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Overview of Health Issues After the Fukushima Incident

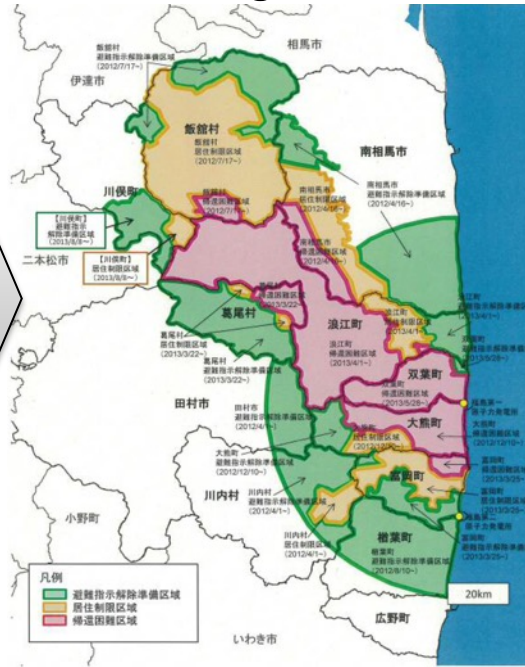
Department of Radiation Health Management
Fukushima Medical University School of Medicine
Masaharu TSUBOKURA

