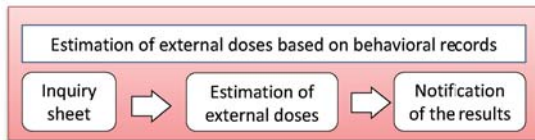


### A survey to obtain data that is to serve as the basis for monitoring and protecting residents' health

In order to estimate external doses, individuals were asked to keep and submit a record of their behavior.

Based on collected behavioral records for the four months from March 11 to July 11, 2011, each individual's external dose was estimated using the External Dose Estimation System developed by the National Institute of Radiological Sciences.

[Survey scheme]



Estimated results and the period for estimation are reported to participating individuals to let them know their own external doses, and at the same time, the obtained data are utilized in the Detailed Surveys and individuals' health management to be continued for the long term.

Prepared based on the 4th Expert Meeting on Communications with Nuclear Disaster Victims Regarding Their Health, Ministry of the Environment

The Basic Survey was commenced for the purpose of estimating the level of external doses of the residents of Fukushima Prefecture based on the records of their behavior, informing them of the estimation results individually, and thereby promoting and maintaining the health of the prefectural residents, in light of the effect of radiation due to the accident at Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi NPS, which occurred following the Great East Japan Earthquake.

Specifically, inquiry sheets were delivered to the applicable residents to ask them to record their behavior during the four months after the accident. Based on the behavioral records entered in the inquiry sheets, individuals' external doses were estimated using a program developed by the National Institute of Radiological Sciences. The four months after the accident, which is the targeted period of the Basic Survey, is the period during which ambient dose rates were the highest, and it is most important to determine people's external doses during this period.

Individuals' estimated external doses were compiled and statistically processed, and have been utilized for analyzing radiation exposure and its health effects in Fukushima Prefecture.

Included in this reference material on March 31, 2013

Updated on March 31, 2020

**[Period for estimation]**

Behavior during the four months from March 11 to July 11, 2011

**[Coverage]**

Approx. 2.06 million people

• Residents of the prefecture:

People with residence registration in the prefecture from March 11 to July 1, 2011

• People residing outside the prefecture:

- (1) People who were registered as residents in other prefectures but were residing in the prefecture from March 11 to July 1, 2011
- (2) People residing outside the prefecture who commuted to work or school in the prefecture from March 11 to July 1, 2011
- (3) People residing outside the prefecture who temporarily stayed in the prefecture from Mar. 11 to Mar. 25, 2011

(For people residing outside the prefecture, inquiry sheets were sent upon their request.)

The 4th Expert Meeting on Communications with Nuclear Disaster Victims Regarding Their Health, Ministry of the Environment

The period for surveying behavioral records was the four months from March 11 to July 11, 2011.

The Basic Survey covered approx. 2.06 million people who were registered as residents of the prefecture at the time of the earthquake. People registered as residents in other prefectures were also covered if they resided, commuted to work or school, or temporarily stayed in the prefecture during this period.

Included in this reference material on March 31, 2013

Updated on March 31, 2019

There are two types of inquiry sheets: a detailed version and a simplified version.

### ● Detailed version (conventional version)

区 町	丁目	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	地名・施設名
3/11	区外																									① 自宅 ② 学校 ③ 職場 ④ 避難所
3/12	区外																									① 自宅 ② 学校 ③ 職場 ④ 避難所 ⑤ 友人宅
3/13	区外																									① 自宅 ② 学校 ③ 職場 ④ 避難所 ⑤ 友人宅
3/14	区外																									① 自宅 ② 学校 ③ 職場 ④ 避難所 ⑤ 友人宅
3/15	区外																									① 自宅 ② 学校 ③ 職場 ④ 避難所 ⑤ 友人宅
3/16	区外																									① 自宅 ② 学校 ③ 職場 ④ 避難所 ⑤ 友人宅
3/17	区外																									① 自宅 ② 学校 ③ 職場 ④ 避難所 ⑤ 友人宅
3/18	区外																									① 自宅 ② 学校 ③ 職場 ④ 避難所 ⑤ 友人宅
3/19	区外																									① 自宅 ② 学校 ③ 職場 ④ 避難所 ⑤ 友人宅
3/20	区外																									① 自宅 ② 学校 ③ 職場 ④ 避難所 ⑤ 友人宅
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All respondents were asked to record the activities they conducted on an hourly basis for the period from March 11 to March 25, but the simplified inquiry sheet allows some respondents to summarize their behavior and only enter basic behavioral patterns for a certain period of time.

In November 2013, a simplified inquiry sheet was introduced.

