Overview of Health Issues After the Fukushima Incident

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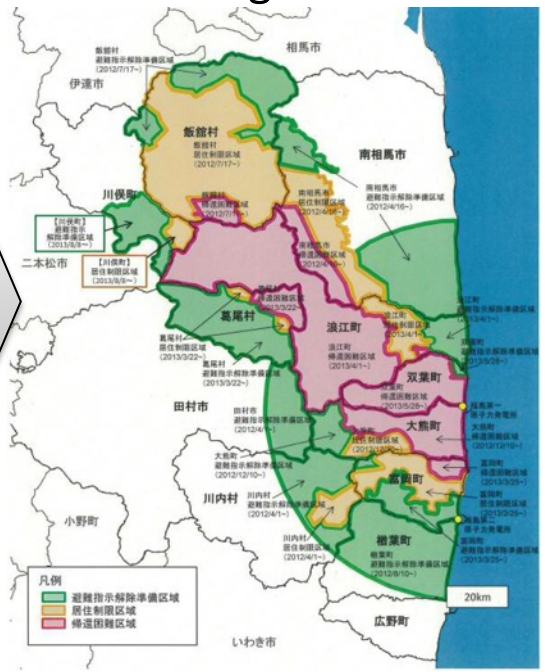
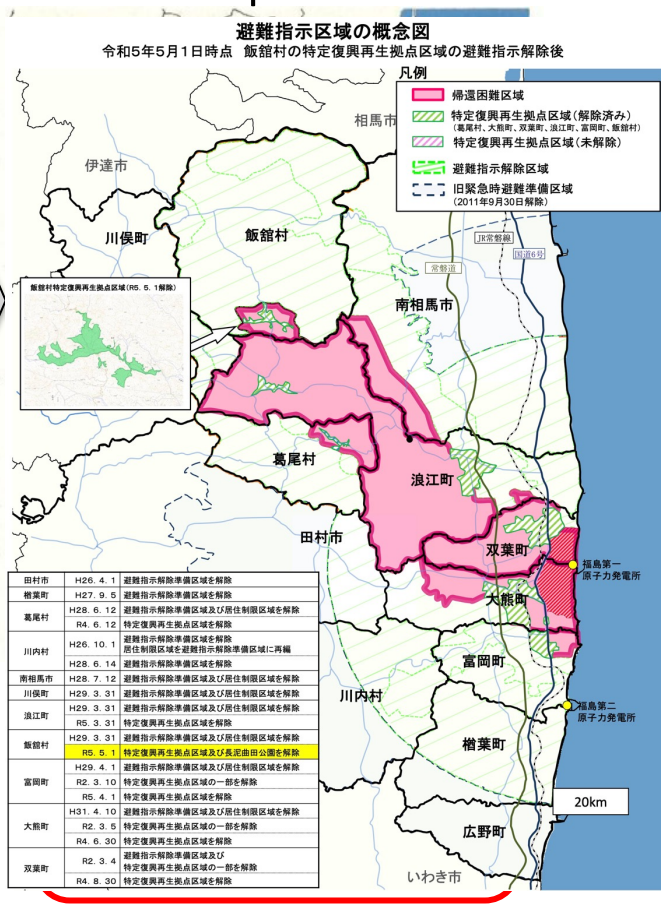
Zoning: Change in evacuation order

