"Basic Survey," Fukushima Health Management Survey
Results (from FY2011 to FY2019)

1. Purpose of the Survey

In light of the effects of radiation released due to the accident at Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Station after the Great East Japan Earthquake, this survey aims to estimate residents' external doses based on their behavioral records and inform them of the estimation results, and to obtain data serving as the basis for their heath management into the future.

2. Survey Methods and Outline of the Provision of Support

(1) Estimation of external doses

A) Coverage

Questionnaire sheets to enter behavioral records were sent to people with residence registration in Fukushima Prefecture from March 11 to July 1, 2011. Additionally, questionnaire sheets were sent to the following upon their request: (i) people who were registered as residents in other prefectures but were residing in the prefecture from March 11 to July 1, 2011; (ii) people residing outside the prefecture who commuted to work or school in the prefecture from March 11 to July 1, 2011; and (iii) people residing outside the prefecture who temporarily stayed in the prefecture from March 11 to March 25, 2011. People falling under any of (i) to (iii) above were treated as "temporary visitors" and their data were tabulated separately from those of people with residence registration as of the time of the earthquake.

B) Questionnaire sheets

The original questionnaire sheet prepared at the time of commencing the survey (referred to as the "detailed version") required respondents to enter their behavioral records on an hourly basis for the two weeks from March 11 to March 25, 2011. For the period from March 26 to July 11, 2011, the matters to be entered were simplified and entries of only the place of residence, average hours spent outdoors per day, addresses of regularly visited places (workplace, school, etc.), etc. came to be required.

In November 2013, a simplified version of the questionnaire sheet was introduced by strictly limiting the targets to people who experienced a change of residence or workplace less than twice (none or only one significant behavioral pattern change) in the four months following the earthquake.

C) Outline of the survey

As measurement using personal dosemeters was impossible immediately after the accident, it was considered to be the best to estimate external doses based on the distribution map of air dose rates, which was created as accurately as possible through the emergency environmental monitoring, and individuals' behavioral records collected in detail. Accordingly, questionnaire sheets were delivered to the applicable residents to ask them to record where they were (their behavioral records) during the four months after the accident and send back completed questionnaire sheets to the Fukushima Medical University. At the same time, a system to make it possible to calculate external doses of a large number of survey targets was developed. Behavioral records entered in questionnaire sheets (the detailed version and simplified version) were digitalized and external doses depending on places where individuals stayed for the four months after the accident were calculated, while also taking into account shielding effects of buildings. Estimation results have been fed back individually to survey targets and have also been tabulated by area, gender, age bracket, etc. to ascertain levels of external doses (for the four months after the accident) of residents of Fukushima Prefecture as a whole.

Areas where exposure doses were considered to be relatively high based on the distribution of air dose rates within the prefecture and the timing of people's evacuation (Namie Town, Iitate Village, and Yamakiya District in Kawamata Town) were targeted for the initial screening, and copies of the detailed version were delivered there ahead of the other areas. On June 30, 2011, the delivery of the detailed version was commenced with regard to residents of these areas, and regarding the rest of the residents of Fukushima Prefecture (those with residence registration in Fukushima Prefecture from March

11 to July 1, 2011), the delivery was commenced thereafter. In the end, copies of the detailed version were delivered to a total of approximately 2.06 million residents.

Then, in November 2013, copies of the simplified version were delivered to the targets of the Thyroid Examination who had not returned their responses to the detailed version at that point in time (approximately 0.25 million people). Thereafter, the simplified version came to used broadly, not limited to those covered by the Thyroid Examination.

Estimation results were sent (by post) individually to those who sent back questionnaire sheets wherein they entered their behavioral records. Regarding returned questionnaire sheets which contained behavioral records for less than four months, estimation results were fed back to the relevant respondents with comments specifying the period for the estimation starting from March 11.

(2) Activities for raising response rates

As explained later, the overall response rate exceeded 20% at the end of 2011 but showed no significant increases thereafter. Therefore, we have made various efforts for raising response rates since FY2012.

A) Support counters to help respondents fill in questionnaire sheets

We dispatched staff members to various sites to help respondents fill in questionnaire sheets as needed and collect completed questionnaire sheets on the spot. On occasions of the Thyroid Screening conducted at general public facilities with relatively plentiful space, we established service counters when possible, called for the attention of Thyroid Screening targets who finished the screening and their guardians, and provided explanations and support for filling in questionnaire sheets for the Basic Survey if they wished. Other than the venues of the Thyroid Screening (general public facilities), we established similar support counters to offer assistance at (i) city halls and other municipal buildings, (ii) venues of health checkups, (iii) temporary housing, (iv) hospitals and healthcare centers, etc.

