Session 1

Significance and key findings of the Basic Survey

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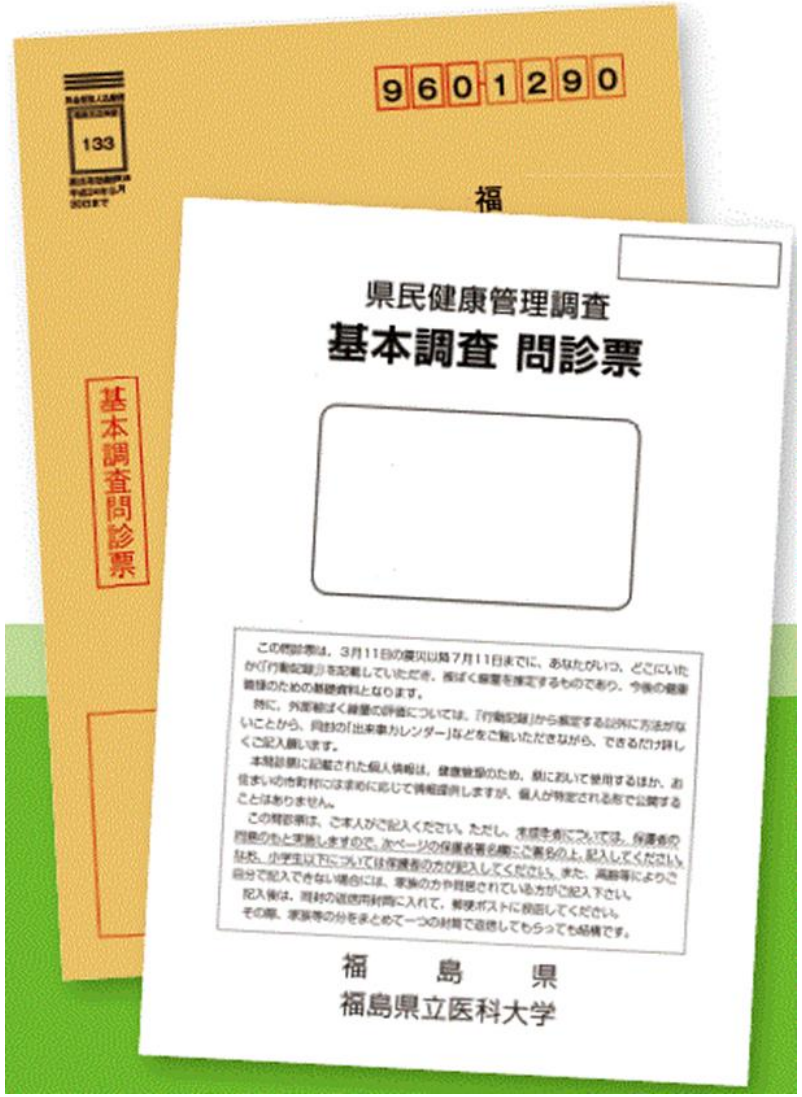
Purpose and eligible people for the Basic Survey

Environmental radiation levels jumped after the nuclear accident in Fukushima Prefecture

