

# POPULATION VULNERABILITY

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# AN OVERVIEW

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- Rationale and purpose
- Drivers of population vulnerability
- Risk factors for population vulnerability
- Indicator selection criteria
- Reporting options

# RATIONALE

Vulnerability is considered important in environmental health because:

*“those regions of the world where poor health status is met with limited capacity to adapt will be most severely affected (by environmental stresses)”*

Berrang-Ford et. al. (2012).

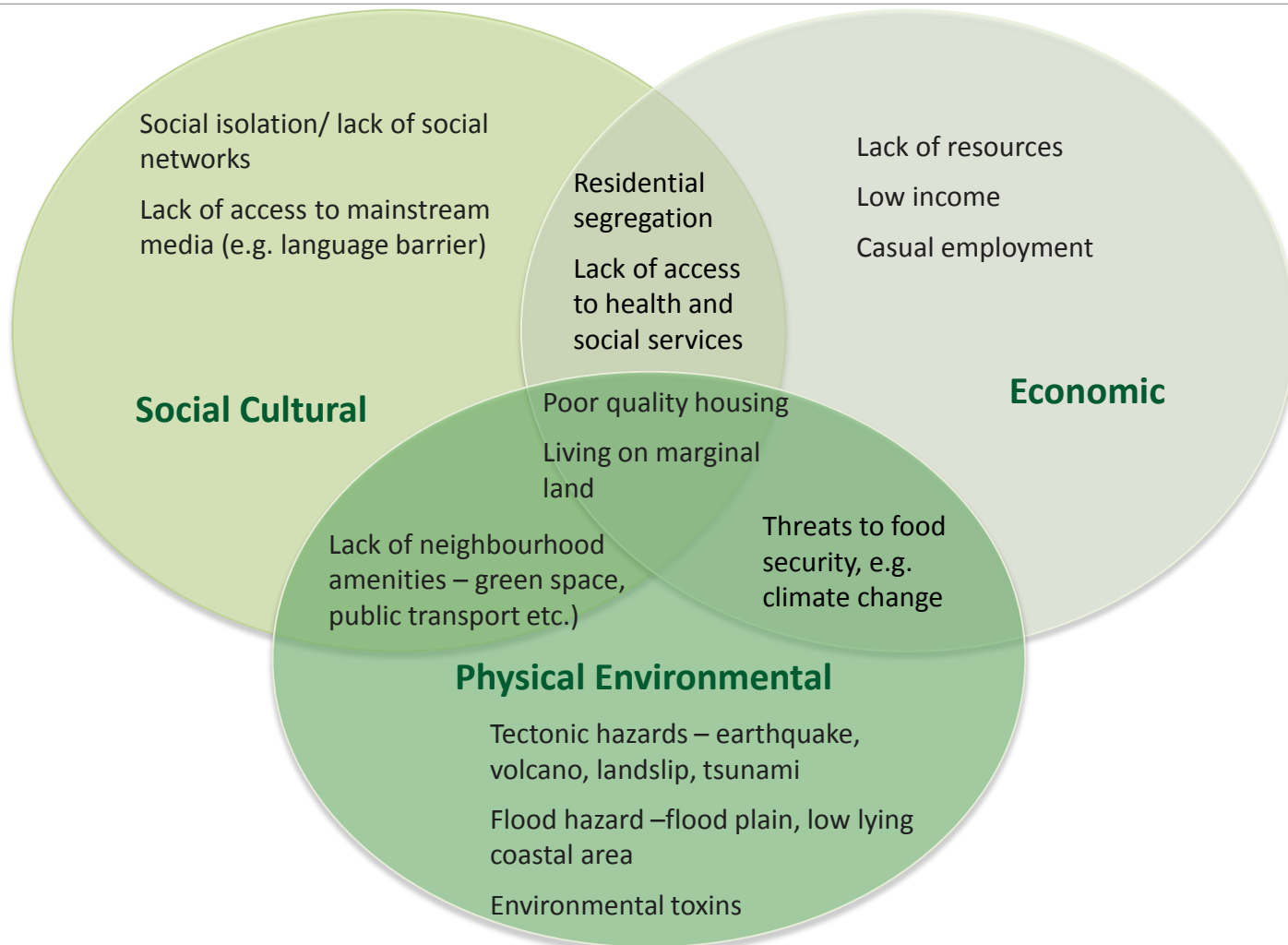
Two components to vulnerability:

- Potential for exposure to a hazard (or environmental stress)
- Coping ability (resistance and resilience in the face of a hazard)

Rygel et. al. (2006)

An indicator domain would need to encompass both these perspectives and most crucially, identify groups for whom the two perspectives intersect,

# DRIVERS OF POPULATION VULNERABILITY



# RISK FACTORS FOR POPULATION VULNERABILITY

Place	People	Animals
Exposure to environmental stresses.	Pregnant women	Early warning for environmental toxins/ pathogens: (e.g. elevated lead lives in eggs of “backyard” chickens, myopathy in pig hunting dogs)
	The very young (0-4 years) Children (0-14 years)	
	The very old ( $\geq 85$ years) Elderly ( $\geq 65$ years)	Zoonosis' as an environmental stress
	Māori/ Pacific peoples	Keeping and culling of backyard livestock – potential environmental risks
	Refugees and asylum seekers	
	People suffering from chronic conditions	Medication of animals – build-up of antibiotic resistance in animals and people
	People with limited resources (high NZDep)	Biosecurity – (e.g. foot and mouth) – economic and food security risk factor

# INDICATOR SELECTION CRITERIA

The following should be considered when identifying suitable indicators for population vulnerability::

- Available data
- Scientifically valid (have an established, scientifically sound basis for the link made)
- Consistent and comparable
- Methodologically sound measure
- Intuitive easy to interpret (clear what the indicator is measuring)
- Able to disaggregate (break down into subgroups)
- Timely (reported at a regular frequency)
- Public health impact

Vulnerability indicators can either be recorded in a separate domain or specific indicators/ indices included in each environmental health indicator domain.

# REPORTING OPTIONS

There are several options for developing vulnerable population indicators:

1. Identify individual measures of vulnerability and categorising these. This is the approach currently undertaken by the EHI Team with indicators reporting on:
  1. Percentage population under 5 years
  2. Percentage population over 65 years and over 85 years
  3. Percentage single person households over 65 years and over 85 years
  4. Socio-economic deprivation (NZDep2013)
2. A vulnerability profile for specific geographical entities: we are currently developing (proof of concept) models linking population vulnerability to degree of risk to earthquake hazard in the Wellington region.
3. A single “vulnerability index”: using several measures of vulnerability with weights to differentiate the importance of each measure to overall vulnerability is a potential future development.

# A CASE STUDY OF POPULATION VULNERABILITY TO TECTONIC HAZARDS IN THE WELLINGTON REGION

The project looked into mapping populations according to risk associated with earthquakes. The earthquake data is based on a study conducted by the Greater Wellington Regional Council (GWRC) in 2012. The aim of the study was to identify vulnerable populations at high risk of factors associated with an earthquake.

GWRC created an index for: ground shaking, liquefaction potential, slope failure, tsunami evacuation zones and highly active fault lines. All 6 hazardous components were then combined to create a 1-5 index rating for earthquake severity.

Census 2013 population data by mesh block unit (the smallest area unit for which statistical data is reported in New Zealand) was overlaid onto the combined index. By using area as a proxy for population, the proportion of a mesh block covered by an earthquake severity rating was converted to a risk gradient for a specified population.