B) Other activities

We also made the following efforts in order to raise response rates: (i) visited various places and held briefing sessions to explain how to fill in questionnaire sheets; (ii) posted awareness-raising articles concerning the Basic Survey in PR magazines of the prefecture and municipalities; and (iii) conducted PR activities concerning the Basic Survey using newspapers and via TV and radio.

The aforementioned activities aiming to raise response rates were not carried out separately on different occasions but several of them were conducted concurrently.

However, the examination on the representativeness of dose distribution, which is explained later, was conducted in FY2015 and the Prefectural Oversight Committee Meeting for Fukushima Health Management Survey concluded that the dose distribution based on the data obtained so far represents the status for all residents of Fukushima Prefecture. Therefore, activities for raising response rates were discontinued at the end of FY2015. Nevertheless, we continued providing support to help respondents fill in questionnaire sheets at venues of the Thyroid Screening targeting screening targets and their family members, who were considered to be interested in their exposure doses. In recent years, we provided such opportunities 26 times in FY2018 and 19 times in FY2019, all at venues of the Thyroid Screening (general public facilities) in the seven areas in the prefecture.

(3) Examination on the representativeness

Although activities for raising response rates were continued from FY2012, it was rather difficult to raise response rates on the basis of all residents, some 2.06 million people. Those activities improved response rates to some extent but failed to significantly raise the overall response rate, which remained at 27.2% as of June 30, 2015.

Therefore, in FY2015, an examination was conducted as to whether questionnaire responses obtained so far and the external doses estimated based thereon represent all residents of Fukushima Prefecture (examination on the representativeness). Through comparing doses between people who had already responded to the Basic Survey and those

who had not, this examination aims to ascertain whether the results obtained through the Basic Survey so far represent all residents of the prefecture.

Figure 1 shows the framework of this examination. Among a group of people randomly selected from each area ((A) in Figure 1), staff visited people who had not responded to the Basic Survey ((C) in Figure 1) and asked them to make responses. Doses of people who made responses after staff visits ((D) in Figure 1) and doses of people who had responded to the Basic Survey earlier ((B) in Figure 1) were compared for each area. The method of a "Two One-Sided Test" was employed to verify whether those doses are equivalent or not.

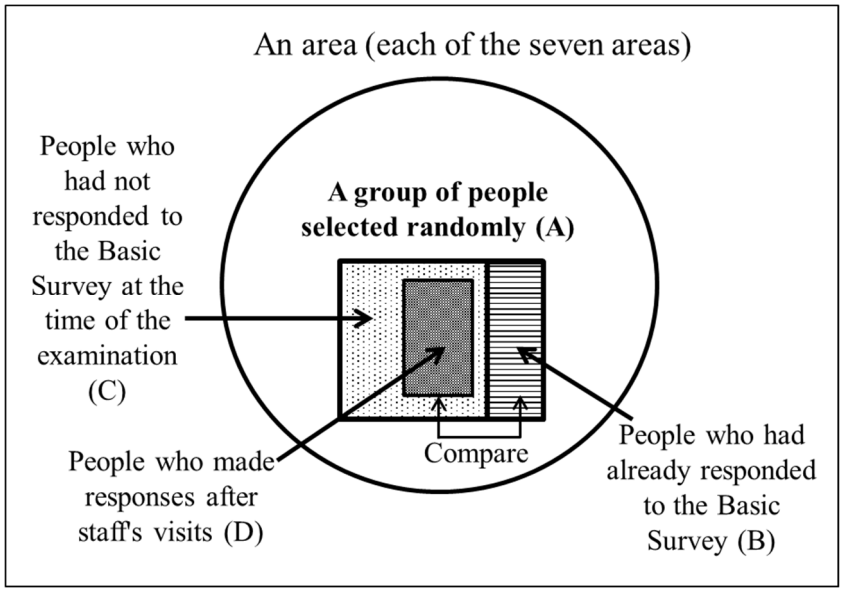


Figure 1: Methods of Selection and Comparison of Targets in Examination on the Representativeness

A certain number of responses is required for this verification. For an area where doses distribute in a narrower range, comparison may be made among a relatively small number of responses, but for an area with wider dose distribution, a larger number of responses is required. Accordingly, the number of people to be randomly selected ((A) in Figure 1) was set larger for the Soso area, in particular.

