Study of post-disaster indirect death
- by the case of the Great East Japan Earthquake and Tsunami
東日本大震災における震災関連死に関する研究

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Miyako city

Ofunato area

Fukushima Daiichi Nuclear Power Station

Photo Source: Ministry of Land, Infrastructure, Transport and Tourism

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1. Introduction

| Date & Time	March 11, 2011. 2:46 p.m. JST
Magnitude	9.0
Casualties	19,747 deaths, 6,242 injured, 2,556 missing
Destroyed house	1,168,453
Economic loss	Over ¥25 trillion ($300 billion)
Tsunami height	Max 15m-20m

Definition

災害関連死：当該災害による負傷の悪化又は避難生活等における身体的負担による疾病により死亡し、災害弔慰金の支給等に関する法律（昭和48年法律第82号）に基づき災害が原因で死亡したものと認められたもの 。

Disaster-related indirect death: Death that is due to injury worsening or illness associated with physical burden from displacement, and recognized as caused by the disaster according to the condolence law (Act No. 82 of 1973).

2. Results

Estimated and actual CDR* (per 10,000 people) during 2000-2019

Color
— Actual
— Estimated

Fill
More
Less

*CDR: Crude death Rate
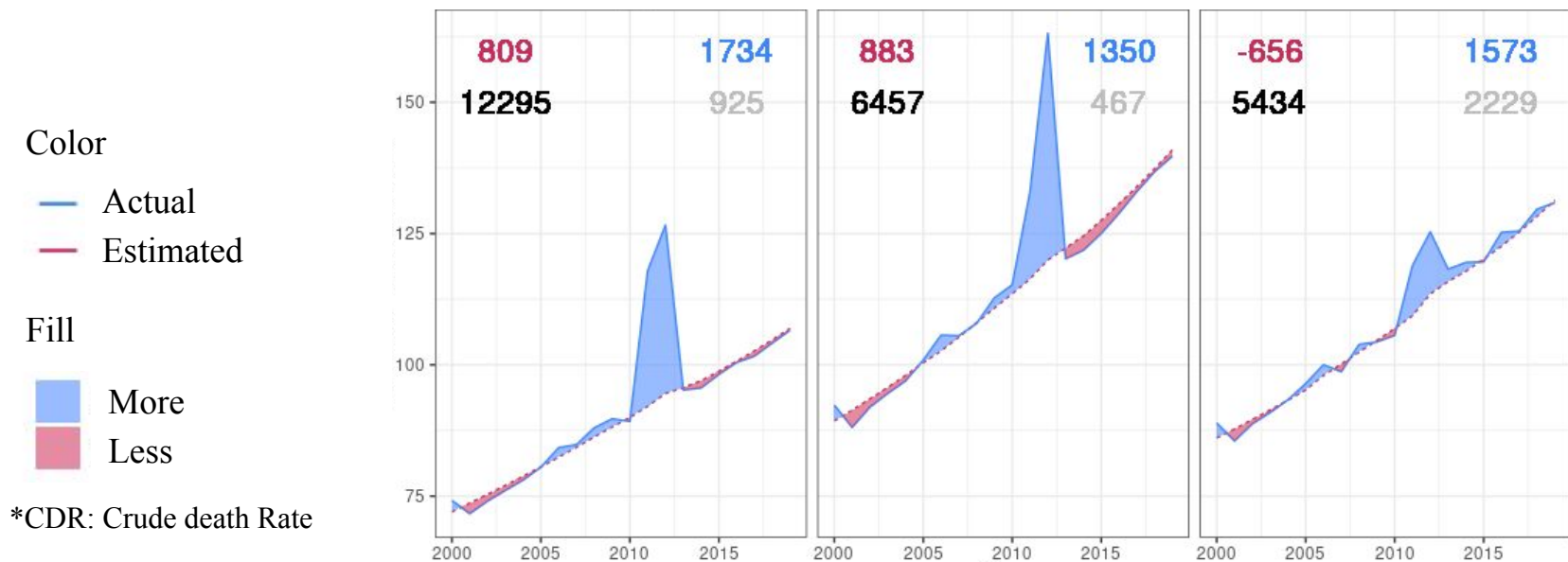
| Number of indirect death	Miyagi	Iwate	Fukushima
Reported (by 31 March 2022)	930	470	2333
Estimated	1734	1350	1573
Discrepancy	804	880	-760