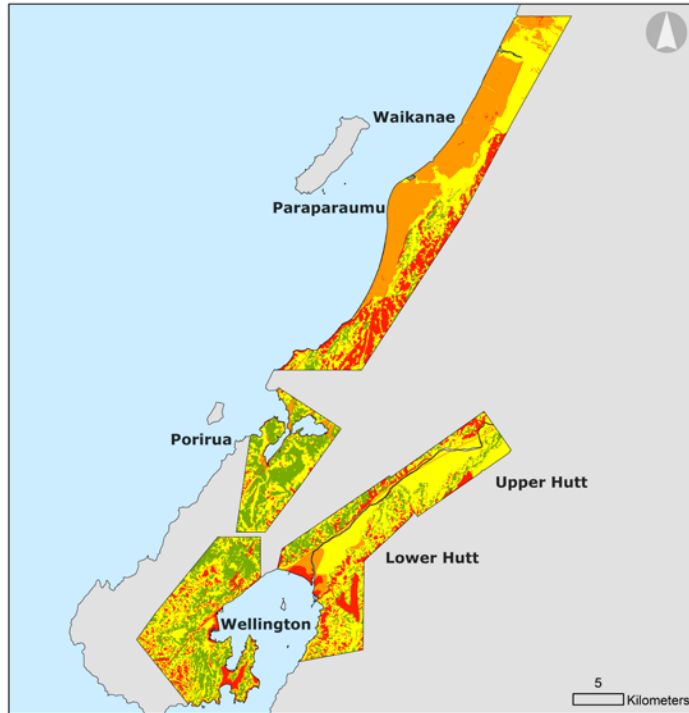
The number of people in the GWRC area living in each risk category for combined earthquake hazard are as follows:

Low risk	1 – 42
	2 – 143979
Moderate risk	3 – 184670
	4 – 49946
High risk	5 - 37677



# A CASE STUDY OF POPULATION VULNERABILITY TO TECTONIC HAZARDS IN THE WELLINGTON REGION

Combined Earthquake Hazard Index  
Wellington Proof of Concept



Combined Earthquake Hazard Index

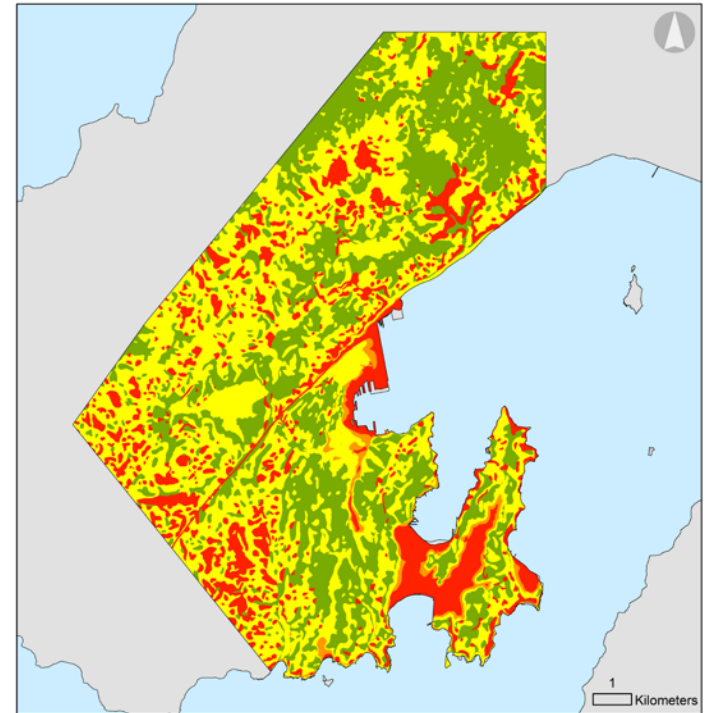


Data Source: GNS Science, Greater Wellington Regional Council, Statistics New Zealand  
Author: Connor McInnes  
Publication Date: 20/09/2016  
File Path:  
Disclaimer: Information from CHQIndex is based on data from a wide range of organisations, each of whom take responsibility for the information they submit. While every effort has been made to ensure accuracy, responsibility for the integrity of the data rests with its creator. All data displayed on outputs from CHQIndex is from publicly available sources. All reasonable measures have been taken to ensure the quality and accuracy. If you believe that any of this information may be inaccurate, please contact us at [info@ehinz.govt.nz](mailto:info@ehinz.govt.nz)  
 

Maps illustrate the combined risk of earthquake induced:

- Slope failure
- Ground shaking
- Liquefaction
- Tsunami

Combined Earthquake Hazard Index  
Wellington Central Close Up



Combined Earthquake Hazard Index



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