Zoning: Change in evacuation order

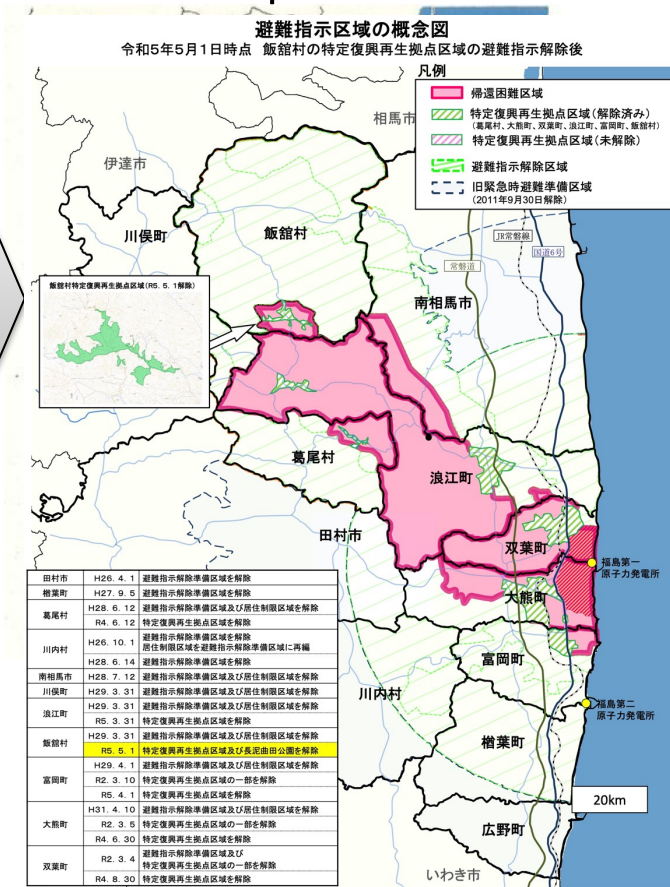
22 Apr. 2011



8 Aug. 2013



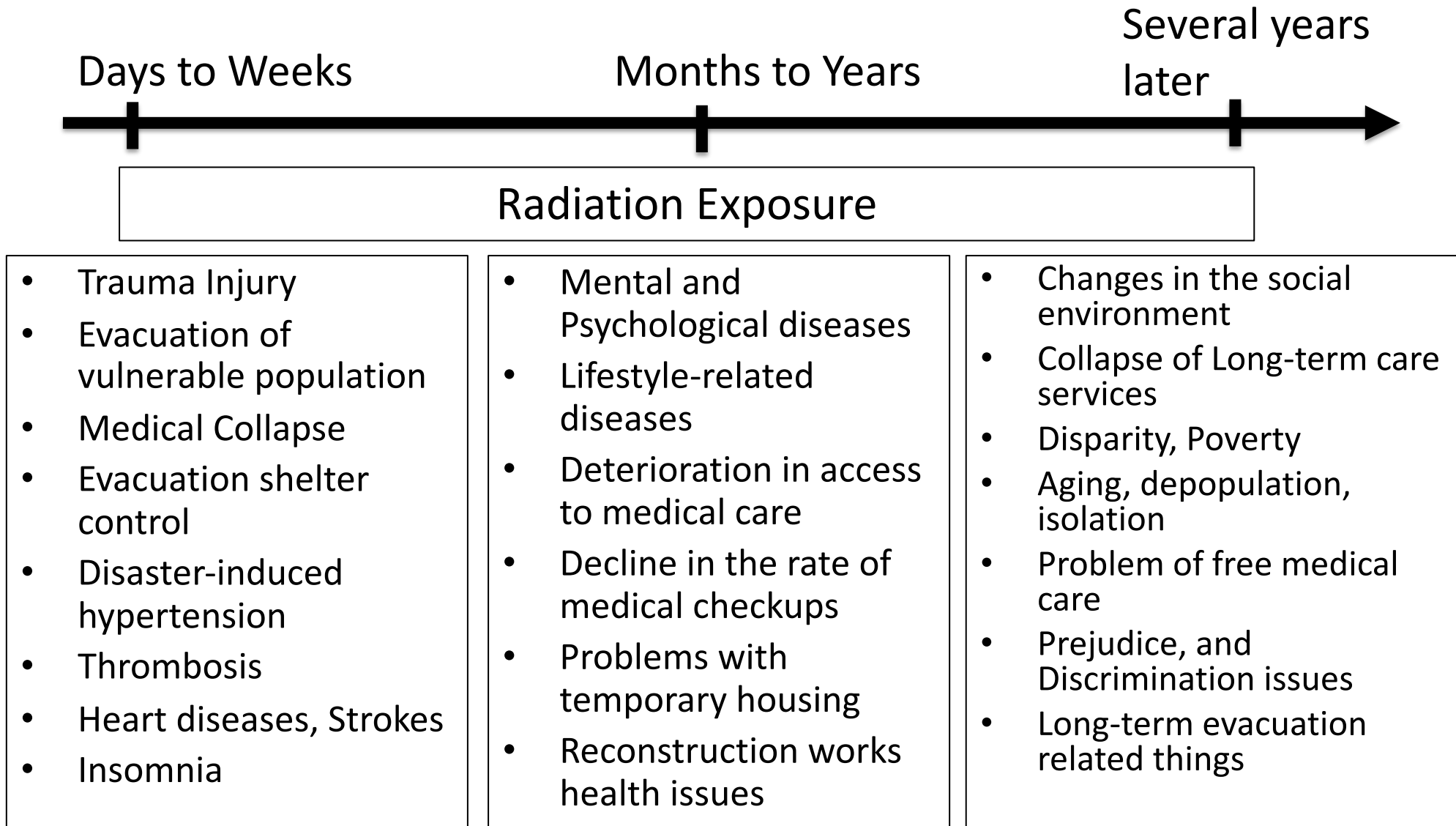
10 Apr. 2019



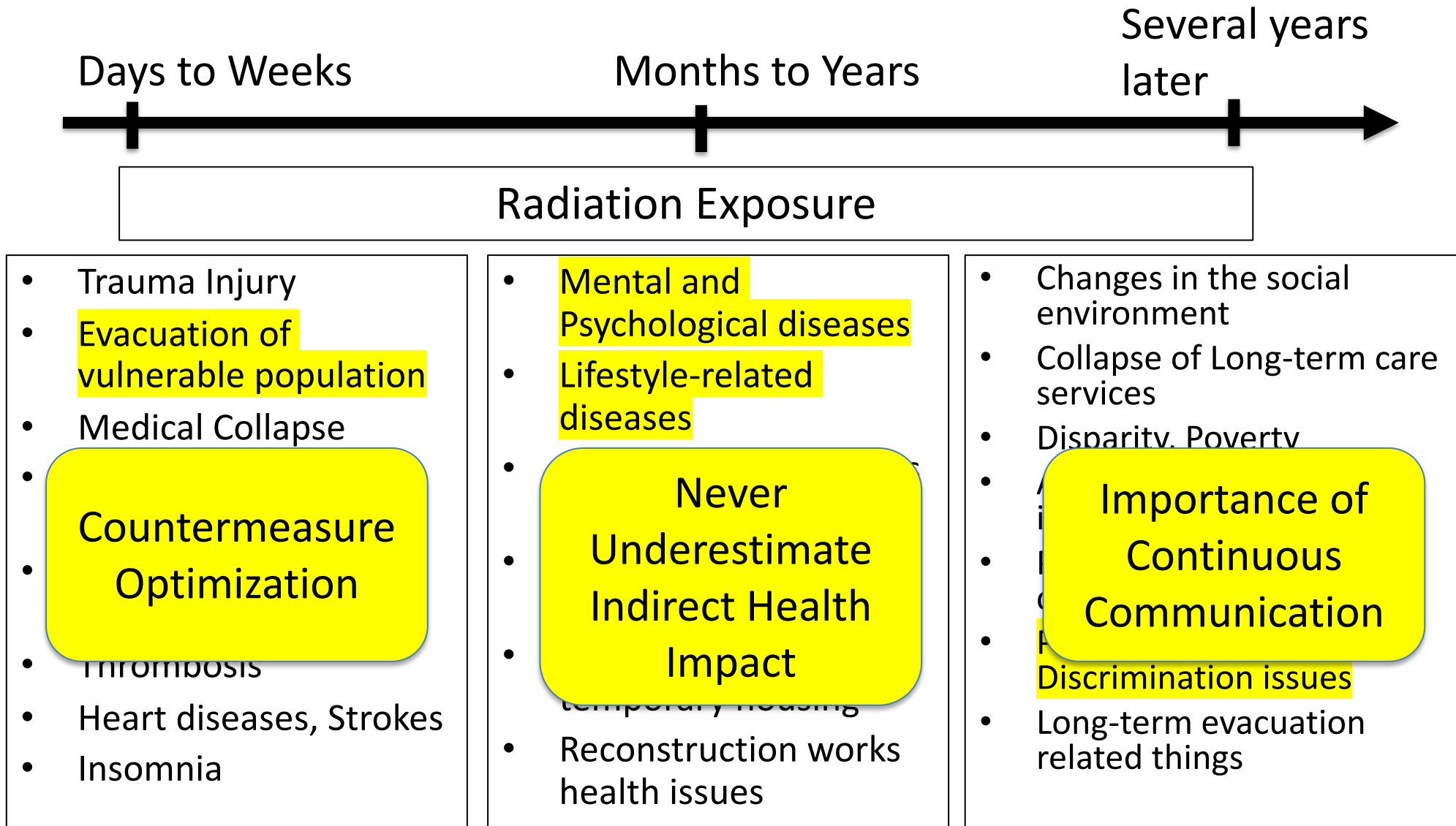
- Evacuation order zone
- Emergency evacuation preparation zone
- Planned evacuation zone

- Difficult-to-return zone
- Restricted residence zone
- Evacuation order cancellation preparation zone

What health problems emerged after the Fukushima incident?



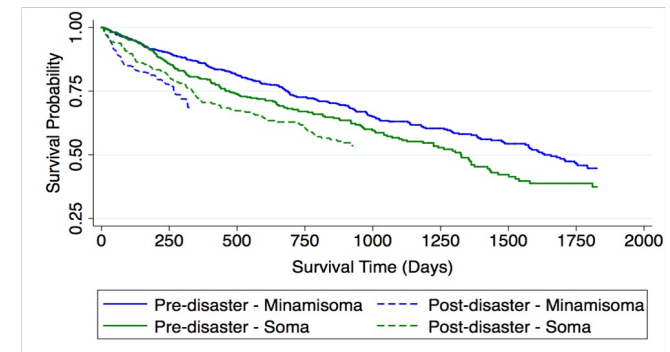
What health problems emerged after the Fukushima incident?