Regression analysis

| Predictors	OLS Estimates	Robust Linear Model	
		Estimates	standardized CI
Direct Mortality (Per 10,000 residents)	0.03 **	0.03 ***	0.20 – 0.44
Distance to epicenter (km)	-0.14 *	-0.10 **	-0.35 – -0.08
Nuclear Impact (0/1)	28.61 ***	37.42 ***	0.40 – 0.59
Single Household Rate (Per 100 households)	0.50 **	0.29 **	0.05 – 0.26
Average Income (1000 yen per resident)	0.03 *	0.01	-0.13 – 0.76
Employment Rate (Per 100 residents)	-0.97 *	-0.32	-0.83 – 0.15
Life expectancy F (Year)	-9.36 *	-4.61 *	-0.28 – -0.01
R^2 / R^2 adjusted	0.839 / 0.778		

*Excerpted indicators

* $p<0.05$ ** $p<0.01$ *** $p<0.001$
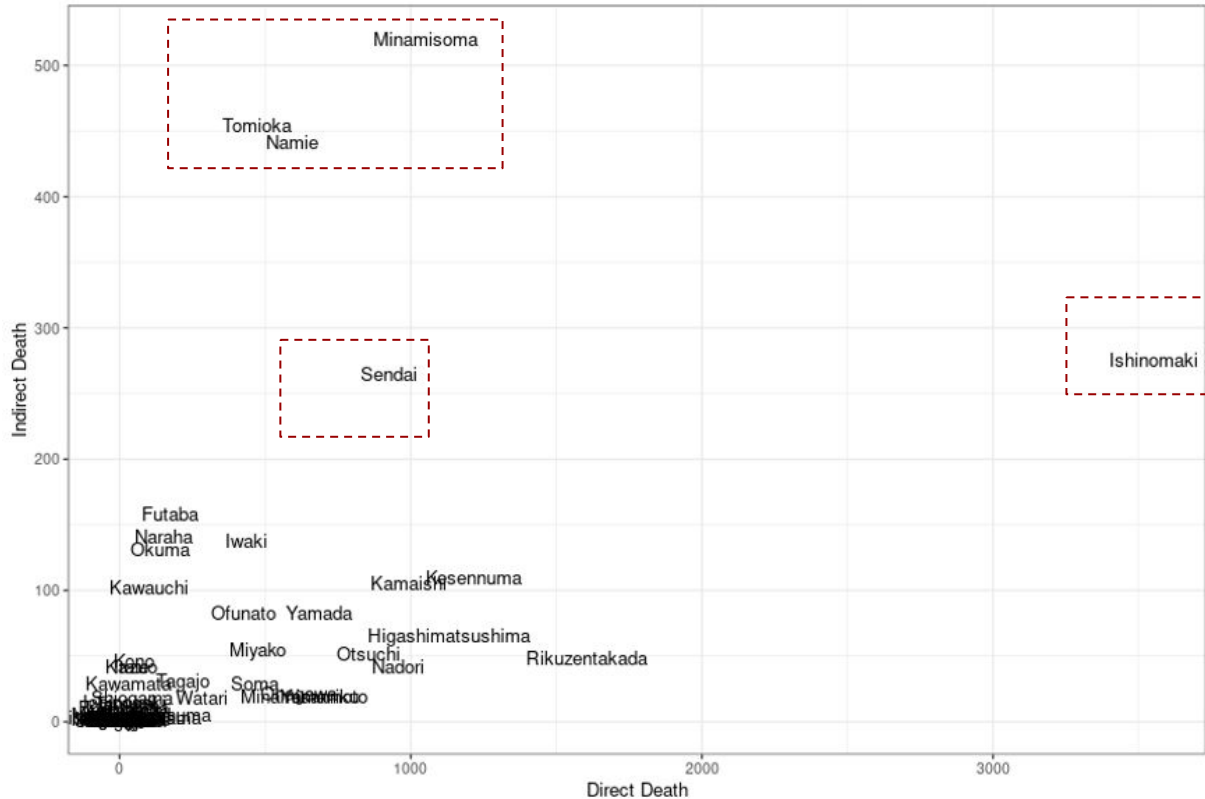
3. Methodology:
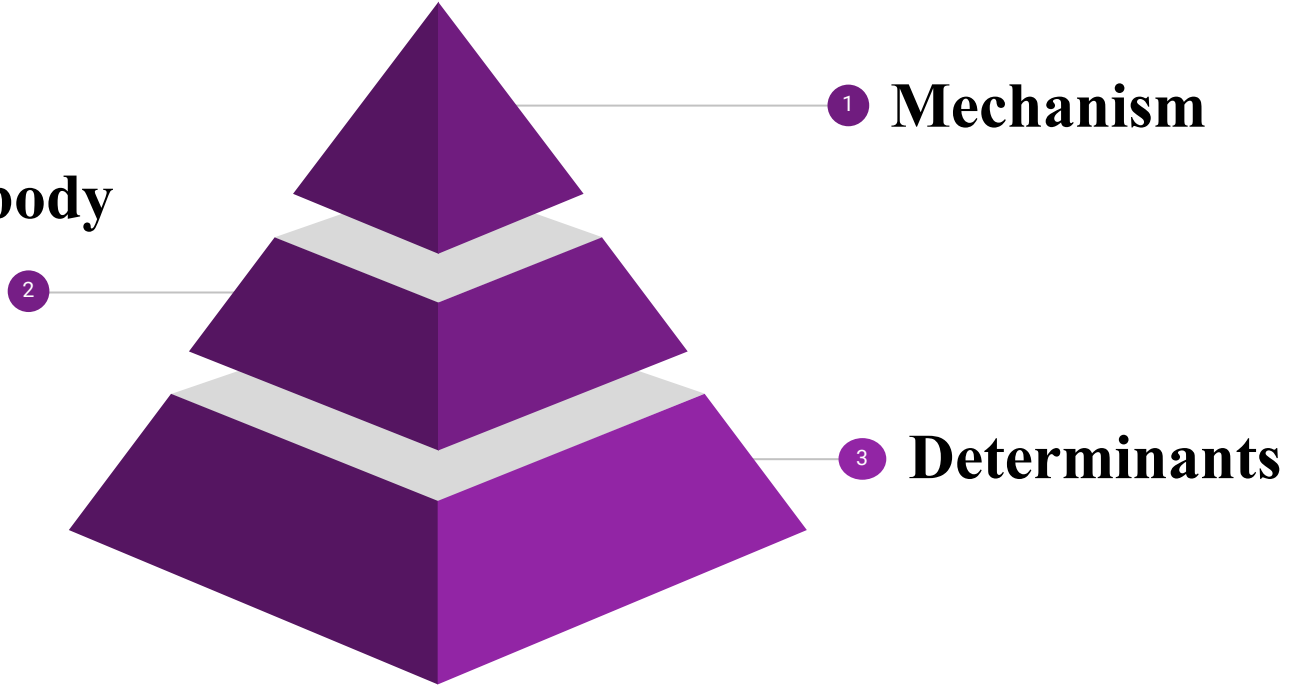
The Crude death rates per 100,000 people
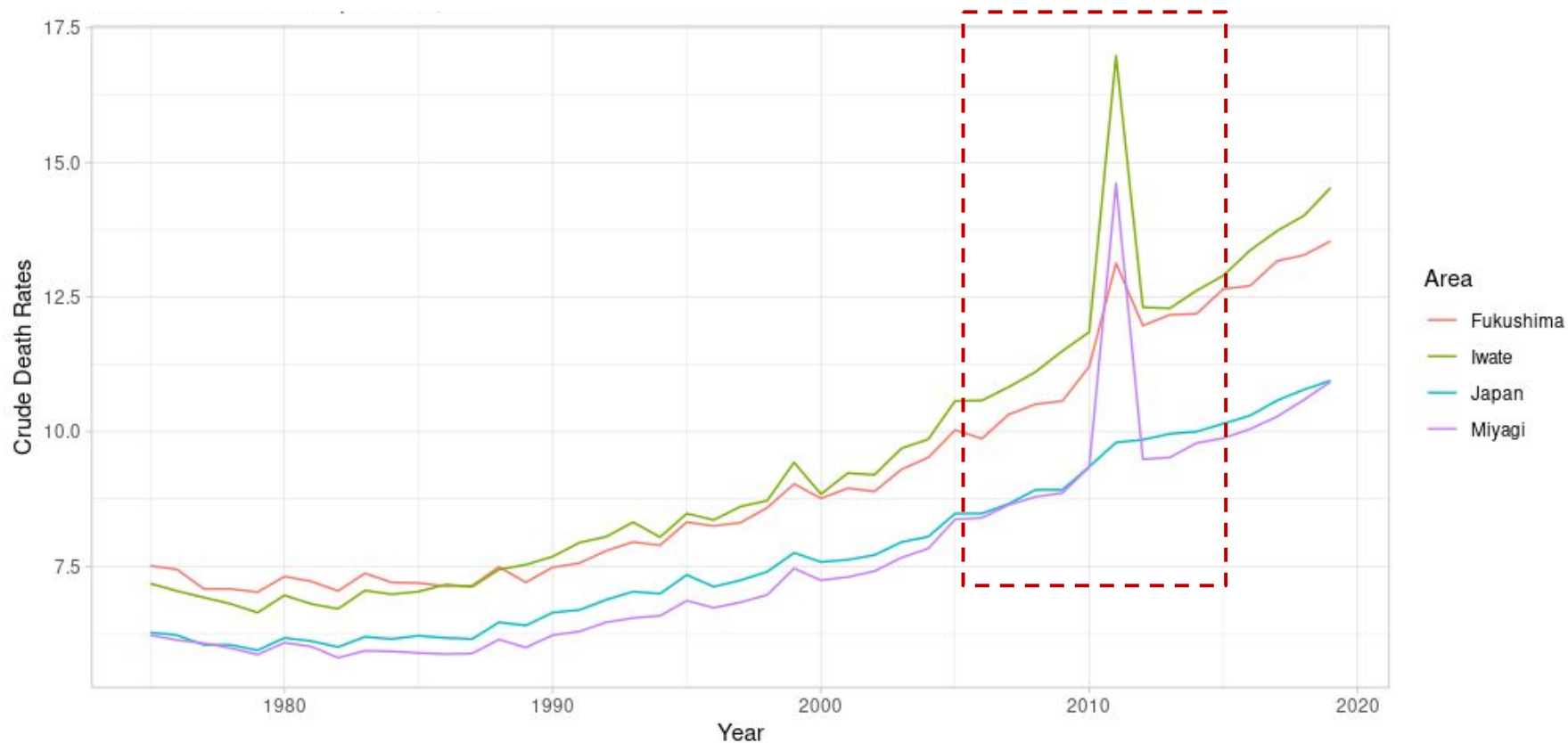
Data source: Vital registration mortality data from Population, Demographic and Household Surveys based on the Basic Resident Ledger