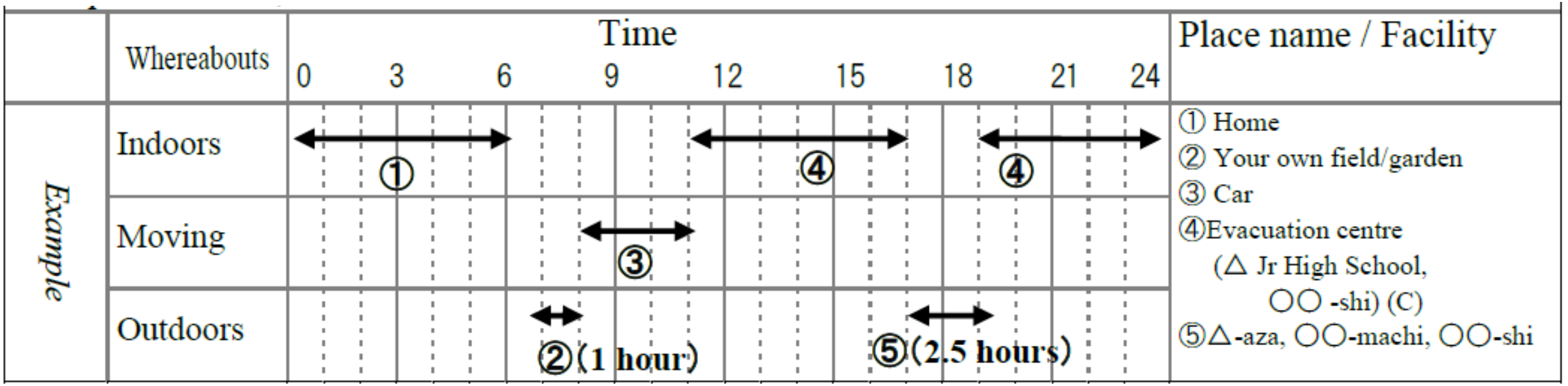
- Residents were asked to record their behavior in the early post-accident period (self-administered questionnaire). Individual external doses (exposure doses from radiation in the environment) were estimated based on their behaviors and reported to respondents by post.

- Eligible people were those registered as residents in Fukushima Prefecture between March 11 and July 1, 2011 (around 2.06 million people).



Behavior record example in the questionnaire (major part)

Behavior record example, for the period from March 11, 2011 (the day of earthquake) to March 25



The items to be filled in for the period from March 26 to July 11 include:

- Area(s) of residence
- Average time spent outdoors per day
- Places of regular attendance (workplace, school, etc.)

Period for dose estimation: four months from March 11, 2011, to July 11, 2011

Even if behavior records cover less than four months, dose is estimated for the period for which the behavior records are available.

Infants and children are also included as eligible people.
For minors: a guardian's signature is required with submission of the questionnaire.

Outline of dose calculation method

Information on whereabouts, including time spent indoors and outdoors.

Dose reduction effects by staying indoors are also considered.

Whereabouts are converted to longitude and latitude data.

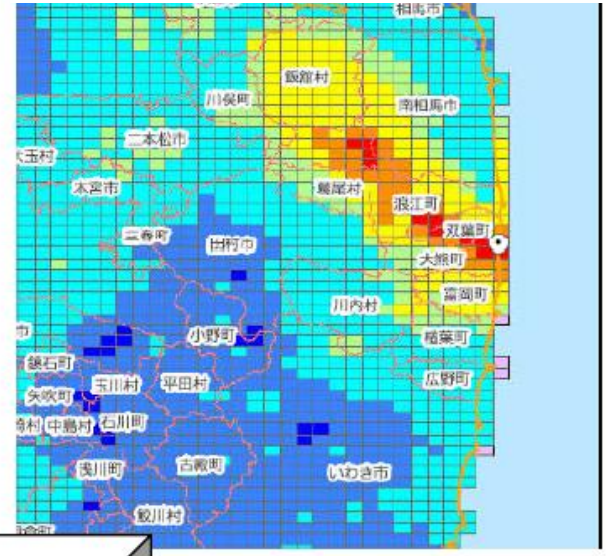
Questionnaire survey

Source: National Institutes for Quantum Science and Technology
"System overview" The external exposure doses estimation evaluation system
https://www.qst.go.jp/uploaded/attachment/2123.pdf

Results of ambient dose measurements

Digitized behavior records

Daily ambient dose rate maps



Individual doses were estimated by superimposing digitized behavior records and ambient dose rate maps.

National Institute of Radiological Sciences (current name: National Institutes for Quantum Science and Technology) developed a computer program for this calculation.

Flow of the Basic Survey

Dose estimation for individual respondents

Distribute questionnaire form

Provide questionnaire writing support.

Example: “I was at my relative’s house” (if such information cannot be converted to longitude and latitude, then dose estimation is not possible).

Collect questionnaire responses

Ask respondents and adjust records, if an address or building name is ambiguous (more than 60,000 people).

Digitize behavior records

Number of responses peaked at around 8,000 per day.

Estimate doses using calculation program

Send results to respondents

Provide estimated doses to around 555,000 individuals (including those who submitted behavior records of less than four months).

