

# **Overview of health consequences after the Fukushima Daiichi nuclear accident**

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# WHO/UNSCEAR health risk assessment

## ■ Public

- Doses lower than the thresholds for deterministic effects
- No discernible increase in cancer risk

## ■ Workers

- Possibility of Hypothyroidism for those with the highest thyroid exposure
- No discernible increase in cancer risk

# Today's topics

## ■ Public

- Thyroid exposure of children
- Health conditions of people in Fukushima Prefecture

## ■ Workers

- Epidemiological study

## ■ Summary

# Dosimetric facts

- Estimated external dose during the first 4 months is  $< 2$  mSv for 94% of  $\sim 450,000$  residents of Fukushima Prefecture.
- Internal dose from Cs-134 and 137 is  $< 1$  mSv for 99.8% of  $\sim 15,000$  whole body counting in Fukushima Prefecture.
- Concentration of radioactive cesium in foodstuffs is kept low.

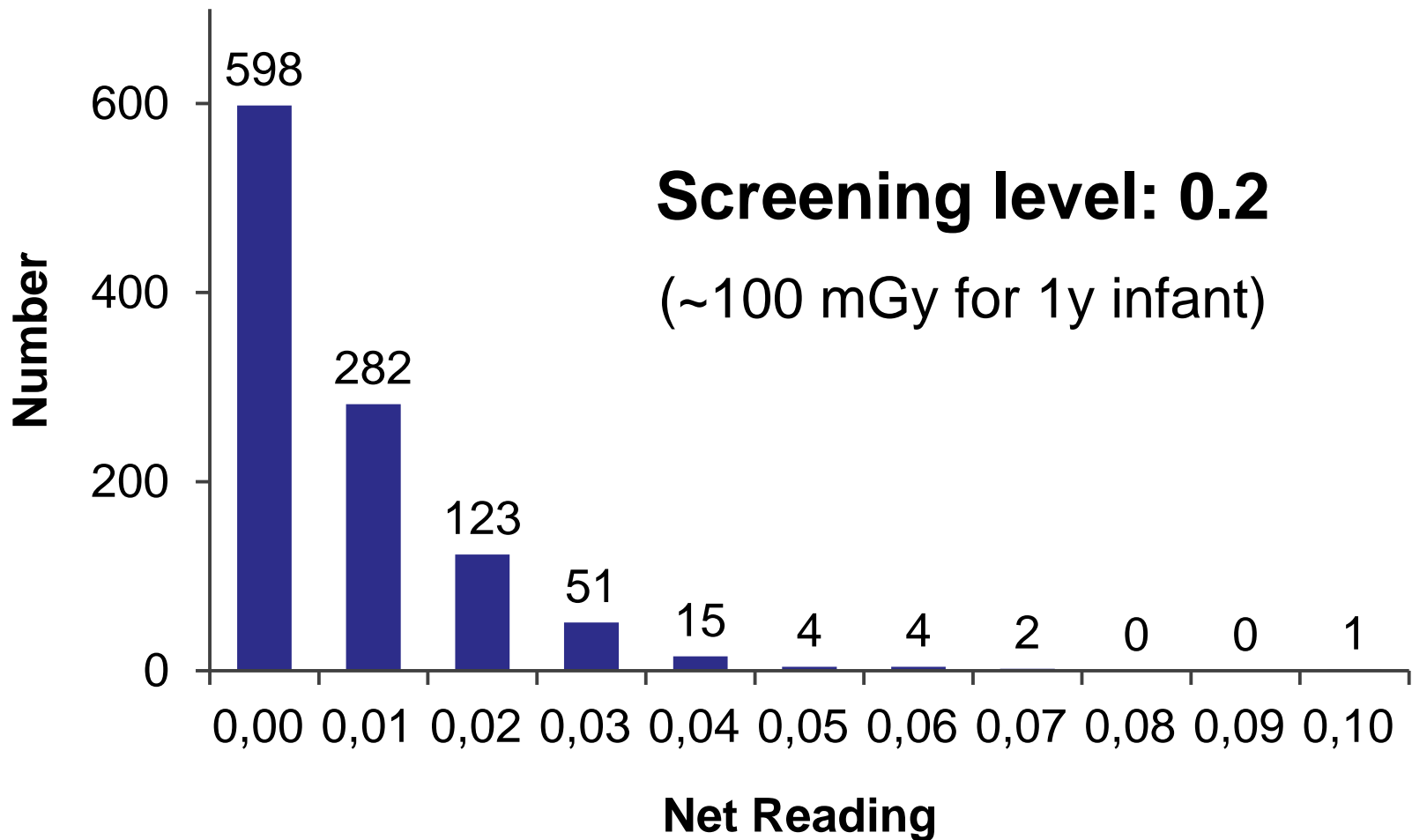
# Thyroid monitoring

Municipality	Date	Participants
Iwaki	26–27 March, 2011	134
Kawamata	28–30 March, 2011	647
Iitate	30 March, 2011	299
Total		1,080

# Outline of thyroid monitoring

- Children of 0–15 years old
- NaI scintillator survey meter (Aloka TCS-161, 171, 172)
- Background  $\leq 0.2 \mu\text{Sv/h}$
- Neck wiped with clean wet towel
- Mean of 3 readings

