

***THE SITUATIONS OF
EXTERNAL AND INTERNAL RADIATION
EXPOSURE
IN FUKUSHIMA***

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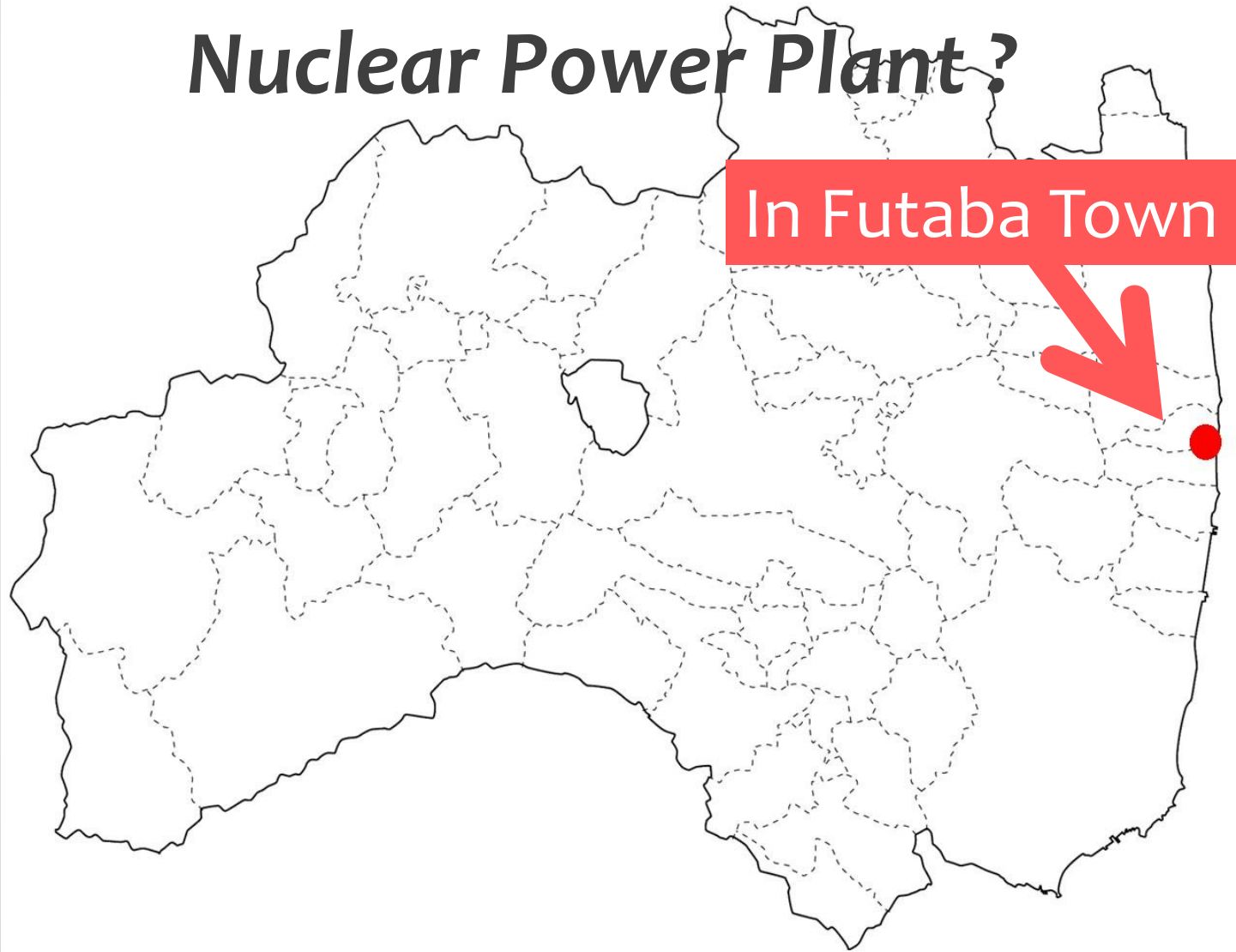
The Internal Radiation Exposure

4. *Conclusion*

Where is Fukushima ?



Where is Fukushima Daiichi Nuclear Power Plant?



