

# Basic Survey (Radiation Dose Estimates)

Reported on 18 May 2015

## 1. Response Rates and Radiation Dose Estimates

### 1.1 Response Rates of Residents

The overall effective response rate to the Basic Survey (radiation dose estimates), which targeted the entire population of Fukushima Prefecture, was 27.1% (556,917 of 2,055,339) as of 31 March 2015. Thanks to instructions given at thyroid ultrasound examination venues for filling out the survey form, we continue to receive responses from participants. Response rate for the simplified questionnaire was 3.2% (65,452 of 2,055,339). (See Table 1)

Survey population		2,055,339	
Responses	Original questionnaire	491,465	23.9%
	Simplified questionnaire*	65,452	3.2%
	Total	556,917	27.1%

\*Preliminary figures  
Fractions have been rounded.

The following tables show the results of the original and simplified questionnaires combined.

### 1.2 Radiation Dose Estimates

It has been four years since the Great East Japan Earthquake and the Fukushima Daiichi nuclear disaster, and we continue to receive responses from participants. Doses have been estimated for 540,638 of 556,917 respondents (97.1%) as of 31 March 2015, and the results have been returned to 536,186 respondents.

(See Table 2)

Area(preceding and full-scale surveys)	Survey population a	Responses b	Response rate c=b/a	Completed dose estimates d	Proportion e=d/b	Returned results f	Proportion g=f/b
Kempoku	504,045	150,628	29.9%	147,598	98.0%	146,014	96.9%
Kenchu	557,259	134,016	24.0%	129,364	96.5%	128,616	96.0%
Kennan	152,229	33,863	22.2%	32,695	96.6%	32,350	95.5%
Aizu	267,205	55,953	20.9%	53,684	95.9%	53,247	95.2%
Minami-aizu	30,788	6,180	20.1%	5,861	94.8%	5,785	93.6%
Soso	195,590	89,063	45.5%	86,382	97.0%	86,211	96.8%
Iwaki	348,223	87,214	25.0%	85,054	97.5%	83,963	96.3%
Total	2,055,339	556,917	27.1%	540,638	97.1%	536,186	96.3%

Including Yamakiya of Kawamata, Namie and Iitate.

We have been estimating doses for non-residents who were visiting or staying in Fukushima Prefecture at the time of the accident. (See Table 3)

Number of requests	Responses	Response rate	Completed dose estimates	Proportion	Returned results	Proportion
a	b	c=b/a	d	e=d/b	f	g=f/b
3,891	2,149	55.2%	1,915	89.1%	1,869	87.0%

## 2. Results of Radiation Dose Estimates

Table 4 shows the numbers of completed dose estimates (see Table 2) —excluding the data in the estimation period less than four months—within a range of values.

Radiation doses for a total of 462,061 residents have been estimated to date. The results for 453,065 respondents (excluding radiation workers) suggest that the doses for about 87% of the respondents in Kempoku area and about 92% in Kenchu area were <2 mSv. The doses for approximately 88% of the respondents in Kennan area and more than 99% of those in Aizu and Minami-aizu areas were <1 mSv. Doses for about 78% of respondents in the Soso area and more than 99% of respondents in Iwaki were also <1 mSv.

Effective Dose (mSv)	Total	Excluding radiation workers				By area (excluding radiation workers)												
		Kempoku *		Kenchu		Kennan		Aizu		Minami-aizu		Soso **		Iwaki				
<1	287,058	281,446	62.1%	93.8%	24,772	20.1%	56,272	51.6%	24,625	88.3%	43,872	99.3%	4,738	99.3%	55,233	77.6%	71,934	99.1%
1-2	146,008	143,718	31.7%	99.8%	82,632	67.0%	44,516	40.8%	3,239	11.6%	282	0.6%	34	0.7%	12,391	17.4%	624	0.9%
2-3	25,364	25,003	5.5%		15,382	12.5%	7,904	7.2%	17	0.1%	21	0.0%	0	-	1,649	2.3%	30	0.0%
3-4	1,542	1,465	0.3%	5.8%	463	0.4%	414	0.4%	0	-	1	0.0%	0	-	583	0.8%	4	0.0%
4-5	537	495	0.1%	0.2%	39	0.0%	5	0.0%	0	-	0	-	0	-	450	0.6%	1	0.0%
5-6	429	376	0.1%		18	0.0%	3	0.0%	0	-	0	-	0	-	354	0.5%	1	0.0%
6-7	266	228	0.1%	0.1%	10	0.0%	1	0.0%	0	-	1	0.0%	0	-	216	0.3%	0	-
7-8	151	114	0.0%		1	0.0%	0	-	0	-	0	-	0	-	113	0.2%	0	-
8-9	113	73	0.0%	0.0%	1	0.0%	0	-	0	-	0	-	0	-	72	0.1%	0	-
9-10	69	39	0.0%		0	-	0	-	0	-	0	-	0	-	39	0.1%	0	-
10-11	67	34	0.0%	0.0%	0	-	0	-	0	-	0	-	0	-	34	0.0%	0	-
11-12	52	31	0.0%		1	0.0%	0	-	0	-	0	-	0	-	30	0.0%	0	-
12-13	36	13	0.0%	0.0%	0	-	0	-	0	-	0	-	0	-	13	0.0%	0	-
13-14	34	12	0.0%		0	-	0	-	0	-	0	-	0	-	12	0.0%	0	-
14-15	27	6	0.0%	0.0%	0	-	0	-	0	-	0	-	0	-	6	0.0%	0	-
≥15	308	12	0.0%		0	-	0	-	0	-	0	-	0	-	12	0.0%	0	-
Total	462,061	453,065	100.0%	100.0%	100.0%	100%	109,115	100%	27,881	100%	44,177	100%	4,772	100%	71,207	100%	72,594	100%
Max	66 mSv	25 mSv			11 mSv		6.3 mSv		2.6 mSv		6.0 mSv		1.9 mSv		25 mSv		5.9 mSv	
Mean value	0.9 mSv	0.8 mSv			1.4 mSv		1.0 mSv		0.6 mSv		0.2 mSv		0.1 mSv		0.8 mSv		0.3 mSv	