Trend analysis

Aggregate the dose estimate data.

Report to the Oversight Committee and publish in academic journals.

Scientific data and insights on the situation of radiation exposure in Fukushima are disseminated nationally and internationally.

Activities to support completing the questionnaire (writing support) and study on its representativeness

Writing support was mainly offered at the following places:

- Temporary housing facilities
- Thyroid Ultrasound Examination venues (public facilities)
- Health check venues in municipalities
- City halls and other government buildings, etc.

Writing support booth

Overall response rate for the entire prefecture: 27.7%
(as of March 31, 2023, for all 59 municipalities)

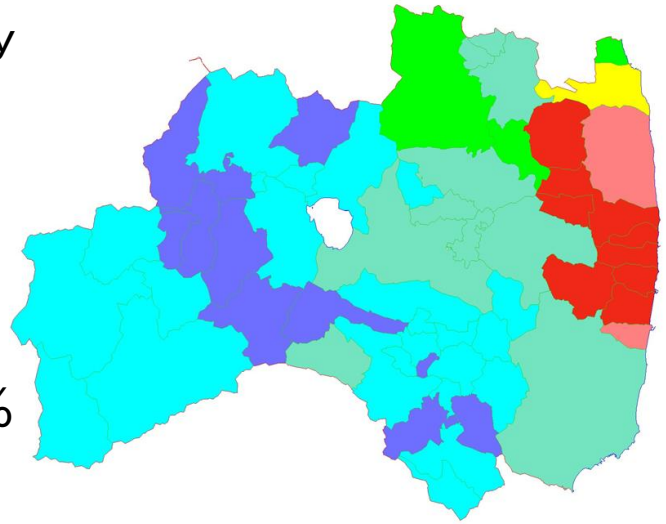
Response rates >50%: 8 municipalities
Response rates 40-50%: 2 municipalities
(Areas marked in red in a figure on the right)

Response rates by municipality

>50%

40 - 50%

Other areas: less than 40%



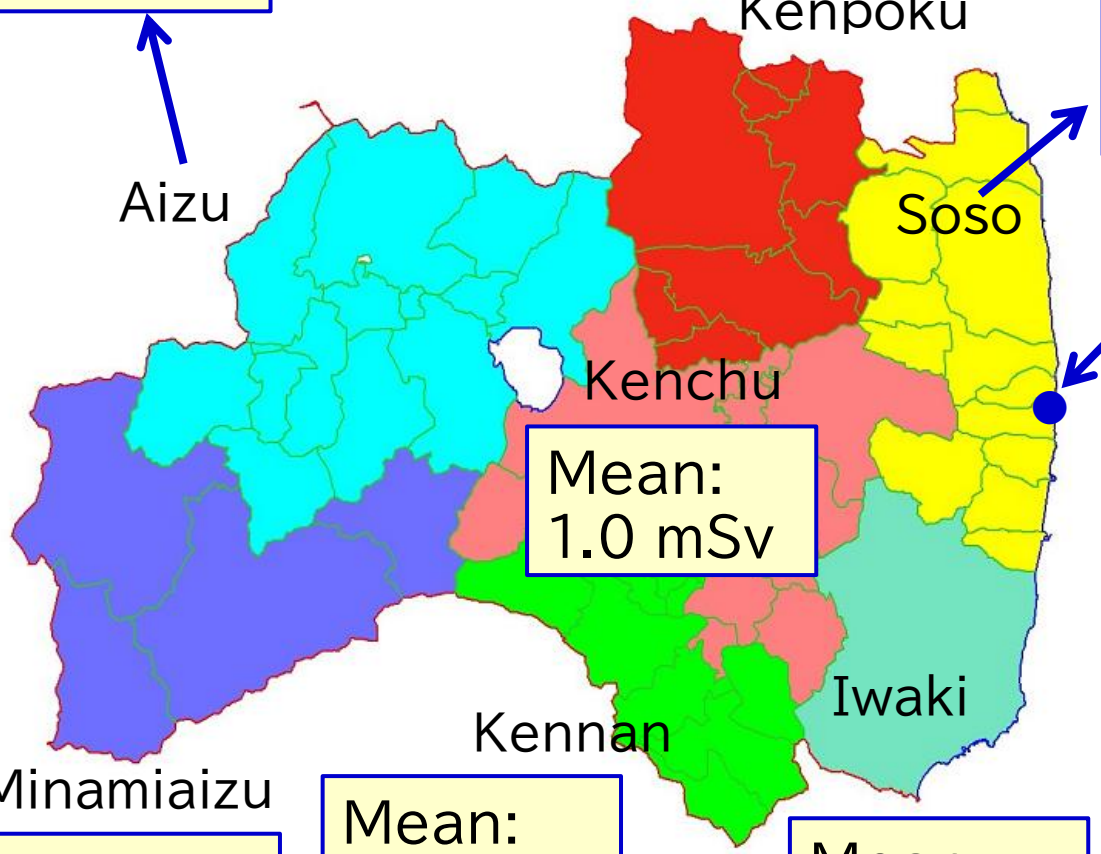
Ishikawa T et al.: Radiat Environ Med 8(2) 118-126 (2019)