In Futaba Town

1. AFTER THE ACCIDENT



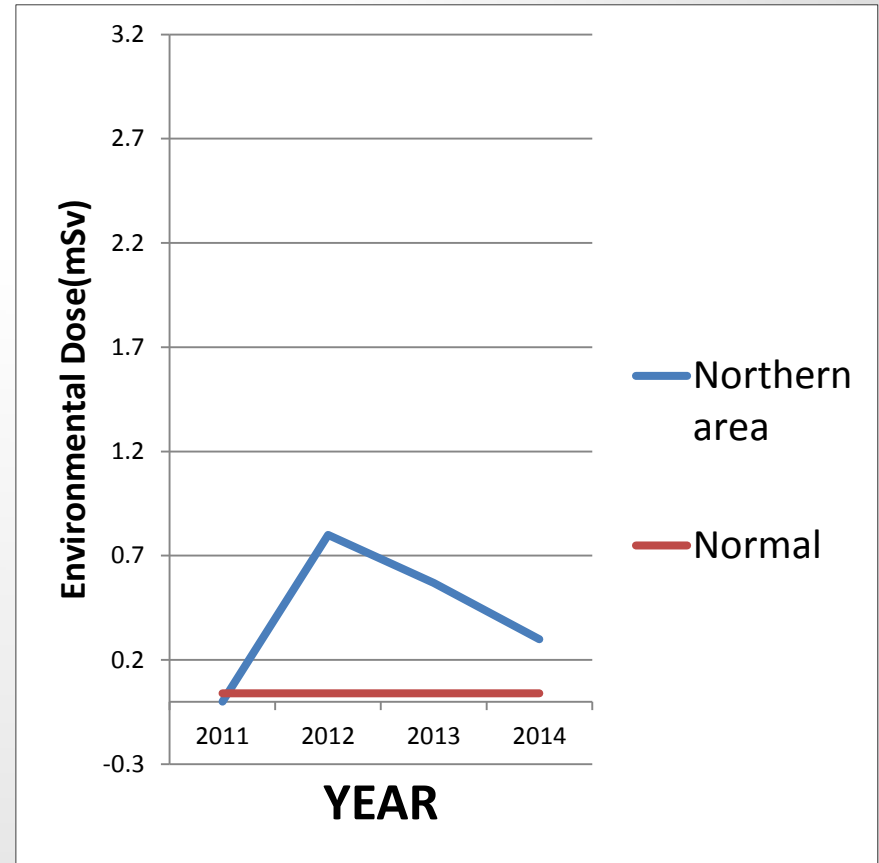
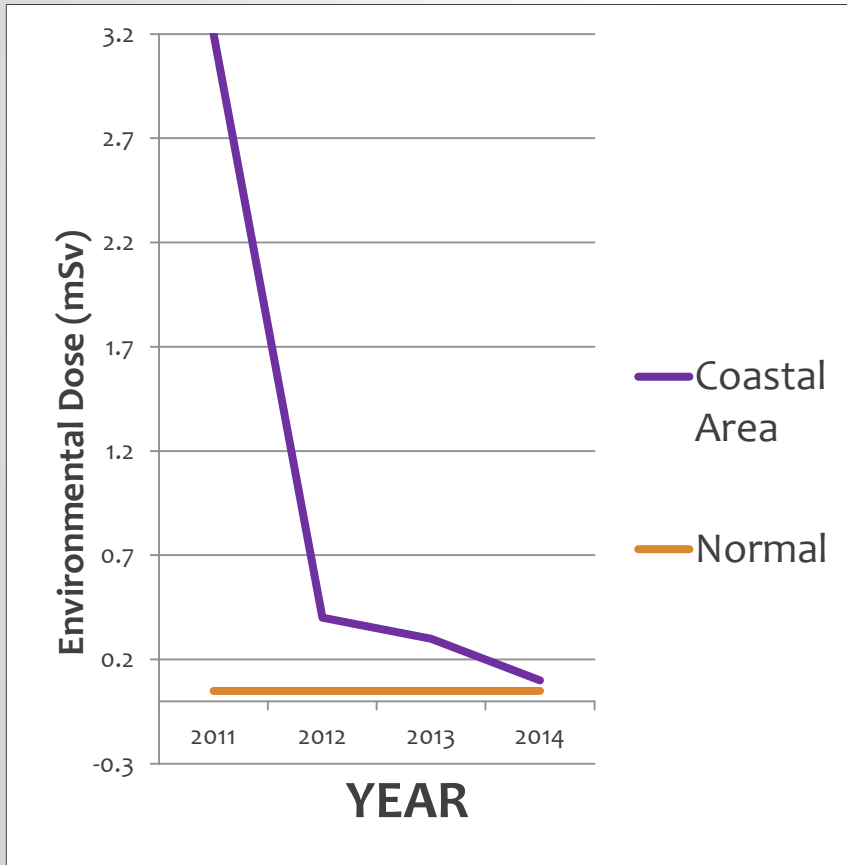
Personal dosimeter