22 Apr. 2011

8 Aug. 2013



10 Apr. 2019



田村市	H26. 4. 1	避難指示解除準備区域を解除
楢葉町	H27. 9. 5	避難指示解除準備区域を解除
葛尾村	H28. 6. 12	避難指示解除準備区域及び居住制限区域を解除
	R4. 6. 12	特定復興再生拠点区域を解除
川内村	H26. 10. 1	避難指示解除準備区域を解除 居住制限区域を避難指示解除準備区域に再編
	H28. 6. 14	避難指示解除準備区域を解除
南相馬市	H28. 7. 12	避難指示解除準備区域及び居住制限区域を解除
川俣町	H29. 3. 31	避難指示解除準備区域及び居住制限区域を解除
浪江町	H29. 3. 31	避難指示解除準備区域及び居住制限区域を解除
	R5. 3. 31	特定復興再生拠点区域を解除
飯舘村	H29. 3. 31	避難指示解除準備区域及び居住制限区域を解除
	R5. 5. 1	特定復興再生拠点区域及び長泥曲田公園を解除
富岡町	H29. 4. 1	避難指示解除準備区域及び居住制限区域を解除
	R2. 3. 10	特定復興再生拠点区域の一部を解除
	R5. 4. 1	特定復興再生拠点区域を解除
大熊町	H31. 4. 10	避難指示解除準備区域及び居住制限区域を解除
	R2. 3. 5	特定復興再生拠点区域の一部を解除
	R4. 6. 30	特定復興再生拠点区域を解除
双葉町	R2. 3. 4	避難指示解除準備区域及び 特定復興再生拠点区域の一部を解除
	R4. 8. 30	特定復興再生拠点区域を解除

Evacuation order zone

Emergency evacuation preparation zone

Planned evacuation zone

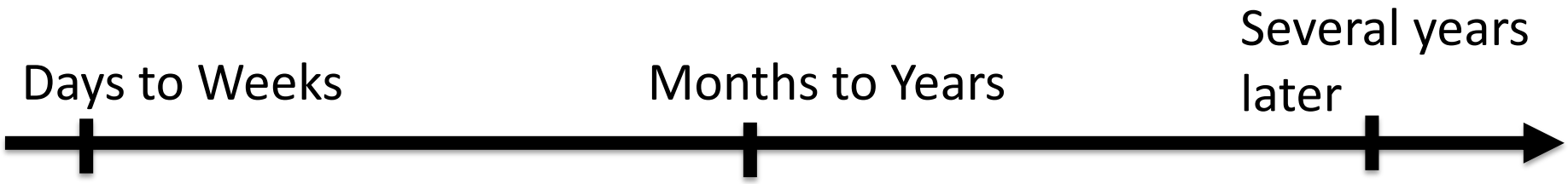
Difficult-to-return zone

Restricted residence zone

Evacuation order cancellation preparation zone

Fukushima Prefectural Govt., https://www.pref.fukushima.lg.jp/site/portal/list271-840.html

What health problems emerged after the Fukushima incident?



Radiation Exposure

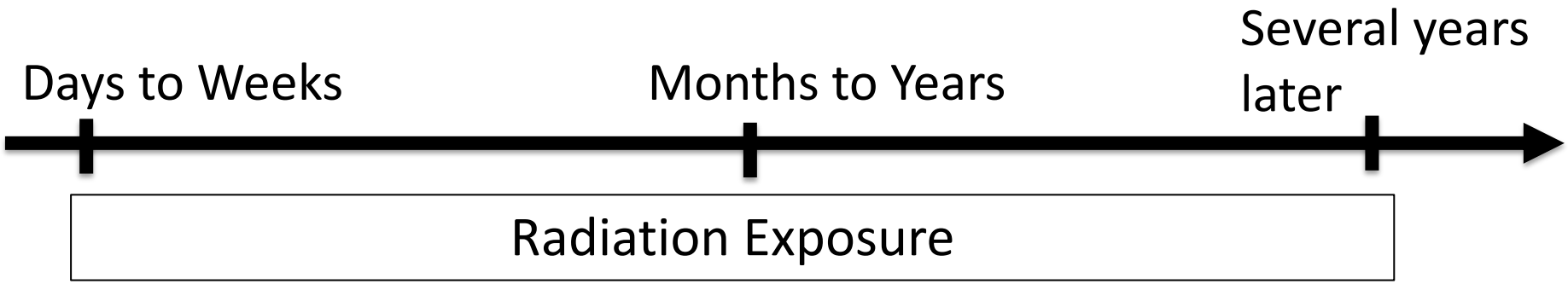
- Trauma Injury
- Evacuation of vulnerable population
- Medical Collapse
- Evacuation shelter control
- Disaster-induced hypertension
- Thrombosis
- Heart diseases, Strokes
- Insomnia

- Mental and Psychological diseases
- Lifestyle-related diseases
- Deterioration in access to medical care
- Decline in the rate of medical checkups
- Problems with temporary housing
- Reconstruction works health issues

- Changes in the social environment
- Collapse of Long-term care services
- Disparity, Poverty
- Aging, depopulation, isolation
- Problem of free medical care
- Prejudice, and Discrimination issues
- Long-term evacuation related things

Tsubokura et al. J Natl. Inst. Public Health, 67 (1) : 2018.