The direct death and the reported cumulative indirect death

Direct

Ishinomaki : 3553

Rikuzentakada: 1606

Kesennuma : 1218

Indirect

Minamisoma : 520

Tomioka : 454

Namie : 442

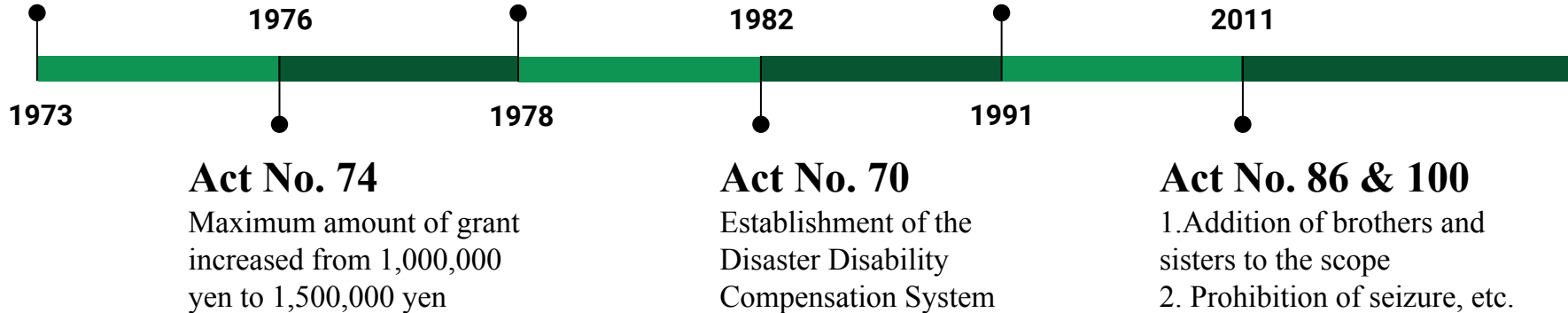# The timeline of the public policy of indirect death

Act No. 82

Enactment of the "Act on the Payment of Disaster Condolence Money, etc." proposed by Mr. Takashi Sato
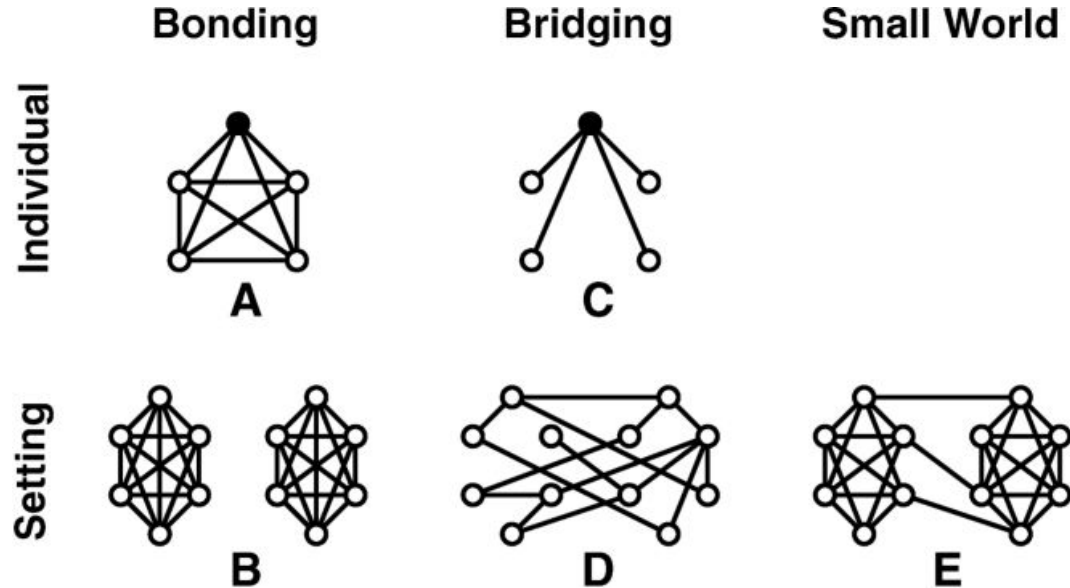
Act No. 6

Maximum amount of payment to 2,000,000 yen

Act No. 88

Maximum amount increased to 5 million yen

1976

1982

2011

1973

1978

1991

Act No. 74

Maximum amount of grant increased from 1,000,000 yen to 1,500,000 yen

Act No. 70

Establishment of the Disaster Disability Compensation System

Act No. 86 & 100

1. Addition of brothers and sisters to the scope
2. Prohibition of seizure, etc.

4. Discussion

Social capital

Bonding   **Bridging**   **Small World**

Individual

A   C

Setting

B   D   E

Source: Neal, J., Neal, Z. Implementation capital: merging frameworks of implementation outcomes and social capital to support the use of evidence-based practices. (2019)

Post-disaster recovery : (1) Higher satisfaction (2) Speedier recovery

Nakagawa, Y., & Shaw, R. (2004). Social capital: A missing link to disaster recovery. International Journal of Mass Emergencies and Disasters, 22(1), 5-34.