Environmental Air Dose Monitor

1. AFTER THE ACCIDENT

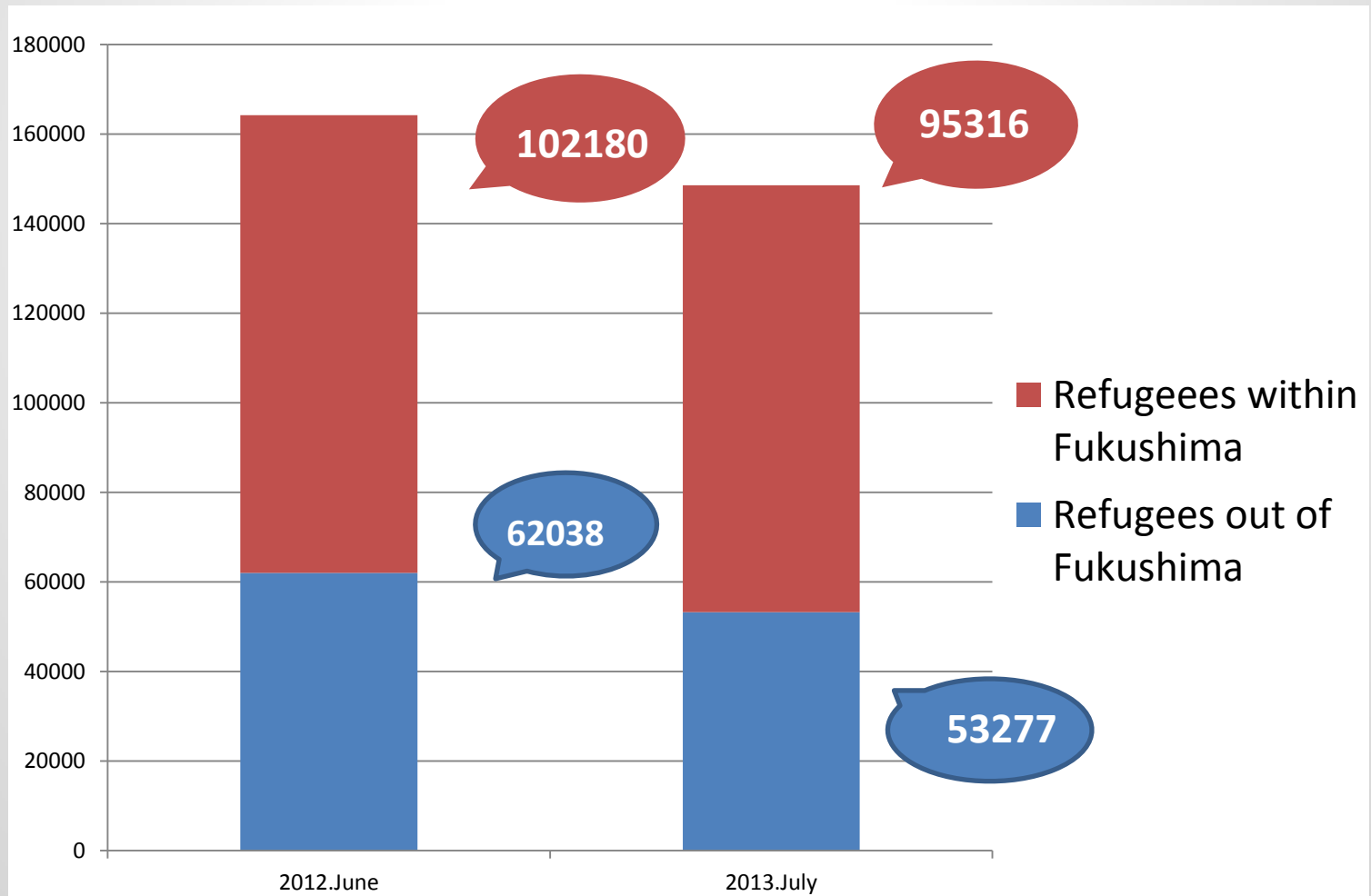
Environmental Radiation Dose in Fukushima



They haven't gone back to normal.