# Result of thyroid monitoring



# Thyroid examination (Initial screening)

## ■ Target

Residents of Fukushima Prefecture born between 2 April 1992 and 1 April 2011

## ■ Methods

Primary examination

- Ultrasonography

Confirmatory examination

- Further ultrasonography
- Blood test, Urine test
- Fine-needle aspiration cytology (FNAC)

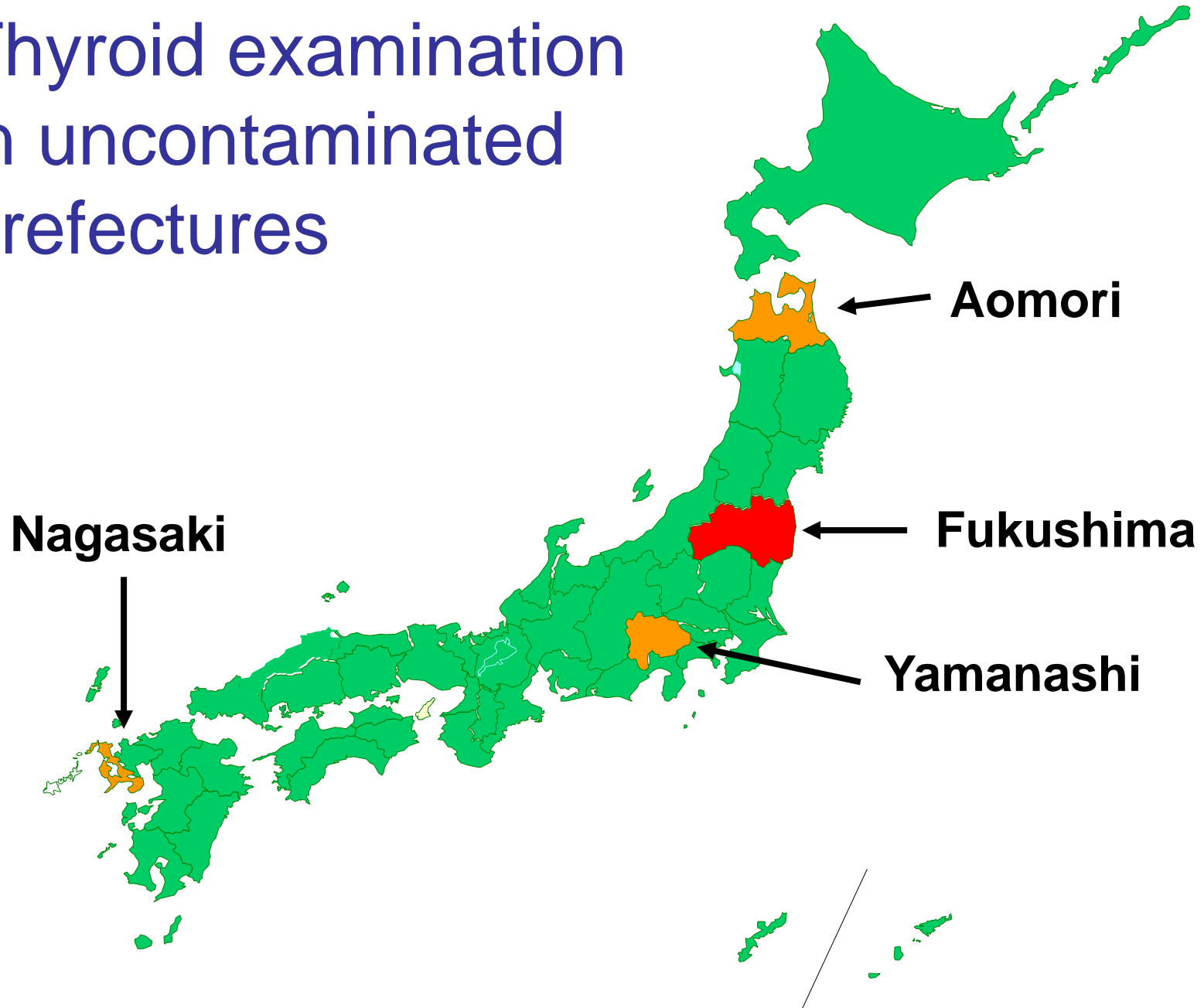


# Diagnostic criteria of primary exam

Classification	Description
A1	No nodules / cysts
A2	Nodules <5.0mm or cysts <20.0mm
B	Nodules >5.1mm or cysts >20.1mm
C	Immediate need for confirmatory examination

B and C are advised to take the confirmatory examination.

# Thyroid examination in uncontaminated prefectures



# Result of primary examination

(As of 31 October 2014)

Diagnosis	Fukushima Prefecture	Other prefectures*
A1	152,633 (51.5%)	1,853 (42.5%)
A2	141,379 (47.7%)	2,468 (56.5%)
B	2,240 (0.8%)	44 (1.0%)
C	1 (0.0%)	0 (0.0%)
Total	296,253 (100.0%)	4,365 (100.0%)