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



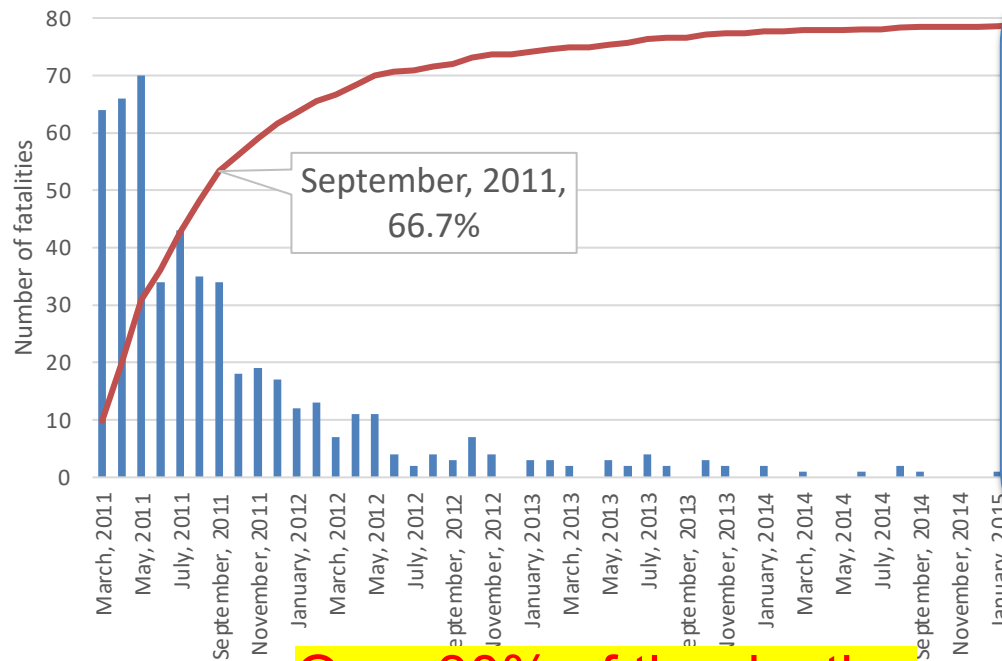
- The major reason the staff could not stay was not radiation, but because they could not maintain their daily lives due to closing schools and companies. *5
- The risk of death may increase by staying in the area with limited medical resources. *6
- Detailed case reports of hospital evacuations *7,8,9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



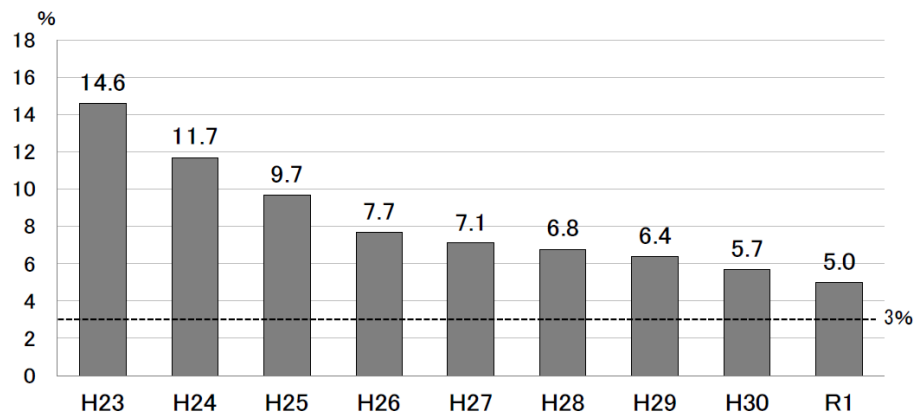
Of note, disaster-related deaths by Nagaoka criteria: within 6 months after the disaster