1. AFTER THE ACCIDENT

The number of Fukushima refugees has hardly decreased

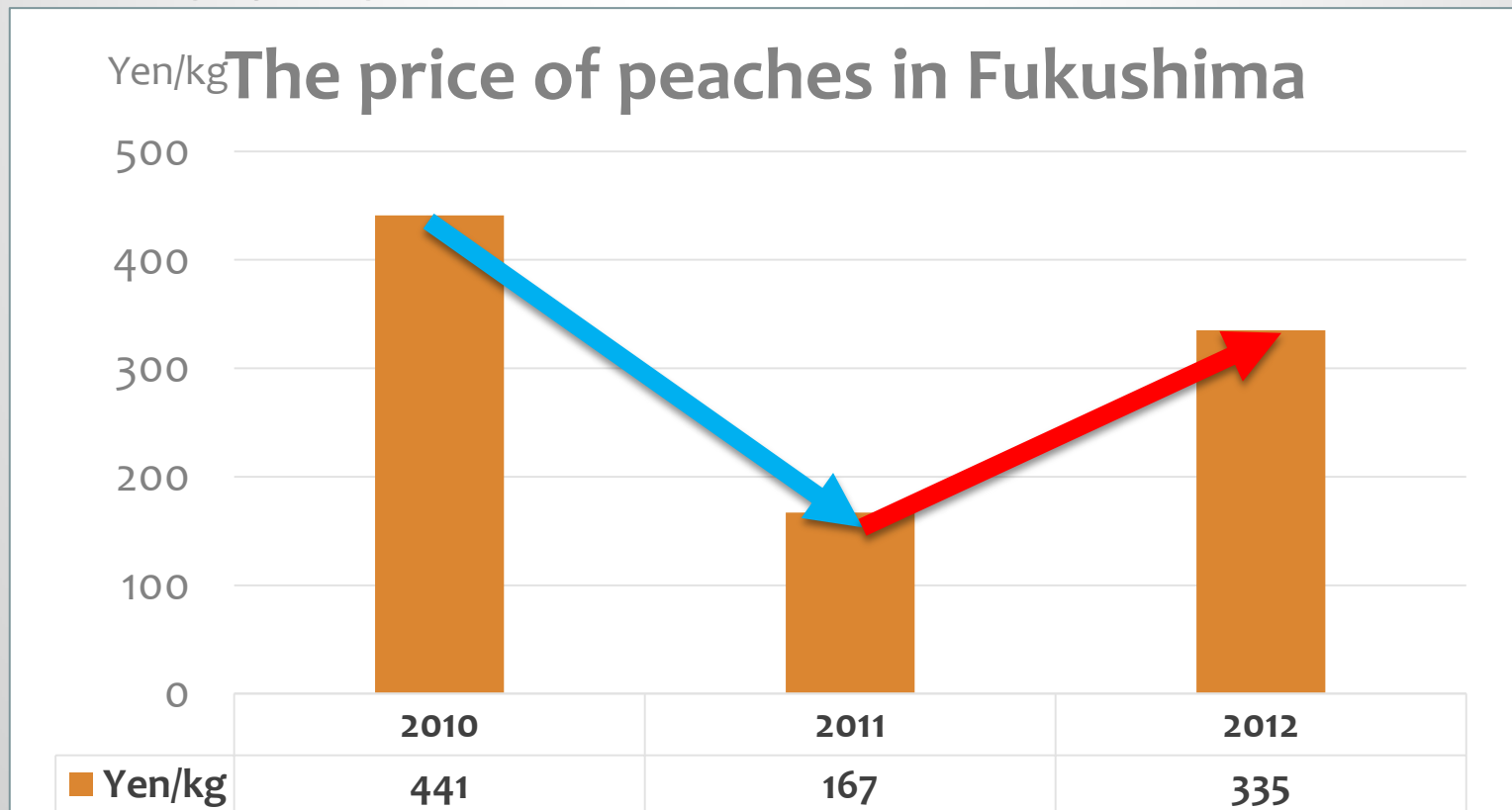


2. HARMFUL RUMOR

2-1. Agriculture

① Peach

→ Although the shipment has returned, the price hasn't returned.

