LET'S TALK ABOUT DISASTERS &

# SOCIAL VULNERABILITY

## 1) WHAT IS SOCIAL VULNERABILITY?

Social vulnerability refers to the **socio-economic conditions that lessen people's ability to prepare for, cope with, and recover from a shock or hazard event.**

## 2) HOW DO DISASTERS AFFECT VULNERABILITY?

Social vulnerability is not a permanent condition. Disasters can both worsen existing inequalities and create new ones, making some people more impacted than others.

## 3) WHAT DOES THIS MEAN FOR EMERGENCY MANAGEMENT?

Once we identify ***what*** makes people vulnerable to floods and ***how*** to assess it, we can begin to address it.

***How can we identify areas of disproportionate socio-economic vulnerability*** so that we can reduce their risks and create a more equitable and resilient future for all?

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# 4) HOW CAN SOCIAL VULNERABILITY BE ASSESSED?

A **social vulnerability index**, or SoVI for short, is **a decision-support tool to assess and visualize relative social vulnerability within a specific area.** SoVIs combine different socio-economic variables (*for example: demographics, income, housing type*) from a dataset, such as the Canadian Census.

**SoVIs enable us to compare social vulnerability between areas**, such as across cities or between different neighbourhoods. In doing so, we can pinpoint areas that may need extra attention or support!

# 5) HOW CAN SOVI BE USED TO SUPPORT INCLUSIVE RESILIENCE?

SoVIs can be combined with other data, such as flood exposure, to map areas that have both:

- relative high hazard exposure ***AND***
- relative high social vulnerability

In doing so, we can work to ensure that we are allocating resources, time, and energy to those who need it most!

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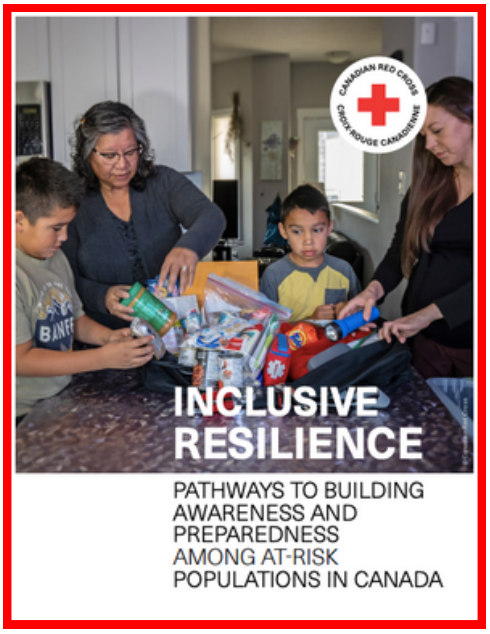
# INCLUSIVE RESILIENCE

IN PARTNERSHIP WITH THE CANADIAN RED CROSS FUNDED BY PUBLIC SAFETY CANADA VIA THE EMERGENCY PUBLIC AWARENESS CONTRIBUTION PROGRAM

In 2020, the Canadian Red Cross and Public Safety Canada started a four-year project, the ***Emergency Public Awareness Contribution Program***. This program developed and tested materials, methods, and tools to engage and empower communities in culturally relevant ways. It relies on continuous monitoring and evaluation to enhance emergency and disaster preparedness.

As part of this program, the **Inclusive Resilience** project aimed to promote inclusive approaches, tools, and actions that foster inclusive disaster risk reduction and emergency preparedness across Canada. P4A conducted research on public outreach and risk communications, and on understanding and identifying where disproportionate social vulnerabilities exist within a community.

**uwaterloo.ca/inclusive-resilience/**





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# READ OUR 2024 REPORT

*Inclusive resilience: A socio-economic vulnerability index to map flood risks for targeted communications and disaster risk reduction*