The results of the study on representativeness indicate that the dose distributions obtained thus far are considered also to be unbiased dose distributions for the entire prefecture.

Estimated external doses over the four months following the accident (as of March 31, 2025)

Sources: materials for 56th Oversight Committee Meeting

Mean doses for each region



< 1 mSv: 77.3%
< 2 mSv: 94.9%
< 3 mSv: 97.2%
Mean: 0.7 mSv

Dose distribution of 467,730 respondents, excluding former radiation workers

< 1 mSv: 62.2%
< 2 mSv: 93.8%
< 3 mSv: 99.3%
Mean: 0.8 mSv
Maximum: 25 mSv

Evaluation by Oversight Committee

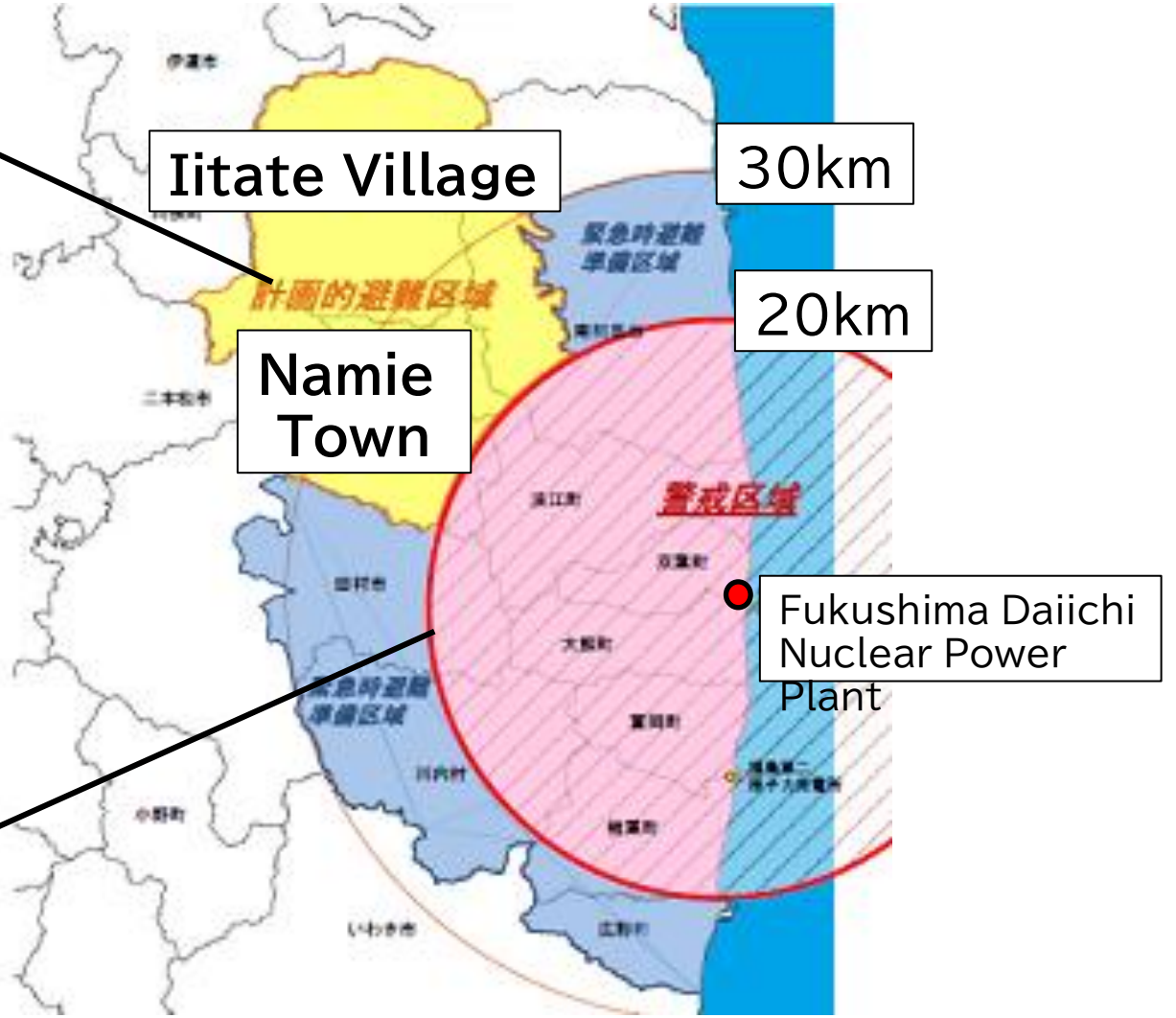
Radiation doses estimated so far are unlikely to cause adverse effects on health, although this conclusion is based on external exposure doses estimated only for the first four months following the accident.