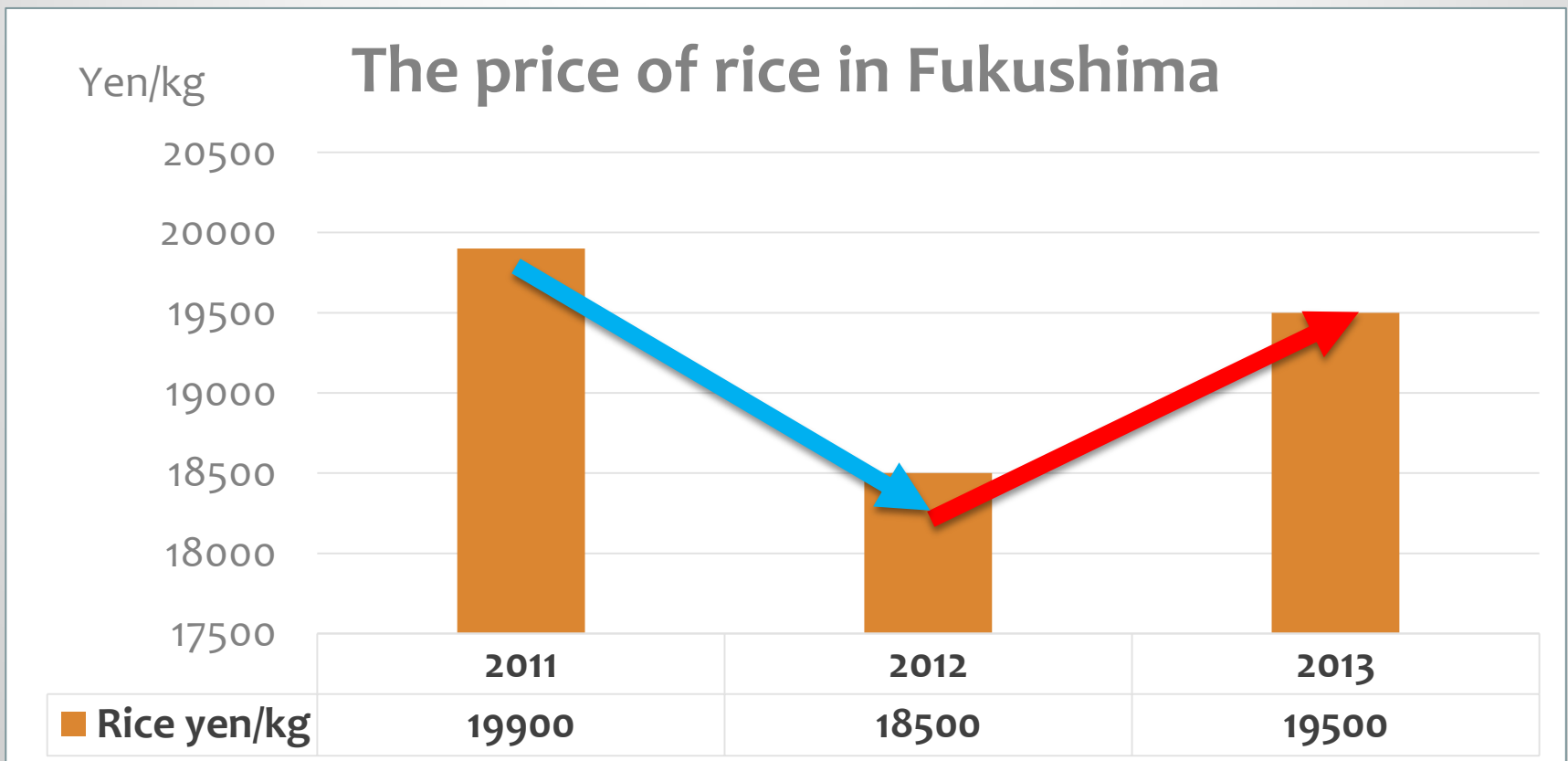


2. HARMFUL RUMOR

2-1. Agriculture

② Rice

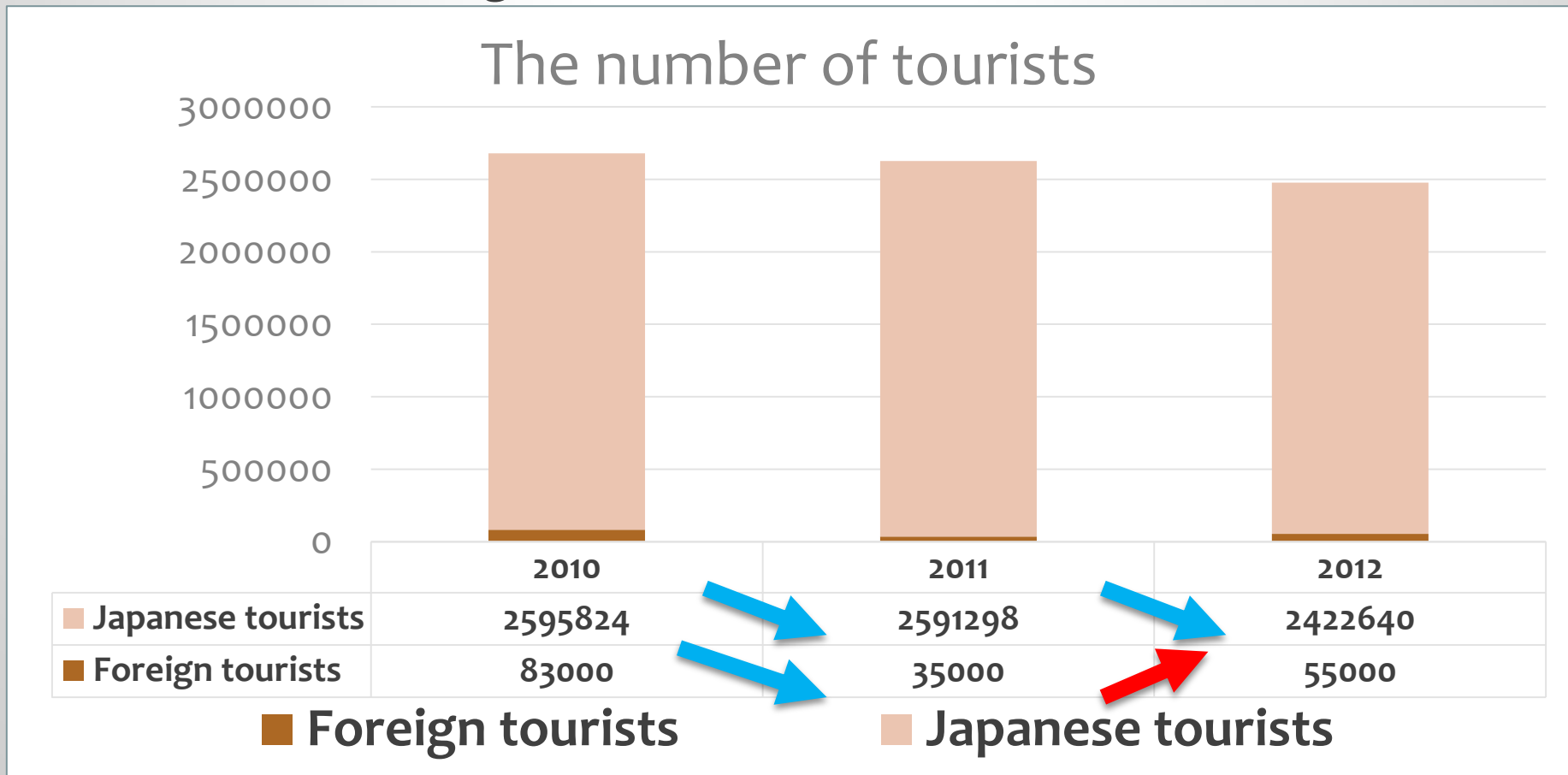
→The price in Fukushima is still below the average because of the harmful rumor.