Physical factors

The triple disaster:Tsunami, earthquake and nuclear accident

Triple disasters
- Earthquake: the triggering disaster
- Tsunami:130,000 houses demolished &16,9 trillion yen lost
- Nuclear accident:154,000 residents displaced

Demographic factors

- Single-person households : **6.1 mil → 21 mil** during 1970 - 2020
- The ratio of the aged (over 65 years old) living alone :
  4.3% → 15.0% (male) and **11.2% → 22.1% (female)** during 1980- 2020
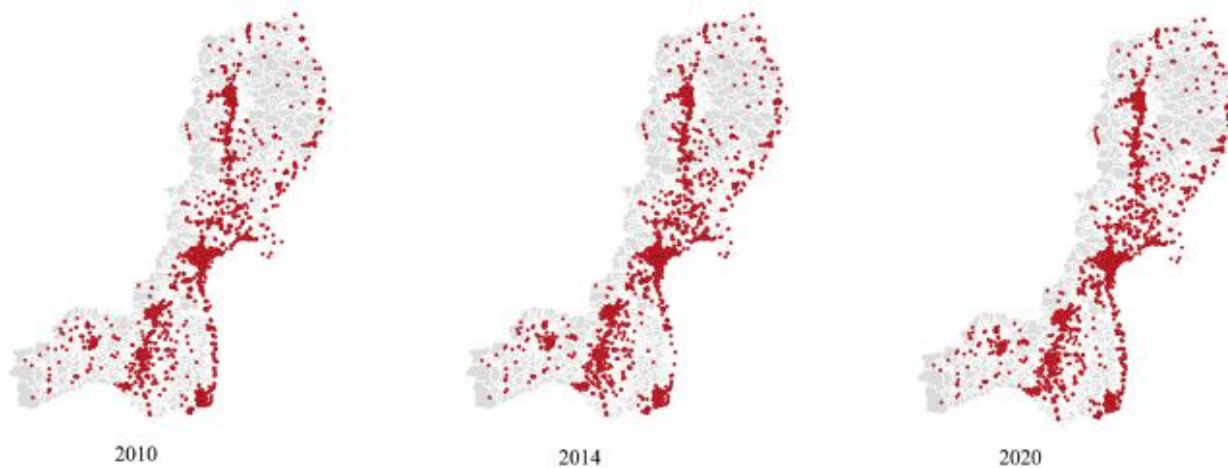
Economic factors