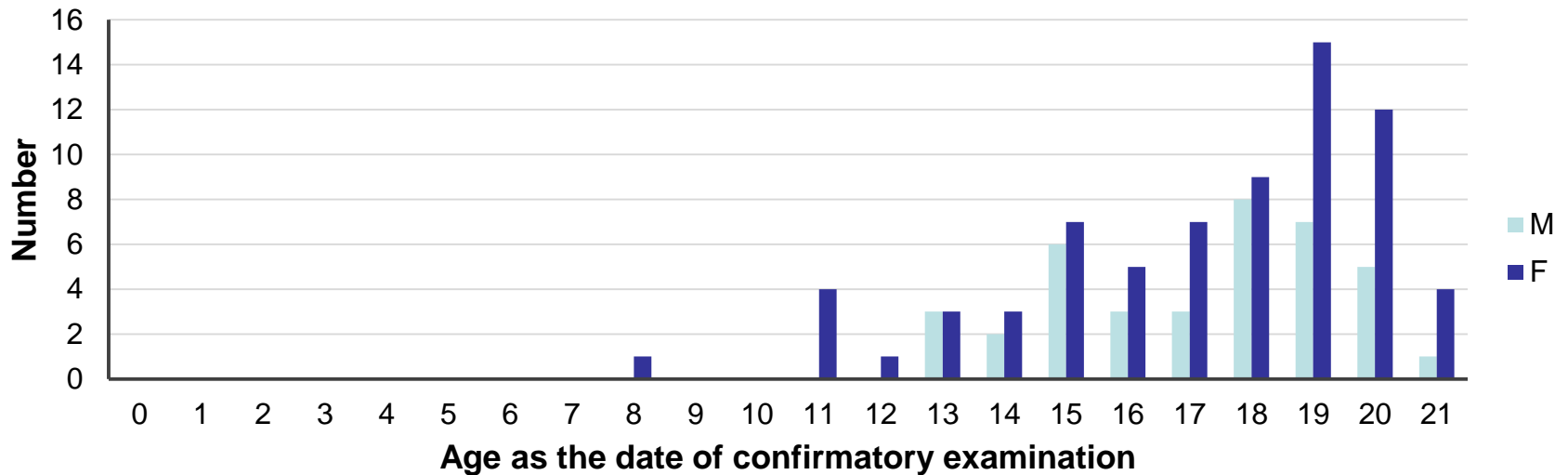
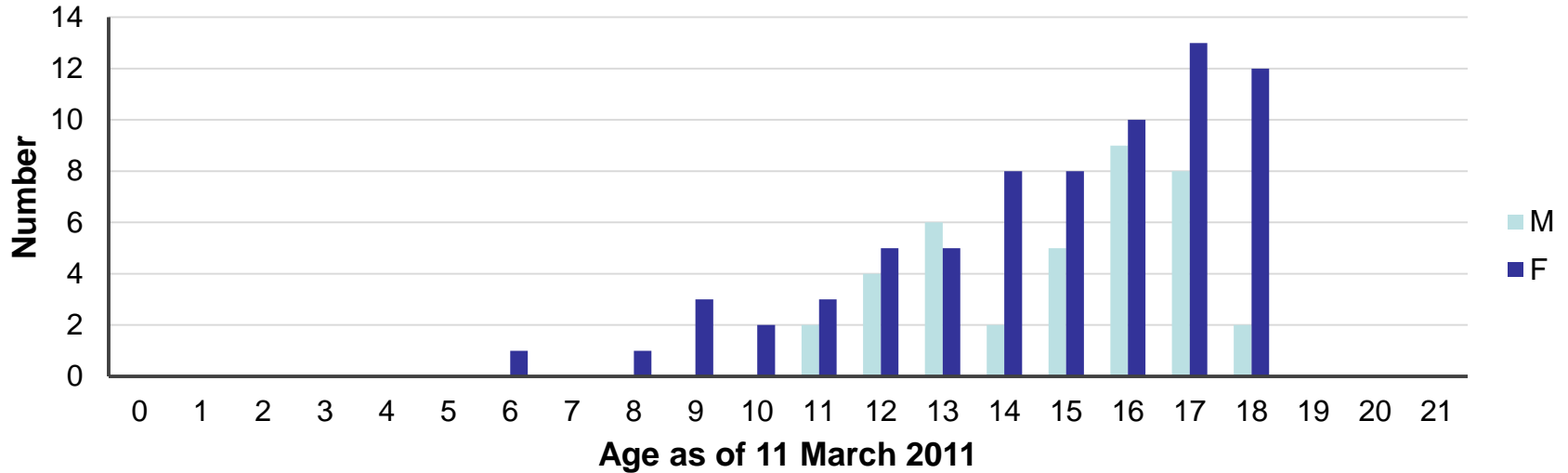
\* Aomori, Yamanashi and Nagasaki

# Result of FNAC

(As of 31 October 2014)

- 519 participants underwent FNAC
- 24 suspicious and 84 malignant cases
- 81 papillary thyroid carcinoma out of 85 surgical cases
- Tumor size:  $14.1 \pm 7.3$  mm

# Age distribution of suspicious/malignant cases



# Thyroid examination (Full-scale screening)

## ■ Target

- Those for initial screening
- Residents of Fukushima Prefecture born between 2 April 2011 and 1 April 2012

