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**Assessing social resilience to disasters at the neighbourhood level:
Co-producing a resilience assessment framework**

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Abstract

Disasters of the past decade have drawn considerable attention to the need to build resilient communities and prompted the adoption of disaster resilience policies across communities, cities, and nations. As policies are translated into local actions, policymakers, researchers, and practitioners are advocating for the measurement of disaster resilience as a means to identify areas for improvement, plan interventions, evaluate the effectiveness of resilience strategies, and monitor resilience progress.

The need to assess disaster resilience has spawned a growing body of research examining the underlying drivers of resilience and identifying how disaster resilience can be operationalised and measured. In particular, recent research has focused on the importance of social resilience, which is a component of disaster resilience and refers to the capacity of people and communities to deal with external stresses and shocks, and how it contributes to disaster preparedness, disaster response, and post-disaster recovery. However, while local communities are seen as the frontline in preparing for and responding to disasters, the scale of analysis for much of the existing resilience assessments have focused on the city or higher levels of analysis. Questions thus remain about whether these assessment tools are relevant and applicable at the sub-city or neighbourhood level.

This thesis seeks to develop social resilience assessment measures for neighbourhoods through integrating scientific and local knowledge. Using an appreciative inquiry approach, a workshop with hazard researchers, practitioners, and a policymaker in Wellington, New Zealand, was first conducted in 2015. This was followed in 2016 by a series of focus groups with stakeholders in five neighbourhoods across the Wellington region in New Zealand, and the City and County of San Francisco in the United States. The workshop and focus groups explored how social resilience is conceptualised, its essential characteristics, and neighbourhood-specific contextual influences that shape social resilience levels.

Responses from various stakeholder groups – hazard researcher, emergency practitioner, policymaker, and neighbourhood stakeholder – revealed similarities in how social resilience is perceived. Social resilience is conceptualised as having both cognitive and structural dimensions and is linked to communities' economic, infrastructural/built, natural, and institutional/governance environments. Cognitive characteristics – those that relate to people's attitudes, values, and beliefs as well as their mental processes and perceptions of themselves and their environment – include collective efficacy, sense of community and place attachment, decision-making inclusiveness, and unifying leadership at the neighbourhood-level. Structural dimensions relate to discrete features and

characteristics of people and communities and include their diversity of skills, education and training; social networks; access to financial resources; and understanding potential hazard risks and impacts. These characteristics form a framework for measuring neighbourhood-level social resilience.

Furthermore, these shared characteristics across different stakeholder groups demonstrate the potential universality of social resilience assessment constructs at the neighbourhood level that could inform new models for measuring disaster resilience. They also provide a foundation for local-level stakeholders (e.g., policymakers, practitioners, and community members) who are looking into baselining neighbourhood disaster resilience using an integrated approach.

While different stakeholder perspectives contain similarities, this thesis finds that common social resilience characteristics are contextual to individual neighbourhoods, reflecting diversity at this level of analysis. By examining the concept of social capital – one of the social resilience characteristics – three key themes were identified that influence the formation, activation, and benefits of social capital resources: community demography, cultural influences on social support, and neighbourhood governance. An assessment framework was proposed that incorporates both quantitative indicators and contextual questions across six structural dimensions (i.e., population stability, neighbourhood-based organisations and groups, coordination between community-based organisations, linkages to cultural and ethnic minority communities, presence and effectiveness of neighbourhood leaders and community-based organisations, and inclusive and transparent government processes) and four cognitive dimensions (i.e., cultural beliefs and expectations, trust, social support, and empowerment through collective action).

Thus, the results of this thesis highlight one important consideration in the development and implementation of resilience assessment tools at this geographic scale. While this research points to potential universality of social resilience assessment constructs and measures, it has also identified the need to consider contextual influences and characteristics when mapping them onto various neighbourhoods.

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On a beautiful day at San Francisco Union Square in 2014, my primary PhD supervisor David, his family (Carol and Joshua), and I had coffee and talked about my enrolling in a PhD programme in Wellington, New Zealand. Four years after that conversation, I am submitting a PhD thesis.

The last few years have felt like an endurance race. As a former marathon runner and a triathlete, I realised that ‘doing’ a PhD is very much akin to participating in an Ironman triathlon race, which consists of a 3.86km swim, a 180.25km bicycle ride, and a run that is 42.16 km long – all to be completed in under 17 hours. I view my PhD journey as engaging in three different activities. My first year in the PhD programme was like swimming, something I enjoy but am terribly slow at. The second year was all about gathering and writing up the research data, similar to that of a bike ride along flat roads and over mountains – sometimes it was easy, but most of the time it was uphill work. The last two years were like a marathon in which I could barely keep my legs moving. Often times, I kept thinking to myself, “How much longer do I have to go before I cross the finish line?”