Unemployment Change in 1997-2021
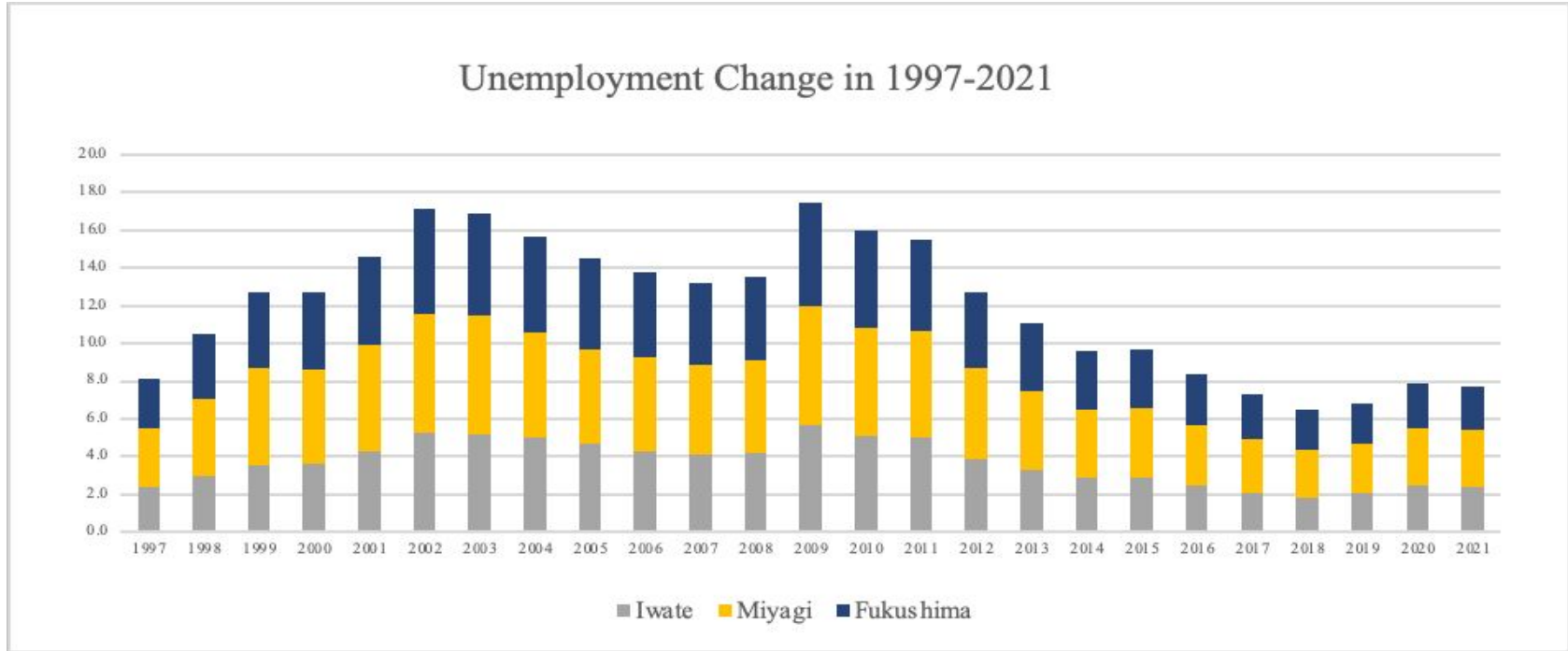
Unemployment rate (2021)
Miyagi: 3.1% , Fukushima : 2.2%, Iwate : 2.3%

Well-being

Hospital distribution in Iwate, Miyagi and Fukushima

2010　　　　　　　2014　　　　　　　2020

- **Izumi district** (a bed town in Sendai) has the highest life expectancy in 2011
  - 82.2 (male) is **3.4 years longer** than Kamaishi (Iwate)
  - 87.9 (femlae) is **2.7 years longer** than Nishigo (Fukushima)

7 targets of Sendai Framework for Disaster Risk Reduction 2015-2030

Source: UNDRR 2020

5. Contribution

Long-term effects
A more developed method
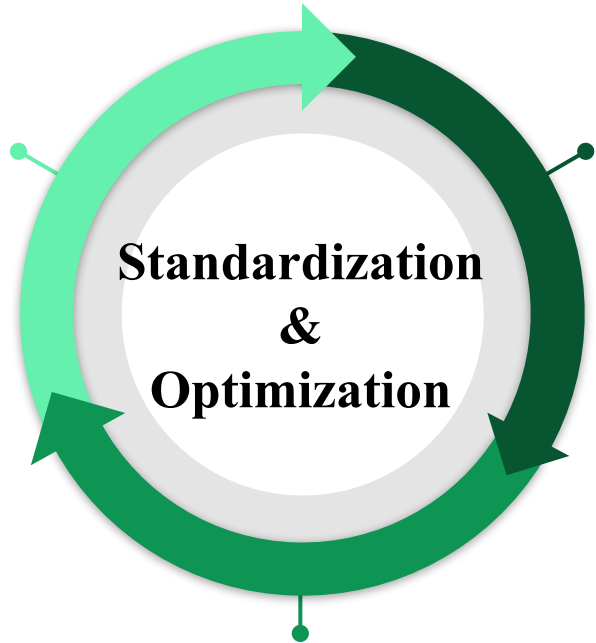
Japan's surveillance
Improvement for certification

Standardization
&
Optimization

Global surveillance
A recommended adjustment for SFDRR

Thank you.