## ■ Examination frequency

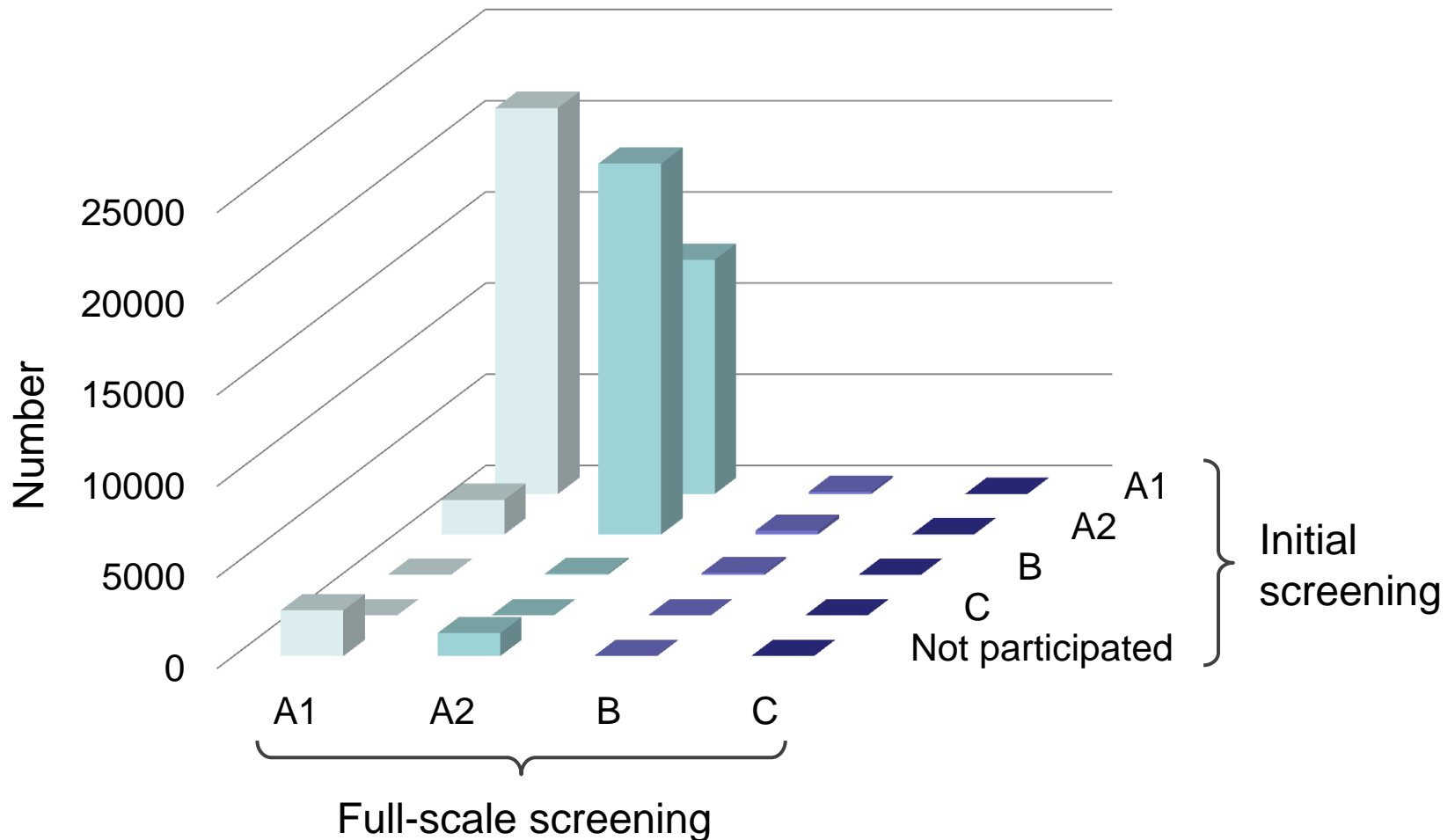
- Every 2 years until the age of 20
- Every 5 years afterwards

## ■ Methods

- Same as initial screening

# Preliminary result of primary exam

(As of 31 October 2014)



# Preliminary result of FNAC

(As of 31 October 2014)

- 155 participants completed confirmatory test
- 11 of them underwent FNAC
- 4 suspicious cases
- Age: 10(M), 13(M), 19(F), 20(M)
- Tumor size: 7.0–17.3 mm