2. HARMFUL RUMOR

2-2. Tourism

→ Japanese tourists are not willing to visit Fukushima rather than foreign tourists.



2. HARMFUL RUMOR

2-3. Discrimination

Example of discrimination outside Fukushima

- *Children were treated badly, so their parents decided to return to Fukushima.*
- *People were required to hand in some reports of radiation inspection.*
- *Some people were refused to check-in hotels, take a taxi, or enter a restaurant.*



One reason:

People in general did not understand radiation well and were more afraid than necessary

2. HARMFUL RUMOR

2-4. Thoughts of people in Fukushima

① Interview to school lunch center

- **“We want to continue to eat local food actively.”**
- **The radiation standard for shipment of food for school lunch is very strict: 10 Bq/kg**
cf. Food for market in Fukushima: 100 Bq/kg
cf. in EU: 500 - 1250 Bq/kg

2. HARMFUL RUMOR

2-4. Thoughts of people in Fukushima

② Interview to my classmates

Some say:

"We are still doubtful."

However, most say:

"We are not afraid of using food made in Fukushima."

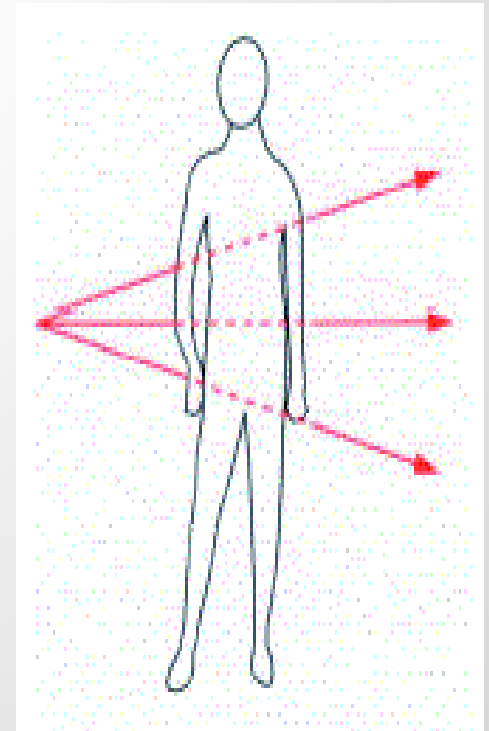
"We don't care about radiation dose."

Most people living in Fukushima do not worry about radiation so much.

3. The External and Internal Radiation Exposure

3-1. What is the External Exposure?

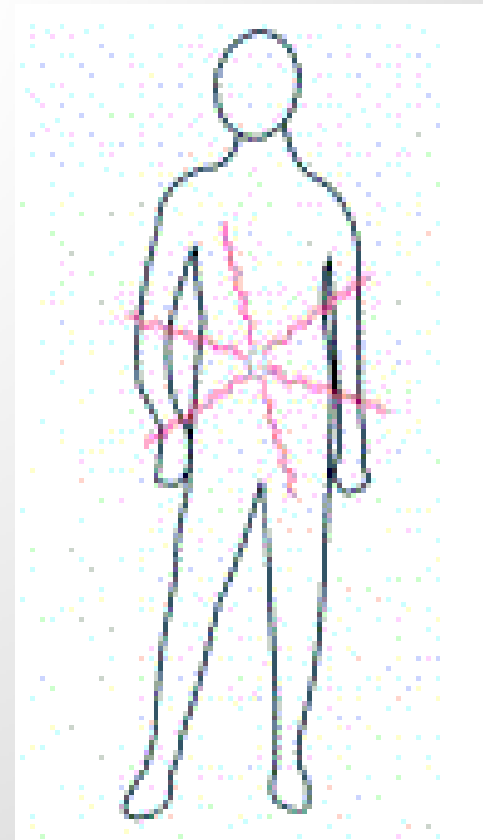
External exposure is being exposed to radioactive substances **outside** our bodies.