## WHAT DOES THE RESEARCH SAY ABOUT WHO IS VULNERABLE– AND WHY/HOW?

Pages 10-12

**Table 1:** Canadian populations that are disproportionately impacted by flooding

| Variable | Types of Impacts | An Example |
|---|---|---|
| **Socio-economic status**<br><br>Low-income households, homelessness, education level, unemployment | ▪ Access to resources/ economic insecurity<br>▪ Increased exposure/ susceptibility to flooding<br>▪ Mobility<br>▪ Housing quality | People with limited financial resources have fewer options for evacuation or relocation. Those who cannot afford alternative accommodations (e.g., hotel, short-term rental) or to repair damaged living spaces may face housing insecurity or homelessness due to the added financial strain (Burton et al., 2016; Walker et al., 2022). |
| Further Reading: | Bjarnadottir et al., 2011; Burton et al., 2016; Chakraborty et al., 2020; Collins et al., 2018; Fielding & Burningham, 2007; Hallegette et al., 2016; Hamideh et al., 2021; Gray-Scholz et al., 2019; McLeod & Kessler, 1990; Morris et al., 2018; Ramin & Svoboda, 2009; Rivera et al., 2021; Vickery, 2017; Walker et al., 2022 | |
| **Household composition and dynamics**<br><br>Lone-parent and single-person households, renters | ▪ Housing quality<br>▪ Access to social supports<br>▪ Access to resources/ economic insecurity | Lone-parent and single-person households may have limited financial resources to cope with and recover from disasters due to one individual assuming the entire burden of household/ familial responsibilities (Oulahen et al., 2015a). |
| Further Reading: | ATSDR, 2022; Klinenberg, 2016; Oulahen et al., 2015a; Tobin-Gurley et al., 2010 | |
| **Age**<br><br>Infants, children, youth, older adults (aged 50+) | ▪ Mobility<br>▪ Physical health and safety<br>▪ Mental health outcomes<br>▪ Access to resources/ economic insecurity<br>▪ Access to social supports | Older adults disproportionately experience adverse post-flood outcomes and often face additional barriers due to reduced mobility and existing medical conditions (Emrich et al., 2020). Further, older adults are more likely to experience social isolation, which reduces their access to non-financial coping mechanisms and social supports during a disaster (Oulahen et al., 2015a). |
| Further Reading: | Adams et al., 2020; Al-Baldawi et al., 2021; Aldrich & Benson, 2008; Arshad et al., 2020; Bjarnadottir et al., 2011; Burton et al., 2016; Burton & Cutter, 2008; Chakraborty et al., 2020; Cutter & Smith, 2009; Emrich et al., 2020; Fulton & Drolet, 2018; Gutman, 2007; Jensen, 2021; Lowe et al., 2013; Manuel et al., 2015; McDonald-Harker et al., 2021; Morris et al., 2018; Oulahen et al., 2015a; Scannell et al., 2017; Tapsell et al., 2010 | |

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# LEARN MORE ABOUT:

- WHY WAS EACH VARIABLE INCLUDED IN THE INDEX?
- WHAT ASSUMPTIONS ARE MADE?

## APPENDIX D:
## SoVI INDICATORS & RATIONALE

| Factor | Variable Code | Description (from Statistics Canada) | Census 2016 Variable Address | Rationale (Why this variable was chosen and how it affects vulnerability) | References |
|---|---|---|---|---|---|
| Social | ONEPERHH | One-person households (%) | Households by type / Total - Private households by household type - 100% data / Non-Census-family households / One-person households | Isolated individuals and/or persons that have full financial responsibility | Andrey & Jones, 2008; Oulahen et al., 2015 |
| Social | NOLANG | Official language knowledge (People who know neither English nor French) % | Knowledge of official language - Both sexes / Total - Knowledge of official languages for the total population excluding institutional residents - 100% data; Both sexes / Neither English nor French | Limited ability to access information and resources without comfort in either official language | Hebb & Mortsch, 2007; Khan, 2012; Oulahen et al., 2015; Tate, 2012 |
| Social | NODEGREE | Inhabitants with age 15 or older with no certificate/diploma/ degree (%) | Education - Total Sex / Total - Highest certificate, diploma or degree for the population aged 15 years and over in private households - 25% sample data / No certificate, diploma or degree | Affects socio-economic status and income | Andrey & Jones, 2008; Cutter et al., 2003; Holand et al., 2011; Lee, 2014; Oulahen et al., 2015; Schmidtlein et al., 2008; Wood et al., 2010b |
| Social | LONEPARENT | Lone-parent families (%) | Family characteristics / Total - Lone-parent census families in private households - 100% data | Can experience challenging childcare responsibilities and financial constraints | |

Pages 52-56

# TECHNICAL GUIDE:

## METHODOLOGY FOR CREATING YOUR OWN SOVI MAPS

*Pages 41-47 | 60-64*

### APPENDIX B:
### STEPS FOR CONSTRUCTING THE 2023 P4A SoVI FOR CANADIAN RED CROSS

**STAGE 1** Data collection and preparation

Step 1.1

**Determine the purpose of creating the index**
(in this case, an index of social vulnerability)

**Determine the following:**

- What question(s) does your organization want to be able to answer?
- Who will use and view the results?

**Why is this important?**

- To get a clear understanding and definition of the phenomenon your organization is evaluating
- To be aligned on why you are creating an index and map
- To be clear on how you will use it – and for which audience(s)

Step 1.2

**Select literature-consistent indicators**

**Determine the following:**

- What variables are consistently supported in the literature as indicators of

### APPENDIX E:
### HOW TO CREATE WEB-BASED MAPS OF SoVI WITH ARCGIS

What follows is the methodology used for creating the web-based maps of a Social Vulnerability Index (SoVI) and its components (e.g., economic insecurity and neighborhood instability) for Partner's for Action's project for the Canadian Red Cross Service on *Inclusive Resilience: A Social Vulnerability Index (SoVI) to Assess and Map Flood Risk for Targeted Communications*, completed in 2023.

Details on the derivation of this SoVI can be found in Chakraborty et al. (2022, 2020) and are beyond the scope of this document. In other words, **before following the steps below to create a map, you must derive the index values and produce the associated polygon(s).**

#### 1. Define the classes of SoVI (using a standard deviation method)

For defining the clusters, the following steps are taken:

- The mean of the index values ($\chi$) is calculated ($\mu$)
- The standard deviation (std. dev) of the index values is calculated ($\sigma$)
- All the index values are z-normalized ($Z_i$; zero mean, std. dev.=1) through:
  - $Z_i = \frac{\chi_i - \mu}{\sigma}$ where $Z_i$ is the normalized value of the index

To read the full report, visit:

**uwaterloo.ca/inclusive-resilience/**

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