# Today's topics

## ■ Public

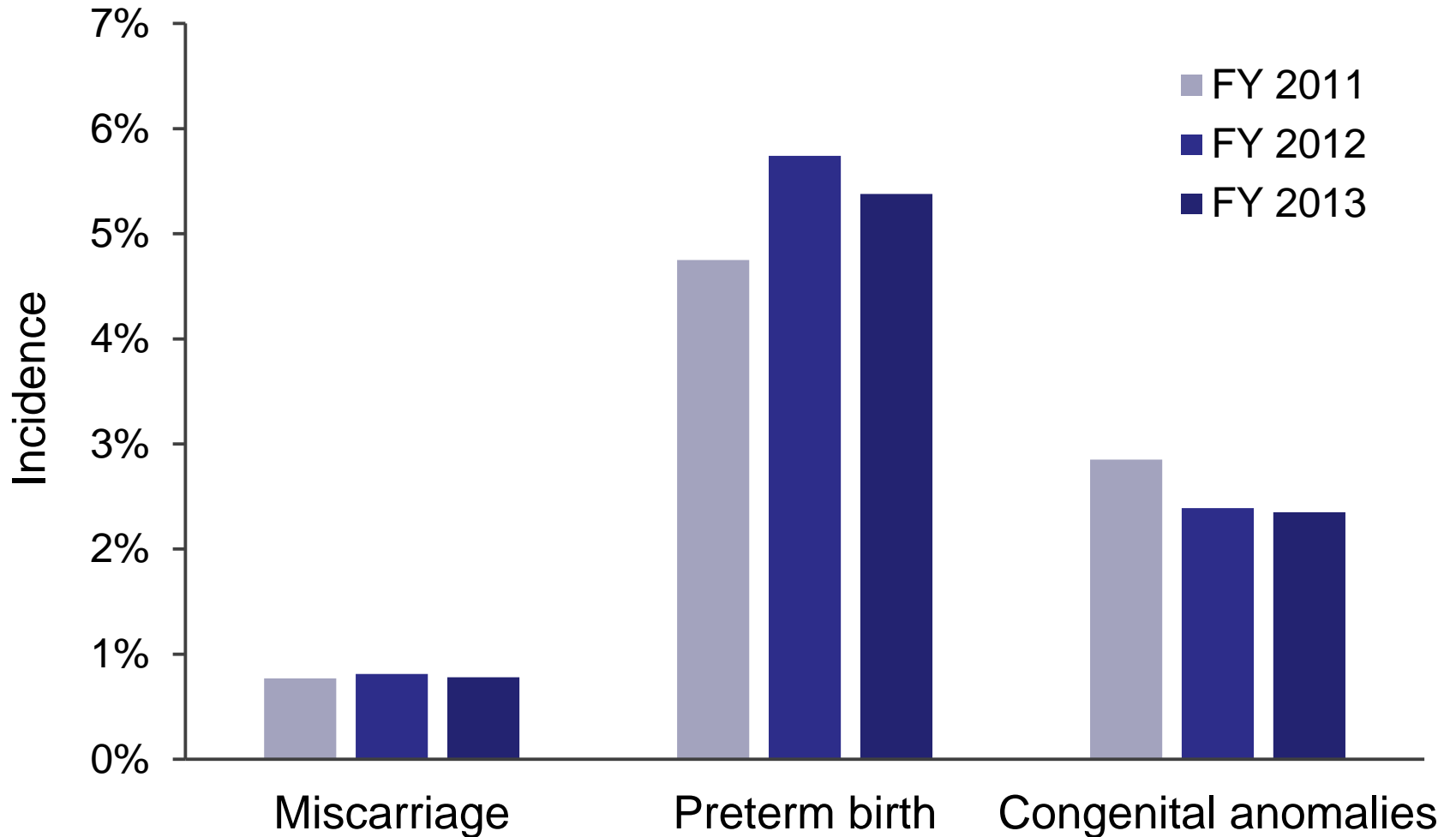
- Thyroid exposure of children
- Health conditions of people in Fukushima Prefecture