What health problems emerged after the Fukushima incident?



- Trauma Injury
- Evacuation of vulnerable population
- Medical Collapse
- [illegible]
- [illegible]
- Thrombosis
- Heart diseases, Strokes
- Insomnia

Countermeasure Optimization

- Mental and Psychological diseases
- Lifestyle-related diseases
- [illegible]
- [illegible]
- [illegible] temporary housing
- Reconstruction works health issues

Never Underestimate Indirect Health Impact

- Changes in the social environment
- Collapse of Long-term care services
- Disparity, Poverty
- [illegible]
- [illegible]
- [illegible] Discrimination issues
- Long-term evacuation related things

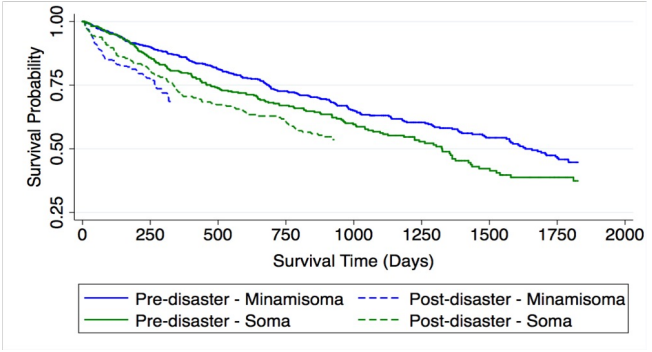
Importance of Continuous Communication

Tsubokura et al. J Natl. Inst. Public Health, 67 (1) : 2018.

While evacuation is necessary, the risk of death among residents of nursing homes increased after the evacuation.

・The relative risk of death for nursing home residents during the post-disaster period was 2.68 times higher than that in the pre-disaster period in Minamisoma City. *1
・In several facilities, approximately 25% of residents died within 90 days after the evacuation.*2

・ The decrease in staff was most severe in the first three months of the incident. *3
・ The disruption of supply from outside had an acute impact on the maintenance of hospital functions. *4