Importance of behavior records in dose estimation

On April 22, 2011, a “Planned evacuation zone” (area marked in yellow in the right figure) was established, because the cumulative dose received by residents was likely to reach 20 mSv within one year after the accident.

These residents were instructed to evacuate within around one month. The actual timing of the evacuation was considered to be different among the residents.

The national government issued an evacuation order for the 20 km radius on March 12, 2011 (the day after the earthquake).



https://www.pref.fukushima.lg.jp/site/portal/cat01-more.html

Importance of behavior records in dose estimation (Namie Town and Iitate village)

WHO: World Health Organization
UNSCEAR: United Nations Scientific Committee on the Effects of Atomic Radiation

Major assumptions used for estimating the first-year dose after the accident

Almost less than 10%

WHO 2012 report
10～50 mSv
(Adults in Namie Town and Iitate Village)

Residents stayed in the planned evacuation zone for four months and then evacuated out of it.
They spent 8 hours outdoors per day.

UNSCEAR 2013 report
5.0 & 7.0 mSv (Adults in Namie Town)
7.8 & 8.0 mSv (Adults in Iitate Village)

Two typical evacuation scenarios each were assumed for Namie Town and Iitate Village.

UNSCEAR 2020/2021 report
0.25～3.1 mSv (Adults in Namie Town)
0.36～5.5 mSv (Adults in Iitate Village)

Actual evacuation patterns estimated from behavior records obtained in the Basic Survey (5 typical patterns for Namie Town and 4 typical patterns for Iitate Village)

石川徹夫:福島原発事故・県民健康調査① 被災者の被ばく線量推計. 公衆衛生 87巻, 1094-1102 (2023)より引用(一部改変)

Summary — significance of the Basic Survey for estimating doses in the early post-accident period —

- The Basic Survey estimates individual external doses from a time when when measuring instruments were not widely available. Notification of exposure doses have been sent to around 555,000 respondents.

- The mean individual dose across the prefecture was 0.8 mSv and the maximum dose was 25 mSv.

- Although activities to improve the response rate continue, the number of responses has not increased much. Therefore, we implemented a “Study on representativeness.” This study showed that the dose distributions obtained thus far are, in fact, representative of the prefecture’s entire population.

- According to the Oversight Committee’s evaluation, radiation doses estimated so far are unlikely to cause adverse effects on health, although this conclusion is based on external exposure doses estimated only for the first four months following the accident.

- In contrast to the overestimation of individual exposure doses initially reported by international organizations, based on their cautious assumptions, Basic Survey estimates, based on actual behavior records, can be deemed as more accurate.