## ■ Workers

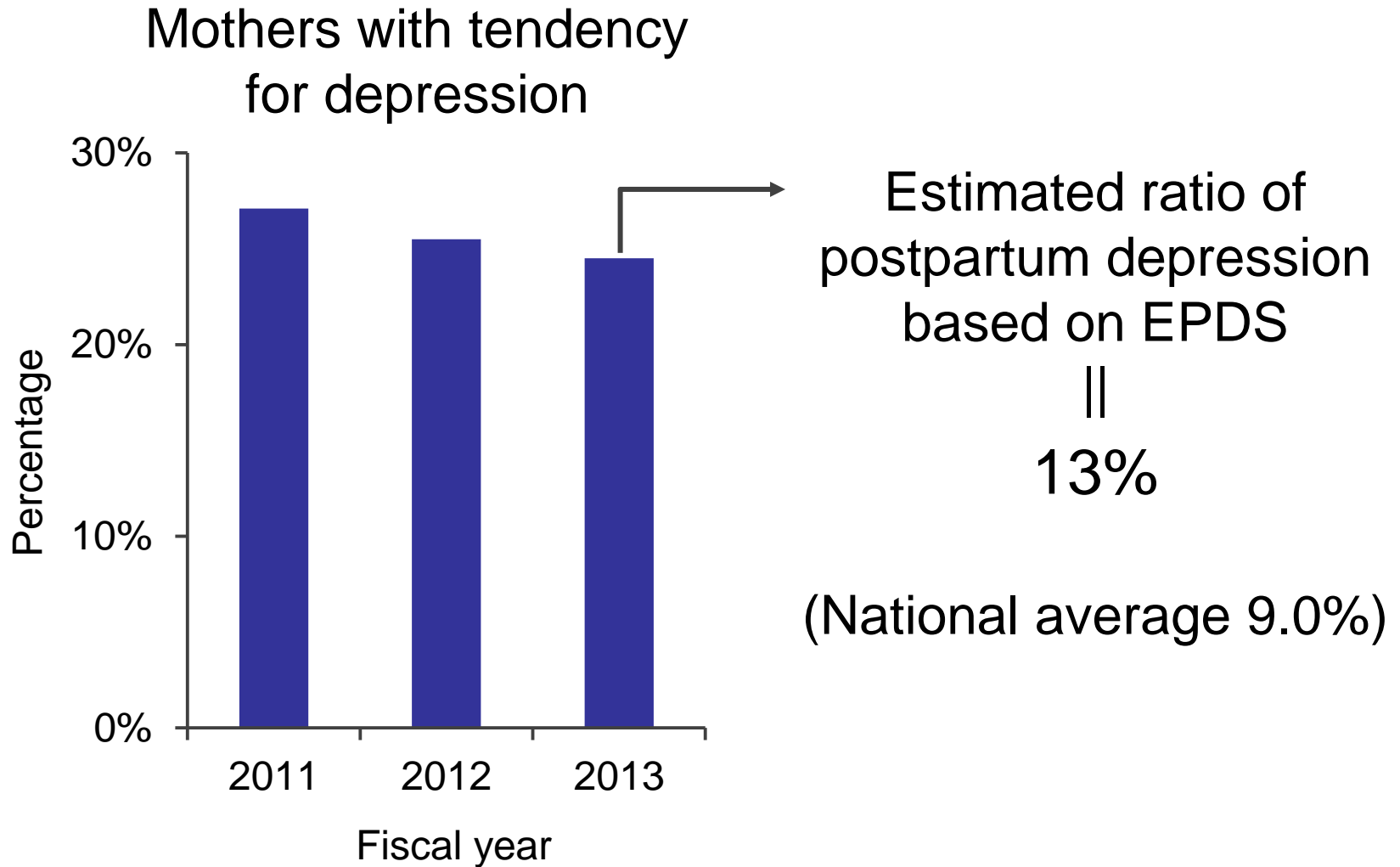
- Epidemiological study

## ■ Summary

# Pregnancy outcome

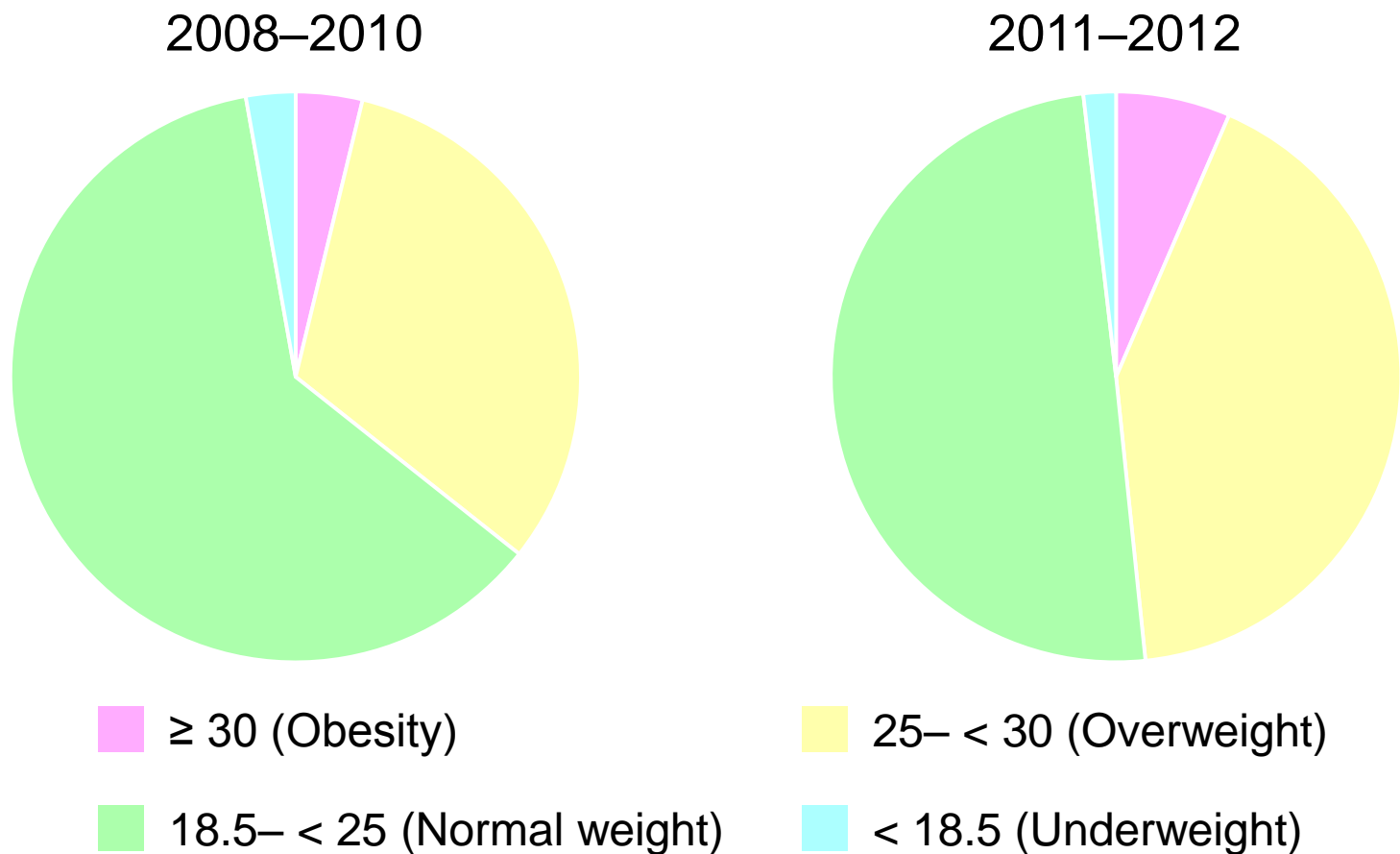