\* Including Yamakiya of Kawamata.

\*\* Including Namie and Iitate.

Percentages have been rounded and may not total to 100%.

Excluding those with estimation period less than four months.

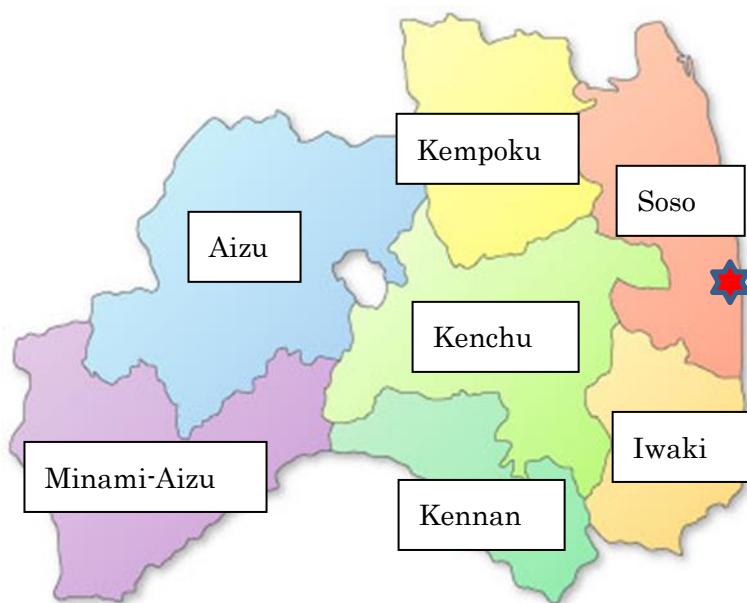
### 3. Evaluation of the results

The latest effective radiation dose estimates showed similar trends to those observed so far.

Since previous epidemiological studies<sup>1</sup> indicate no significant health effects at doses  $\leq 100$  mSv, we concluded that radiation doses estimated so far are unlikely to cause adverse effects on health, although this conclusion is based on external radiation doses estimated only for the first four months following the accident.

#### References

1) Sources and effects of ionizing radiation, United Nations Scientific Committee on the Effects of Atomic Radiation, UNSCEAR 2008 Report to the General Assembly, with scientific annexes.



#### **4. Survey on the representativeness of dose distribution shown in the Basic Survey**

In order to investigate whether people who have responded to the Basic Survey represent the whole population in regard to external dose estimates and dose distribution, we are preparing to start a survey.

##### **4.1 Survey Population**

We plan to use a two-stage sampling method based on nationwide and prefecture-wide polls to select a survey population from participants of the Basic Survey. Using the postal codes, we will divide municipalities into units based on the address as of 11 March 2011 and make sure there is an average of 500 participants of the Basic Survey in each unit. As a first step, we will randomly select geographic areas for polling.

In the next step, we will randomly select 50 samples from each area.

##### **4.2 Methods**

After selecting about 5,000 samples throughout Japan, we will review their responses and addresses to exclude those who already had responded to the Basic Survey, had died, or had moved outside Fukushima Prefecture. There would be about 3,000 samples to be collected for this door-to-door survey.

To meet the need for a large workforce, we will outsource and hire polltakers who will visit nonrespondents to support filling out the questionnaires. This enables us to ask them why they did not answer the questionnaire, and encourage their cooperation.

##### **4.3 Results**

We will estimate the doses for all respondents. By comparing the dose distribution of the respondents from the door-to-door survey and those who responded previously by mail, we will find out if what has already been reported is an accurate and unbiased assessment of dose distribution for the whole population of Fukushima Prefecture.

Reasons gathered from the respondents for not answering the questionnaire will be categorized and tallied to guide how the instructions for filling out the questionnaire and the Basic Survey might be improved.