A total of 5,350 people were randomly selected from the seven areas of the prefecture (the northern area, central area, southern area, Aizu area, Minami-Aizu area, Soso area, and Iwaki area). After examining whether these people had already responded to the Basic Survey, staff visited those who had not (non-respondents) to ask them to make responses.

3. Survey Results

(1) Number of responses and response rate

A) Number of responses and response rate for the prefecture as a whole

Table 1 shows the changes in response rates by fiscal year. Hereinafter, the numbers and rates of responses are the total summing up those for the simplified version and those for the detailed version.

Incidentally, some responses lacked contact information or some entries and could not be supplemented, and doses could not be estimated based thereon. Such responses were approximately 14,100 in number (approximately 2.5% of all responses) as of March 31, 2020. Hereinafter, when including these data, the terms "number of responses" and "response rate" are used, and when excluding these data based on which doses could not be estimated, the terms "number of valid responses" and "valid response rate" are used.

The most recent number of responses was 568,632 as of March 31, 2020, and the response rate was 27.7%. The number of valid responses, excluding those based on which doses could not be estimated, was 554,517, of which dose estimation was completed for 554,320 cases and estimation results were already fed back for 554,132 cases.

Data for temporary visitors are tabulated separately and the numbers and rates of their responses are shown in Table 2.

Table 1: Changes in the Number of Responses by Fiscal Year

■ **Cumulative number of responses**

		Number of responses (in Fukushima)
End of FY2011 (6th)	Detailed version	451,446
	Simplified version	-
	Total	**451,446**
End of FY2012 (11th)	Detailed version	481,423
	Simplified version	-
	Total	**481,423**
End of FY2013 (15th)	Detailed version	487,855
	Simplified version	44,191
	Total	**532,046**
End of FY2014 (19th)	Detailed version	491,465
	Simplified version	65,452
	Total	**556,917**
End of FY2015 (23rd)	Detailed version	493,245
	Simplified version	72,135
	Total	**565,380**
End of FY2016 (27th)	Detailed version	493,538
	Simplified version	73,142
	Total	**566,680**
End of FY2017 (31st)	Detailed version	493,710
	Simplified version	74,100
	Total	**567,810**
End of FY2018 (35th)	Detailed version	493,813
	Simplified version	74,518
	Total	**568,331**
End of FY2019 (38th)	Detailed version	493,859
	Simplified version	74,773
	Total	**568,632**

■ **Number of responses for each fiscal year**

		Number of responses (in Fukushima)	Difference from the previous fiscal year
End of FY2011	Detailed version	451,446	
	Simplified version	-	
	Total	**451,446**	
End of FY2012	Detailed version	29,977	
	Simplified version	-	
	Total	**29,977**	-421469
End of FY2013	Detailed version	6,432	
	Simplified version	44,191	
	Total	**50,623**	20646
End of FY2014	Detailed version	3,610	
	Simplified version	21,261	
	Total	**24,871**	-25752
End of FY2015	Detailed version	1,780	
	Simplified version	6,683	
	Total	**8,463**	-16408
End of FY2016	Detailed version	293	
	Simplified version	1,007	
	Total	**1,300**	-7163
End of FY2017	Detailed version	172	
	Simplified version	958	
	Total	**1,130**	-170
End of FY2018	Detailed version	103	
	Simplified version	418	
	Total	**521**	-609
End of FY2019	Detailed version	46	
	Simplified version	255	
	Total	**301**	-220

Table 2: Responses and Dose Estimation for Temporary Visitors

Number of people to which questionnaire sheets were sent	Number of responses	Response rate	Number of valid responses	Valid response rate	Dose estimation completed	Rate	Results fed back	Rate
a	b	c=b/a	d	e=d/a	f	g=f/d	h	i=h/d
4,100	2,108	51.4%	2,098	51.2%	2,088	99.5%	2,088	99.5%

As of the end of March 2020

B) Number of responses and response rate by area

Figure 2 shows changes over time in the response rates for each of the seven areas of Fukushima Prefecture up to March 31, 2016, when activities for raising response rates were discontinued. The timing of sending copies of the simplified version (November 2013) is indicated in Figure 2, and it is clear that response rates increased to over 20% in the southern area, Aizu area, Minami-Aizu area, etc. thereafter, suggesting that the introduction of the simplified version exerted a certain positive effect. It is also known that the response rate exceeded 45% in the Soso area.

Many of the people in the Soso area took refuge in a complicated manner and do not satisfy the eligibility for the simplified version (changed the place of residence or workplace once or not at all for the four months after the accident). Therefore, the response rate for this area did not show a notable increase even after the introduction of the simplified version.