# Mothers' mental health



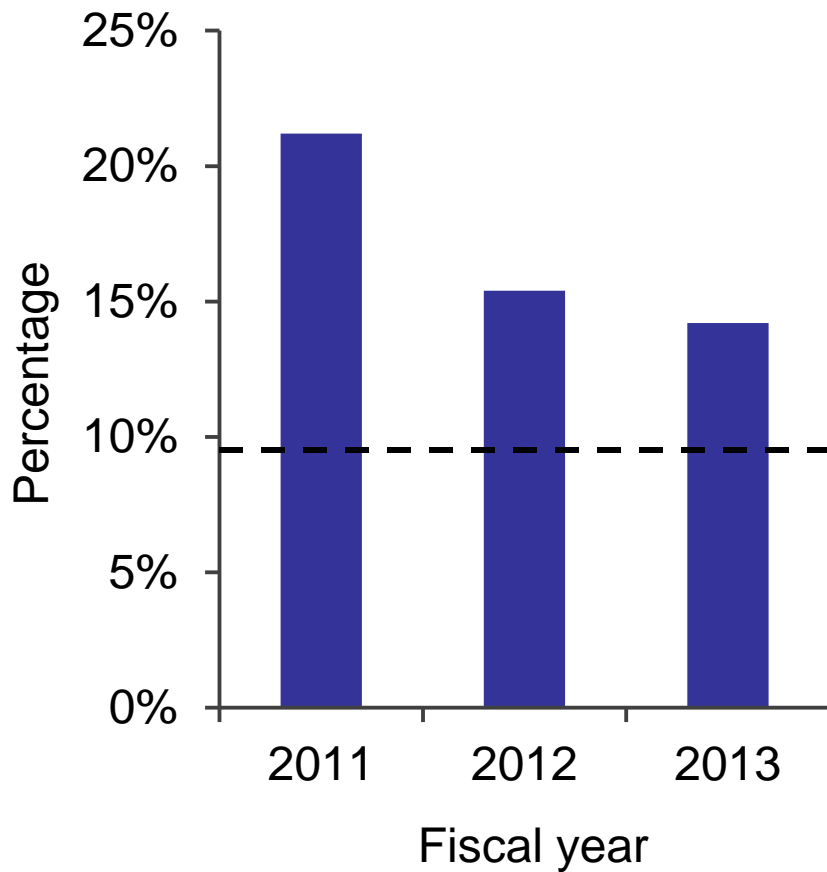
# Weight gain of evacuees

Distribution of BMI in 1,032 adults from Iitate Village (mean age 65) before and after the accident