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Prologue

My interest in the topic of neighbourhood resilience measurements is grounded in my professional experiences in the field of disaster management. Prior to my PhD programme, I managed the Ready Neighborhood programme, a multi-year American Red Cross disaster resilience initiative that sought to increase the disaster resilience of over 20 low-income neighbourhoods throughout the San Francisco Bay Area. Central to the initiative's approach to building neighbourhood resilience was engagement with a cross-section of stakeholders including local governments, community groups, faith-based organisations, and community leaders. I was in charge of overseeing the development of neighbourhood-based resilience plans as well as the initiative's overarching monitoring and evaluation process.

I had just completed my master's degree in geography in which I examined older adults' risk perceptions of wildfires, so I was keenly aware of the literature on social vulnerability and hazard perceptions. However, the concept of disaster resilience, which was gaining traction in the policy and funding circles in San Francisco at that time, was still new to me.

Not quite sure how to 'evaluate' disaster resilience, I surveyed the field and developed a set of key quantitative performance metrics that served to measure disaster resilience as part of the Ready Neighborhood programme evaluation process. These metrics included the number of preparedness trainings provided and the number of businesses and community-based organisations that had developed a continuity of operations plan for an emergency. In programme evaluation lingo, these metrics are a form of output (e.g., production of activities such as the number of personal preparedness trainings provided), rather than an outcome (e.g., changes in the level of performance or behaviours such as increased personal disaster preparedness).

As the American Red Cross initiative approached the end of its first year, we tallied our programme output numbers and used them as a basis for promoting our programme's success in transforming our first set of neighbourhoods into resilient communities. Yet I knew that our outputs did not necessarily equate to increased disaster resilience. My experiences in engaging with stakeholders from neighbourhoods taught me that the concept of resilience is more than having people trained to be prepared for disasters and organisations having plans to continue to operate after disasters occur. While these tangible skills and plans are essential to disaster preparedness, I had a sense that intangible capacities within organisations and communities are equally important. These capacities take the form of active coordination between community groups, durable social connections

between family members and neighbours, and a strong sense of community, among many other factors. These intangible capacities make programme evaluation difficult, especially when evaluation tools are based mostly on quantitative methods. I had to deal with questions about the most effective and expedient way to quantify these intangibles, given that our initiative was operating under a compressed timeframe and budget constraints. I asked myself many times during my career at the Red Cross: How can we measure resilient capacities? What programmes or activities could be developed to move the needle of resilience?

The community partners with whom I worked had the same questions about how resilience is measured. Since the Ready Neighborhood programme's goal is to build disaster resilience, they wanted to know how the American Red Cross defines disaster resilience. It is not uncommon to hear from our partners as our programme rolls out into each neighbourhood questions such as: Are you talking about personal preparedness? Continuity of operations planning? Neighbourhood response planning?

In neighbourhood meetings, our non-profit and government partners would express their organisational objectives and community visions for a better neighbourhood. These objectives and visions were both tangibles (e.g., materials, trainings, funds) and intangibles (e.g., better communication between community-based organisations and local government agencies, an increase in residents' feelings of hope and engagement).

More often than not, each neighbourhood that I worked with had different priorities and needs. However, given the constraints of time and human and financial resources, I had to 'standardise' programme metrics across all of these neighbourhoods. This process entailed simplifying 'resilience' down to a few measurable metrics so that internal stakeholders within the organisation could more effectively focus on key programme deliverables and collect the necessary data. This attempt was met with an equal amount of successes and challenges. On the one hand, our programme's ability to standardise our programme evaluation has allowed organisational staff to quickly and effectively demonstrate successes to funders and our partners. Many of the lessons learned from managing the Ready Neighborhoods programme were incorporated into the community resilience guide published by the American Red Cross (Herbst & Yannacci, 2013). This guide does not deal with aspects of resilience that a responding organisation has no control over, such as the built infrastructure, but rather focuses on elements that the American Red Cross can affect, such as building neighbourhood networks. On the other hand, intangible elements, such as stories told by our partners, did not get captured and evaluated at all. In hindsight, many of these stories reflect exemplars of best practices

in and essence of disaster resilience that non-profit and community-based organisations, funders, and government agencies have sought to cultivate in communities.

Through my experiences working with local stakeholders, I realised there is a need for a process to baseline neighbourhood resilience levels that captures not only factors that are easily observed, but also processes and perceptions that are harder to measure. In many ways, this thesis is part of an on-going dialogue with many people for the past eight years, from my conversations with older adults about their hazard perceptions when I was a graduate student, to informal and formal meetings with colleagues and local stakeholders across the San Francisco Bay Area during my time at the American Red Cross, and to interactions with emergency management professionals, hazards researchers and research participants in Wellington, New Zealand, and San Francisco, U.S., during my PhD programme.

This thesis, therefore, is a summation of many and varied dialogues and interactions. As readers will come to realise, measuring disaster resilience is anything but a straight-forward task. It is my hope that the assessment frameworks proposed here will serve to capture and evaluate the many important elements that contribute to a neighbourhood's increased resilience and well-being.