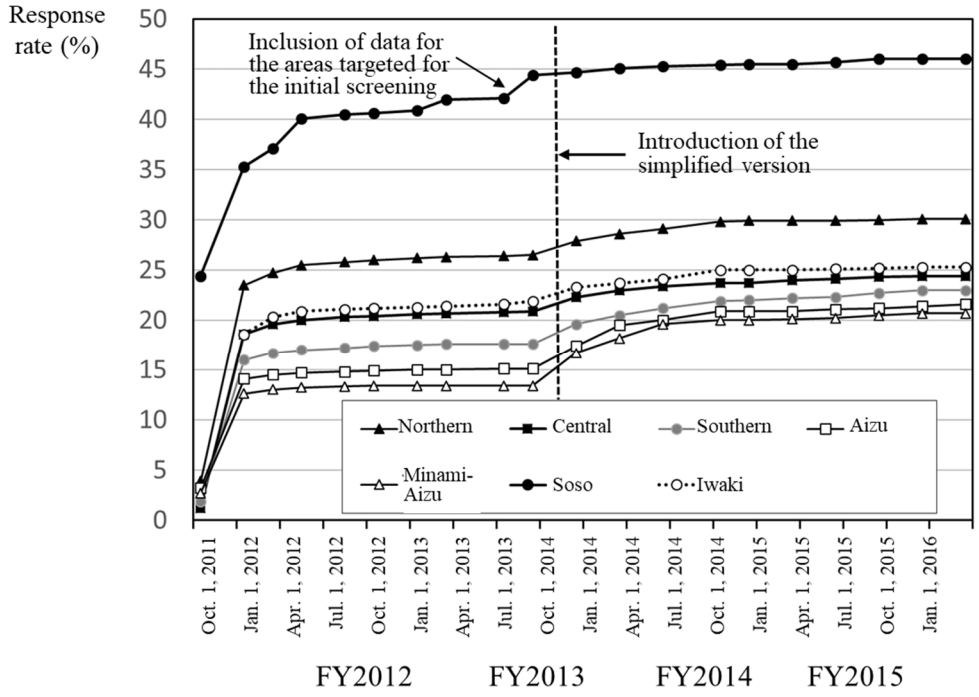


Figure 2: Changes over Time in Response Rates by Area

Until July 31, 2013, data were tabulated separately for the "areas targeted for the initial screening" (areas where questionnaire sheets were delivered ahead of the other areas, namely, Namie Town, Iitate Village, and Yamakiya District in Kawamata Town), the "Soso area excluding Namie Town and Iitate Village" and the "northern area excluding the Yamakiya District in Kawamata Town." However, since the tabulation on September 30, 2013, data for Namie Town and Iitate Village came to be included in those for the Soso area, and data for the Yamakiya District in Kawamata Town came to be included in those for the northern area. Accordingly, the response rate for the Soso area seems to have increased significantly in the tabulation on September 30, 2013, compared with that on July 31, 2013, but this increase was merely caused by the change of the tabulation method.

Figure 2 shows changes in response rates up to March 31, 2016. Increases in response rates thereafter up to March 31, 2020, remained small, at 0.1% to 0.4%, for all of the seven areas. Table 3 shows the number of responses, the number of valid responses, and the numbers of cases where dose estimation was completed and where the results were fed back by municipality as of March 31, 2020.

Table 3: Numbers of Responses and Cases where Dose Estimation was Completed and where Results were Fed back by Municipality