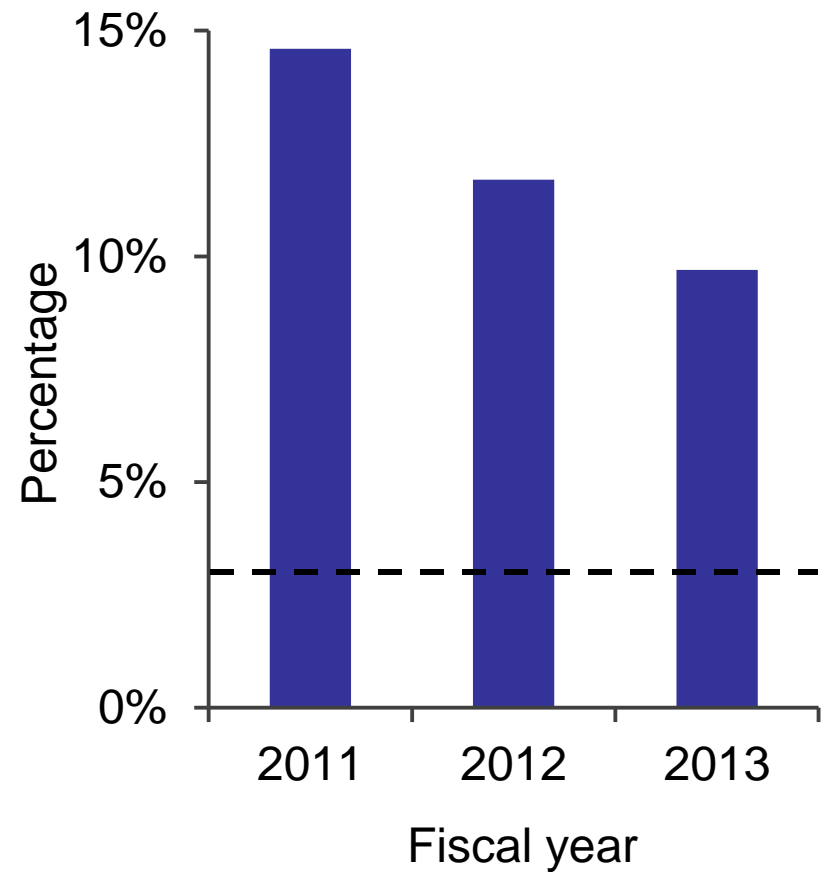


# Mental health of evacuees

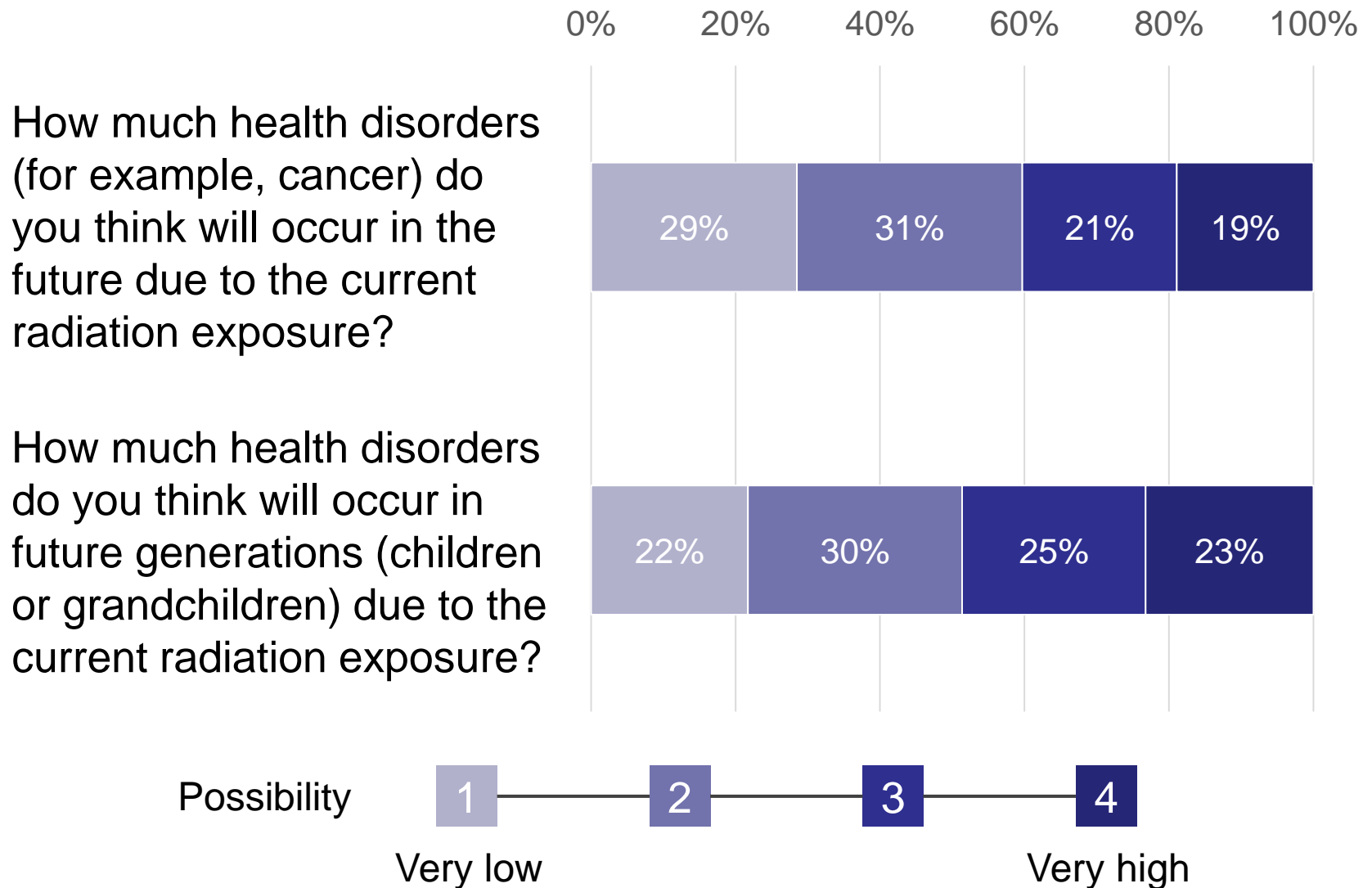
Children (SDQ  $\geq 16$ )



Adult (K6  $\geq 13$ )



# Perception of radiation risk



# Psychological effect?



Imagine what they experienced!

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- Epidemiological study

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# Exposure of emergency workers

- A total of 19,346 workers engaged in emergency work.
- Effective doses to 174 workers exceeded 100 mSv.
- Six of them exceeded 250 mSv.
- Highest effective dose was 678.8 mSv.
- No acute radiation effect was observed.

# Epidemiological study of emergency workers

- Expert meeting set up to make plans
- Report compiled in June 2014
- RERF appointed as the controlling research institute
- Multiple institutions to be engaged
- Baseline studies conducted in FY 2014
- Full-scale study starts in FY 2015

# Outline of study plan (1)

- Target
  - ~20,000 emergency workers
- Study design
  - Prospective cohort (nested case-control)
  - Lifetime follow-up
- Exposure assessment
  - Realistic assessment of cumulative dose
  - Consideration on exposure condition
  - Chromosome assay ( $> 100$  mSv)

# Outline of study plan (2)

## ■ Endpoints

- Solid cancer
- Leukemia
- Non-cancerous disease
- Psychological effects

## ■ Others

- Collection of biological samples (blood)
- Ascertainment of medical exposure
- Questionnaire on confounding factors

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# Summary

- Thyroid cancer cases observed so far are attributed to intensive screening.
- Evacuation has changed people's lifestyle and could affect their health conditions.
- Mental health is an issue of concern especially for evacuees and young mothers.
- Epidemiological study of emergency workers has started, but discernible increase in cancer is unlikely.

# For more information

- Fukushima Radiation and Health

<http://www.fmu.ac.jp/radiationhealth>

- In Focus: Radiation Protection at Works Relating to TEPCO's Fukushima Daiichi Nuclear Power Plant Accident (IRPW)

<http://www.mhlw.go.jp/english/topics/2011eq/workers>