### ● Simplified version

区 町	丁目	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	地名・施設名
3/11	区外																									① 自宅 ② 学校 ③ 職場 ④ 避難所 ⑤ 友人宅
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3/25	区外																									① 自宅 ② 学校 ③ 職場 ④ 避難所 ⑤ 友人宅

[Requirements for using the simplified inquiry sheet]

People who have experienced none or only one significant behavioral pattern change (such as a change of residence, school or workplace due to evacuation or moving) in the four months following the earthquake

### Examples

- 1 A person who was residing in Fukushima City at the time of the earthquake, evacuated to Kanagawa on March 15 and continued staying in Kanagawa until July 11
- 2 A person who was residing in Fukushima City at the time of the earthquake, evacuated to Aizuwakamatsu on March 18 but returned to Fukushima City on June 10

Moved once

Simplified version

Moved twice

Detailed version

Prepared based on the website of the Radiation Medical Science Center for the Fukushima Health Management Survey, Fukushima Medical University (Information on the Inquiry Sheets for the Basic Survey)

The inquiry sheet for the Basic Survey requires respondents to record the activities they conducted on an hourly basis for the period from March 11 to March 25. In response to complaints concerning the difficulty in filling in the sheet, a simplified version was introduced in November 2013.

However, in order to maintain the accuracy of the survey, the simplified inquiry sheet may be used only by those who have experienced none or only one significant change in their living place due to evacuation or moving, etc. in the four months following the earthquake.

Included in this reference material on March 31, 2013

Updated on March 31, 2019

# Basic Survey: Analysis Methods

## (Behavioral Pattern Survey and Dose Rate Map)

### Behavioral pattern survey

Examine behavioral patterns based on inquiry sheets of the Fukushima Health Management Survey

#### Survey period

Four months from March 11 to July 11, 2011

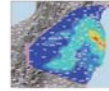
#### Surveyed items

- Stays (places, hours and building structures)
- Moves (places and hours)

記入欄	滞在場所	滞在時間	滞在建物	滞在理由	滞在場所	滞在時間	滞在建物	滞在理由	
滞在	0	3	6	9	12	15	18	21	24
移動	→		→		→		→		
備考									(OO)形××中×××××

### Dose rate maps

Prepare maps showing average daily effective dose rates based on data of SPEEDI and the Ministry of Education, Culture, Sports, Science and Technology (MEXT)



- March 12 to 14 Evaluation results by SPEEDI (effective dose rates)
- From March 15 onward Monitoring data released by MEXT (at that time) (ambient dose equivalent rates)

Convert ambient dose equivalent rates to effective dose rates by multiplying by 0.6

- Divide into 2 km × 2 km grids
  - Interpolate discrete data using software to create a map
- \* Values of natural radiation are not included.

Calculation of cumulative effective doses

Evaluate effective doses based on behavioral patterns and dose rate maps

Prepared based on the website of Fukushima Prefecture, "Estimation of External Doses (Outline of the External Dose Estimation System and Estimation Results by Model Pattern of Evacuation Behavior)", National Institute of Radiological Sciences" (December 13, 2011)

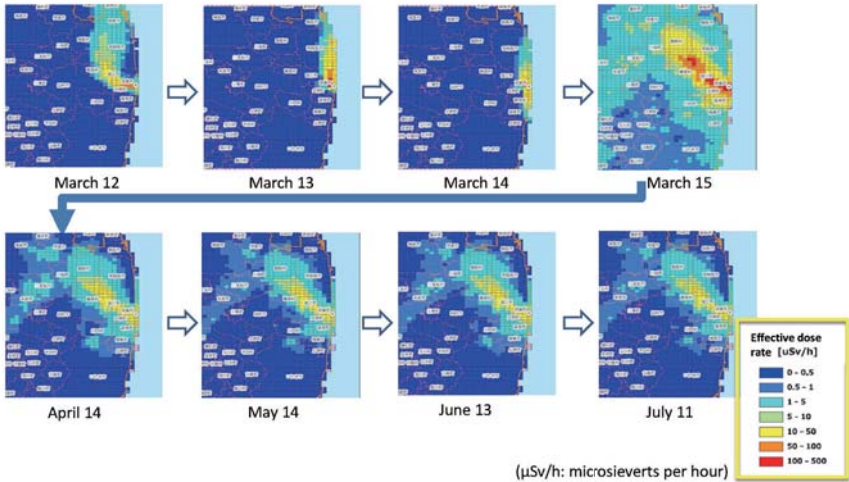
In the Basic Survey, external doses were evaluated combining the results of the behavioral pattern survey and the created dose rate maps. The evaluation was conducted based on dose rate maps and behavioral records entered by respondents, such as where and how long they stayed in buildings, and the type of buildings where they stayed, during the survey period.