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

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

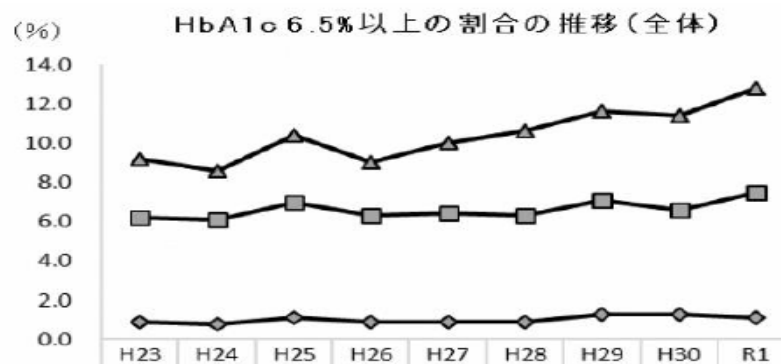
Percentage of those who need help with depression or anxiety



• 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.

Information dissemination using Tiktok

The image shows a browser window displaying the TikTok profile of 'つぼ先生 (@tsubo_sensei)'. The browser's address bar shows 'tiktok.com/@tsubo_sensei'. The profile header includes the name 'つぼ先生 · tsubo_sensei', a search bar, and an 'アップロード' (Upload) button. The profile statistics are: 2 フォロー中 (Following), 1000 フォロワー (Followers), and 8437 いいね (Likes). The bio reads: 'たまに医者、たまに教授のつぼ先生の日常をお届けします' (I occasionally deliver the daily life of Dr. Tsubo, occasionally a professor). Navigation buttons for 'フォロー中', 'メッセージ', and a share icon are visible.

The video feed shows several thumbnails with Japanese text overlays:

- Video 1: '処理水の中にトリチウム以外の放射性物質はないのか?' (Are there radioactive substances other than tritium in the treated water?).
- Video 2: '凍土凍水壁' (Frozen soil and water wall) - '地面を凍らせて、地下水が滲み出てくるのをブロックする' (Freeze the ground to block groundwater from seeping out).
- Video 3: '凍土壁は失敗したのか?' (Did the frozen soil wall fail?).
- Video 4: '処理水が安全ならなぜ今流すことになったのか?' (If treated water is safe, why is it being released now?).
- Video 5: '処理水を処理した水を待って原子炉を冷やしたら、水が再利用されるため処理水の量は増えない?' (If you wait for treated water to cool the reactor, since the water can be reused, the amount of treated water won't increase?).
- Video 6: 'A.処理水は今後も増え続ける状況になります' (A. The treated water situation will continue to worsen).
- Video 7: 'トリチウム以外の放射性物質は含まれるのか?' (Are there radioactive substances other than tritium?).
- Video 8: 'トリチウムや処理水を蒸発させたほうが良いのではないのか?' (Isn't it better to evaporate tritium or treated water?).
- Video 9: 'トリチウムは生体濃縮されないのか?' (Does tritium not bioaccumulate?).
- Video 10: '海産物輸入規制について' (About sea product import regulations).
- Video 11: 'トリチウム基準値は諸外国よりも高いのか?' (Is the tritium standard value higher than other countries?).

Engagement metrics for the videos are: 245 likes, 23 likes, 105 likes, 115 likes, 145 likes.

Navigation options on the left include: おすすめ (Recommended), フォロー中 (Following), 探索 (Discover), LIVE, and フォロー中のアカウント (Accounts you follow). The 'フォロー中のアカウント' section lists 'user9wsq4ypp5 yamachika' and 'tsubo_sensei つぼ先生'. A '続きを読む' (Read more) link is present. A button 'エフェクトを作成' (Create effect) is also visible.

At the bottom, there are links for 'TikTokについて ニュースルーム 連絡先 採用' (About TikTok Newsroom Contact Us Hire), 'TikTok for Good 広告 Developers 透明性 TikTokクーポン TikTok Embeds', and 'ヘルプ セーフティーセンター 利用規約 プライバシー クリエイターポータル コミュニティガイドライン 著作権' (Help Safety Center Terms of Service Privacy Policy Creator Portal Community Guidelines Copyright).

1. Countermeasure Optimization
2. Never Underestimate Indirect Health Impact
3. Importance of Continuous Communication

Thank you.