3. The External and Internal Radiation Exposure

3-2. What is the Internal Exposure?

Internal exposure is being exposed to radioactive substances **inside** our bodies.
e.g.) eating, breathing



3. *The External and Internal Radiation Exposure*

Sv and Bq

- *Sv (Sievert)... A unit to express the extent of biological effect on living bodies of radiation exposure.*
- *Bq (Becquerel)... A unit to express how much an object has been contaminated.*

3. The External and Internal Radiation Exposure

Conversion of Bq into Sv

You can convert Bq into Sv with effective dose coefficients (see the table below).

Isotope	Half-life (year)	Ingestion (Sv/Bq)	Inhalation (Sv/Bq)
^{134}Cs	2.06	1.9×10^{-8}	2.0×10^{-8}
^{137}Cs	30.0	1.3×10^{-8}	3.9×10^{-8}

3-1. The External Exposure

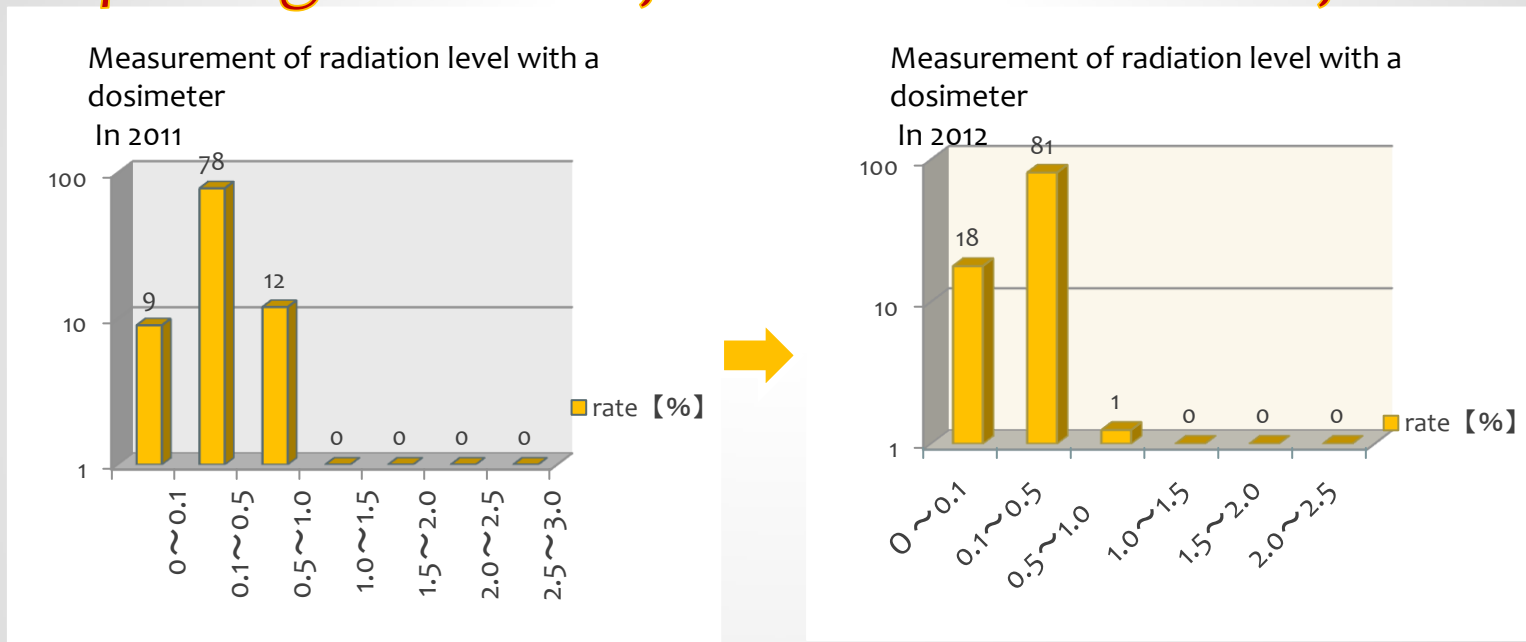
The Investigation with the Integrated Dosimeter

- Integrated dosimeter “GLASS BADGE”



3-1. The External Exposure

Comparing results of 2011 with results of 2012 ①



Average value of the accumulated dose for three months :
0.26mSv in 2011.