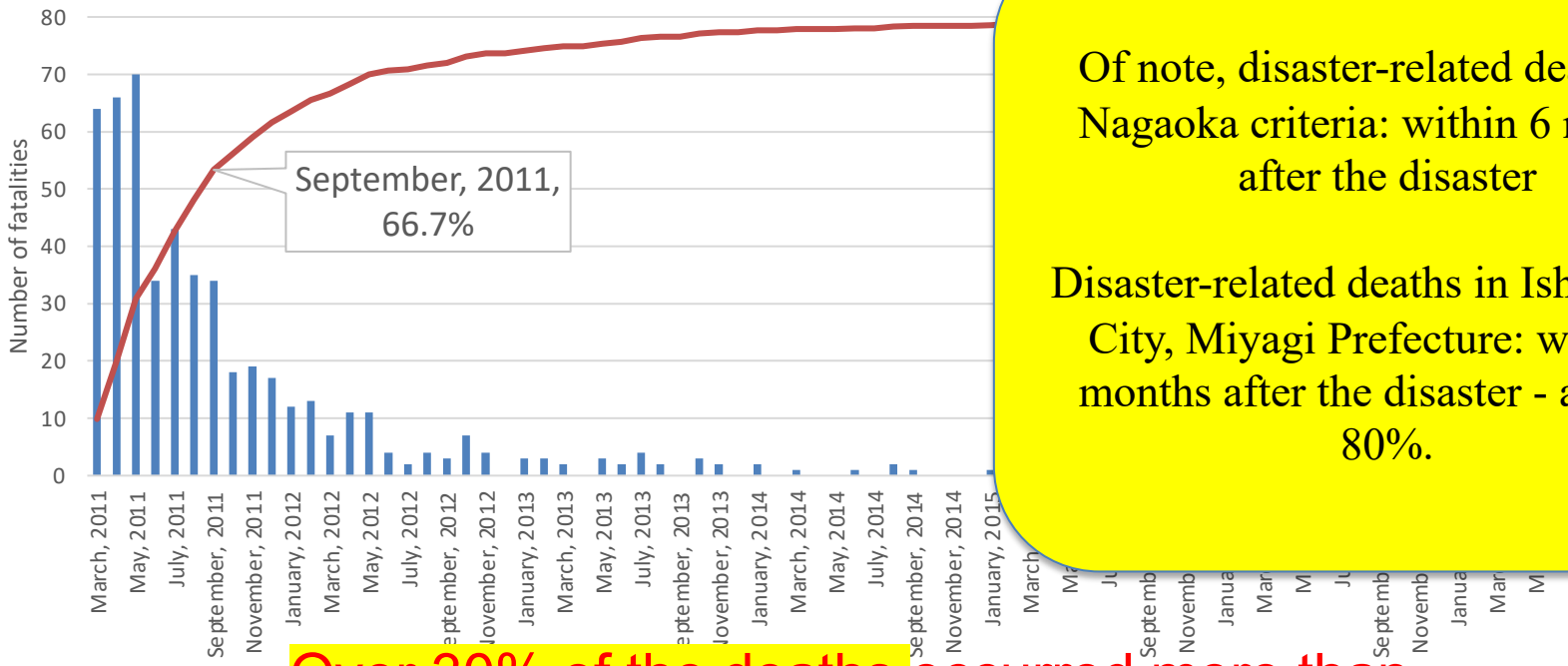


・ The major reason the staff could not stay was not radiation, but because they could not maintain their daily lives due to closing schools and companies. *5
・The risk of death may increase by staying in the area with limited medical resources. *6
・Detailed case reports of hospital evacuations *7,8,9
・Structural similarity to Covid-19 pandemic. *10

1. Nomura, Tsubokura et al. PLoS One. 2013;8(3):e60192.
2. Nomura, Tsubokura et al. Prev Med. 2016 Jan;82:77-82.
3. Ochi, Tsubokura et al. Plos One 2016.
4. Abeysinghe, Tsubokura et al. SSM 2017.
5. Hirohara, Tsubokura et al. BMC PHR 2019.
6. Shimada, Tsubokura et al. BMJ Open. 2018 Jul 28;8(7):e021482.
7. Sawano Tsubokura et al. J Radiat Res. 2021 May 5;62(Supplement_1):i122-i128.
8. Kodama, Tsubokura et al. DMPHP 2014.
9. Sawano, Tsuboura et al. Disaster Med Public Health Prep. 2022 Oct;16(5):2190-2193
10. Tsuboi, Tsubokura et al. J. Radiol. Prot. 42 (2022) 031502

Characteristics of Disaster-related Deaths in Minamisoma City ①

The period from the disaster to the deaths



Of note, disaster-related deaths by Nagaoka criteria: within 6 months after the disaster

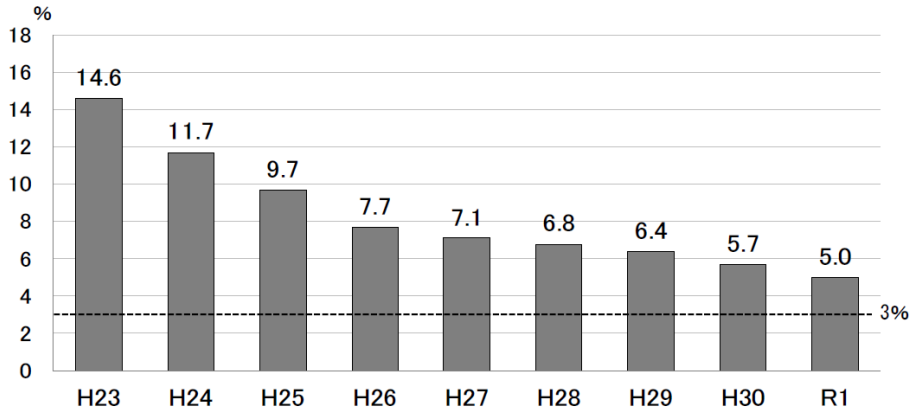
Disaster-related deaths in Ishinomaki City, Miyagi Prefecture: within 3 months after the disaster - approx. 80%.