Included in this reference material on March 31, 2013

Updated on March 31, 2019

## Basic Survey: Analysis Methods

### (Time-Series Dose Rate Maps)



Prepared based on the website of Fukushima Prefecture, "Estimation of External Doses (Outline of the External Dose Estimation System and Estimation Results by Model Pattern of Evacuation Behavior)", National Institute of Radiological Sciences" (December 13, 2011)

Dose rate maps used here are the monitoring data released by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) (at that time).<sup>\*1</sup>

\*1: For the three days from March 12 to March 14, which are included in the period (March 12 to March 15, 2011) during which the monitoring data released by MEXT (at that time) is not available, calculation results by SPEEDI (System for Prediction of Environmental Emergency Dose Information) using the data on radioactive material discharge released by the Nuclear and Industrial Safety Agency (at that time) in June 2011 were applied. Data for March 15 was assumed to be the same as that for March 16, and from March 16 onward, the monitoring data released by MEXT (at that time) was used.

Included in this reference material on March 31, 2013

Updated on March 31, 2019

## Basic Survey: Obtained Responses and Their Representativeness

The response rate was 27.7% for the entire Fukushima Prefecture. However, as a result of the examination on the representativeness, the dose distribution based on the responses obtained so far in the seven districts in the prefecture was found to be unbiased and to properly represent that of respective districts.

**Table 1 Responses to the Basic Survey**

As of March 31, 2020

Number of responses	Coverage	2, 055, 251	
	Detailed version	493, 859	24. 0%
	Simplified version	74, 773	3. 6%
	Total	568, 632	27. 7%

\* Response rates are rounded off for each category.

**Table 2**

Response rate by age group

As of March. 31, 2020

Age group	0~9	10~19	20~29	30~39	40~49	50~59	60~	Total
Response rate	46.6%	36.2%	18.2%	24.8%	22.5%	23.0%	27.9%	27.7%

\* Rates (%) are rounded off.

Prepared based on the material for the 38th Prefectural Oversight Committee Meeting for Fukushima Health Management Survey

Approx. 568,632 people have responded so far (response rate: 27.7%).

In light of the fact that the response rate of the Basic Survey had remained unchanged at around 27%, an examination on the representativeness of the dose distribution was conducted in FY2015. As a result of the examination, the dose distribution based on the responses obtained so far in the seven districts in the prefecture was found to be unbiased and to properly represent that of respective districts.

See the following website for details:

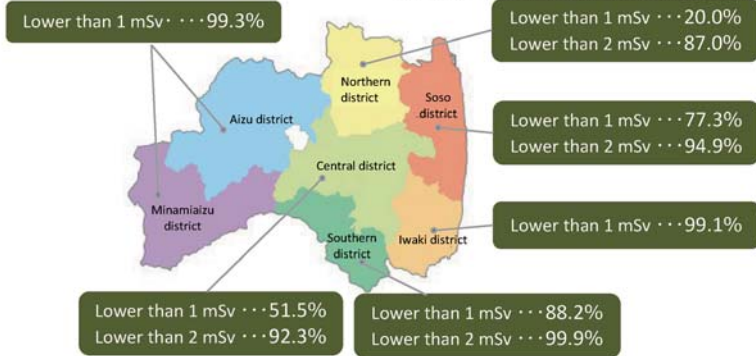
<http://www.pref.fukushima.lg.jp/uploaded/attachment/151271.pdf> (in Japanese)

Included in this reference material on March 31, 2013

Updated on March 31, 2021

## Results of estimated external effective doses by district

(for 466,367 people excluding radiation workers)



## Evaluation of estimated effective doses

Past epidemiological studies have not confirmed clear health effects of radiation below 100 mSv. Therefore, the estimated external effective doses, though covering only four months, can be evaluated as values that are unlikely to show any health effects caused by radiation.

Prepared based on the material for the 38th Prefectural Oversight Committee Meeting for Fukushima Health Management Survey

Out of a total of 554,320 people for whom external effective doses have been estimated by March 31, 2020, a total of 475,579 people submitted records of their behavior for the entirety of the four-month period for estimation. The figure above shows the estimation results of 466,367 people, excluding those who had engaged in radiation work, by district. As shown in the figure, people for whom estimated external effective doses were lower than 1 mSv accounted for 88.2% in the southern district, 99.3% in the Aizu and Minamiaizu districts, 77.3% in the Soso district, and 99.1% in the Iwaki district. The maximum value was 25 mSv estimated for a person residing in the Soso district.

Included in this reference material on March 31, 2013

Updated on March 31, 2021