-0.13mSv

Average value of the accumulated dose for three months :
0.14mSv in 2012.

- Cumulative dose of radiation has decreased nearly in half.

3-1. The External Exposure

Comparing results of 2011 with results of 2012 ②

- 90% of Fukushima residents were exposed to **less than 0.5mSv** over 3 months.



- This is **less than 2.0mSv/year**.
- The ICRP excess radiation limit is **20mSv/year**.
- The global average of natural radiation is **2.4mSv/year**.



Fukushima residents were **NOT** exposed to large amounts of radiation.

3-2. The Internal Exposure

Monitoring Investigation of Daily Meals

- Examination method... All meals, snacks, and drinks from one day were measured together by using germanium semiconductor detector.
- Inspection period... Dec. 2nd, 2012~Feb. 9th, 2013
- Respondent to this survey... ordinary people selected at random: 78 people

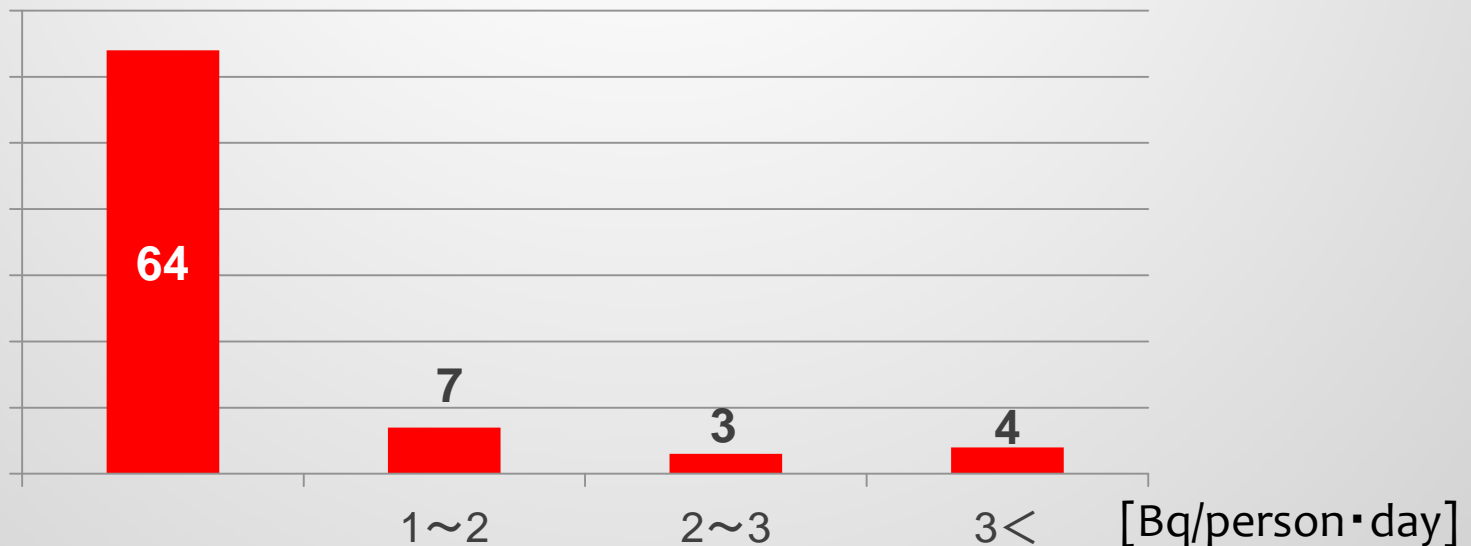
3-2. The Internal Exposure

Monitoring Investigation of Daily Meals: Result

- Measured values are in $0.076 \sim 22 \text{Bq}/(\text{person} \cdot \text{day})$.
- **4 people** have been exposed to radiation over $3 \text{Bq}/(\text{person} \cdot \text{day})$.
- **Most people** have been exposed radiation under $1 \text{Bq}/(\text{person} \cdot \text{day})$.

Intake of radioactive cesium in daily meals

[people]



RESULTS

3-2. The Internal Exposure

Monitoring Investigation of Daily Meals: Result

- **Max.: 22Bq/day= 0.12mSv/year**

<< **Below ICRP's safety standard: 1mSV/year**

cf. You have to eat about **70,000Bq** for a year to get **1mSv**.

<< **Below the natural dose of ^{40}K : 0.18mSv/year**



4. Conclusion

The 2 types of investigations:

*the investigation with integrated dosimeters,
and
monitoring investigation of daily meals
show:*



*We can clearly claim that
Fukushima is SAFE.*

Thank you for listening!