canadian Food Studies/La Revue canadienne des études sur l'alimentation, 4*(1), 4–23. <https://doi.org/10.15353/cfs-rcea.v4i1.211>
- Onwuegbuzie, A. J., Dickinson, W. B., Leech, N. L., & Zoran, A. G.** (2009). A qualitative framework for collecting and analyzing data in focus group research. *International Journal of Qualitative Methods, 8*(3), 1–21. <https://doi.org/10.1177/160940690900800301>
- Portman, M. E., Esteves, L. S., Le, X. Q., & Khan, a Z.** (2012). Improving integration for integrated coastal zone management: an eight country study. *The Science of the Total Environment, 439*, 194–201. <https://doi.org/10.1016/j.scitotenv.2012.09.016>
- Picketts, I. M., Werner, A. T., Murdock, T. Q., Curry, J., Déry, S. J., & Dyer, D.** (2012). Planning for climate change adaptation: Lessons learned from a community-based workshop. *Environmental Science and Policy, 17*, 82–93. <https://doi.org/10.1016/j.envsci.2011.12.011>
- Savan, B., & Sider, D.** (2003). Contrasting approaches to community-based research and a case study of community sustainability in Toronto, Canada. *Local Environment, 8*(3), 303–316. <https://doi.org/10.1080/135498303006657>
- Savary, S., Akter, S., Almekinders, C., Harris, J., Korsten, L., Rötter, R., Waddington, S., & Watson, D.** (2020). Mapping disruption and resilience mechanisms in food systems. *Food Security, 12*(4), 695–717. <https://doi.org/10.1007/s12571-020-01093-0>
- Trimble, M., & Berkes, F.** (2013). Participatory research towards co-management: Lessons from artisanal fisheries in coastal Uruguay. *Journal of Environmental Management, 128*, 768–778. <https://doi.org/10.1016/j.jenvman.2013.06.032>
- Vaughn, L. M., & Jacquez, F.** (2020). Participatory research methods – choice points in the research process. *Journal of Participatory Research Methods, 1*(1), 1–13. <https://doi.org/10.35844/001c.13244>
- Zeuli, K., & Whalen, R.** (2017). Resilient cities require resilient food systems. *ICIC Blog*. Retrieved from <https://icic.org/blog/resilient-cities-require-resilient-food-systems>

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