Over 30% of the deaths occurred more than 6 months after the onset of the disaster

Uchi, Tsubokura et al. in press

Psychological distress and deterioration of life-style diseases: Fukushima Health Management Survey (FHMS)

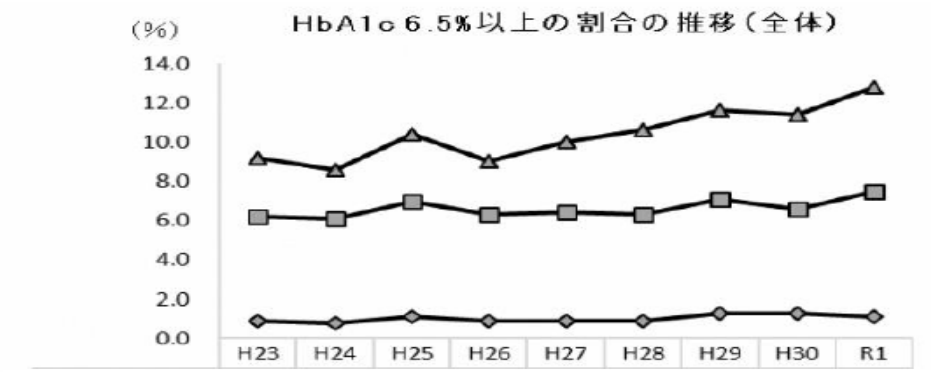
Percentage of those who need help with depression or anxiety



・Although the percentage was high at 14.6% in 2011, it has improved by 2014, moving around 5-7 % since then.

・Compared to the ratio (3%) for the general population who was not affected by the disaster, it still shows a high value.

Impaired glucose tolerance



・The ratio of HbA1c, 6.0% or more, significantly increased in 16-39-year-olds in 2017 compared to 2011, but there was no significant change compared to 2016.

・For those aged 40 and above, the percentage in 2017 increased significantly compared to 2011 and 2016.

- In terms of loss of life expectancy,

1) the risk of the evacuation was approx. **400 times** higher than the risk associated with radiation exposure received in a city of 10-30km away from the nuclear power plant.*1

2) the risk of death due to diabetes could be approx. **40 times** higher than that from radiation exposure.*2

3) the risk of death due to loss of medical check-ups for a few years after the incident was approx. **5-10 times** higher than the risk of radiation. *3,4

1. Murakami, Tsubokura et al. PLoS One. 2015 Sep 11;10(9) :e0137906.
2. Murakami, Tsubokura et al. PLoS One. 2017 Sep 28;12(9):e0185259.
3. Saito, Tsubokura et al. Sci Rep. 2021 Dec 13;11(1):23851.
4. Saito, Tsubokura et al. submitting

- Poor control of life-style diseases among decontamination workers is much more life-threatening compared to the radiation exposure in Fukushima.*5

5. Sawano Tsubokura et al. Radioprotection 2020, 55(4), 277–282

Optimization needs to be constantly balanced with the changing health issues of each period after the nuclear incident.

Radiation Seminars

We performed radiation seminars for all residents in So-so region more than 300 times.

Anxieties about radiation varies depending on backgrounds among residents.

Sugimoto, Tsubokura et al. PloSone 2013.

Information dissemination using Tiktok

1. Countermeasure Optimization

2. Never Underestimate Indirect Health Impact

3. Importance of Continuous Communication

Thank you.