As of the end of March 2020

	Municipality	Number of survey targets	Number of responses	Response rate	Number of valid responses	Valid response rate	Dose estimation completed	Rate	Results fed back	Rate
		a	b	c=b/a	d	e=d/a	f	g=f/d	h	i=h/d
Northern area	Fukushima City	295,633	93,965	31.8%	92,457	31.3%	92,434	100.0%	92,402	99.9%
	Nihonmatsu City	60,854	16,917	27.8%	16,552	27.2%	16,549	100.0%	16,547	100.0%
	Date City	67,574	18,309	27.1%	17,844	26.4%	17,834	99.9%	17,822	99.9%
	Motomiya City	31,759	9,113	28.7%	8,944	28.2%	8,944	100.0%	8,943	100.0%
	Koori Town	13,207	3,884	29.4%	3,775	28.6%	3,775	100.0%	3,775	100.0%
	Kunimi Town	10,316	3,029	29.4%	2,941	28.5%	2,940	100.0%	2,940	100.0%
	Kawamata Town	15,885	5,189	32.7%	5,016	31.6%	5,016	100.0%	5,011	99.9%
	Otama village	8,791	1,935	22.0%	1,891	21.5%	1,891	100.0%	1,891	100.0%
	Subtotal	504,019	152,341	30.2%	149,420	29.6%	149,383	100.0%	149,331	99.9%
Central area	Koriyama City	339,678	87,266	25.7%	85,499	25.2%	85,492	100.0%	85,487	100.0%
	Sukagawa City	80,157	17,308	21.6%	16,872	21.0%	16,867	100.0%	16,867	100.0%
	Tamura City	41,723	10,576	25.3%	10,212	24.5%	10,206	99.9%	10,203	99.9%
	Kagamiishi Town	13,109	2,922	22.3%	2,859	21.8%	2,858	100.0%	2,858	100.0%
	Tenei Village	6,469	1,255	19.4%	1,224	18.9%	1,224	100.0%	1,224	100.0%
	Ishikawa Town	17,489	4,240	24.2%	4,136	23.6%	4,134	100.0%	4,134	100.0%
	Tamakawa Village	7,334	1,510	20.6%	1,462	19.9%	1,461	99.9%	1,460	99.9%
	Hirata Village	7,053	1,666	23.6%	1,610	22.8%	1,610	100.0%	1,610	100.0%
	Asakawa Town	7,163	1,531	21.4%	1,496	20.9%	1,494	99.9%	1,493	99.8%
	Furudono Town	6,321	1,325	21.0%	1,290	20.4%	1,290	100.0%	1,290	100.0%
	Miharu Town	18,989	4,880	25.7%	4,784	25.2%	4,782	100.0%	4,781	99.9%
	Ono Town	11,700	2,610	22.3%	2,546	21.8%	2,546	100.0%	2,545	100.0%
	Subtotal	557,185	137,089	24.6%	133,990	24.0%	133,964	100.0%	133,952	100.0%
Southern area	Shirakawa City	65,427	16,193	24.7%	15,861	24.2%	15,858	100.0%	15,854	100.0%
	Nishigo Village	20,088	5,069	25.2%	4,952	24.7%	4,952	100.0%	4,951	100.0%
	Izumizaki Village	6,931	1,443	20.8%	1,404	20.3%	1,404	100.0%	1,403	99.9%
	Nakajima Village	5,306	1,023	19.3%	998	18.8%	998	100.0%	998	100.0%
	Yabuki Town	18,341	4,131	22.5%	4,025	21.9%	4,017	99.8%	4,016	99.8%
	Tanagura Town	15,384	3,057	19.9%	2,992	19.4%	2,992	100.0%	2,992	100.0%
	Yamatsuri Town	6,491	1,481	22.8%	1,434	22.1%	1,434	100.0%	1,432	99.9%
	Hanawa City	10,061	2,330	23.2%	2,279	22.7%	2,279	100.0%	2,278	100.0%
	Samegawa Village	4,196	824	19.6%	796	19.0%	796	100.0%	796	100.0%
	Subtotal	152,225	35,551	23.4%	34,741	22.8%	34,730	100.0%	34,720	99.9%
Aizu area	Aizuwakamatsu City	127,815	29,765	23.3%	28,790	22.5%	28,766	99.9%	28,765	99.9%
	Kitakata City	53,199	11,114	20.9%	10,686	20.1%	10,681	100.0%	10,676	99.9%
	Kitashiobara Village	3,276	611	18.7%	588	17.9%	588	100.0%	588	100.0%
	Nishiaizu Town	7,725	1,461	18.9%	1,359	17.6%	1,355	99.7%	1,355	99.7%
	Bandai Town	3,888	796	20.5%	778	20.0%	777	99.9%	776	99.7%
	Inawashiro Town	16,271	3,670	22.6%	3,538	21.7%	3,538	100.0%	3,537	100.0%
	Aizubange Town	17,881	3,317	18.6%	3,174	17.8%	3,154	99.4%	3,154	99.4%
	Yugawa Village	3,513	744	21.2%	711	20.2%	701	98.6%	701	98.6%
	Yanaizu Town	4,077	732	18.0%	700	17.2%	698	99.7%	698	99.7%
	Mishima Town	2,029	374	18.4%	340	16.8%	340	100.0%	340	100.0%
	Kaneyama Town	2,544	631	24.8%	575	22.6%	574	99.8%	574	99.8%
	Showa Village	1,569	354	22.6%	327	20.8%	327	100.0%	327	100.0%
	Aizumisato Town	23,412	4,674	20.0%	4,477	19.1%	4,461	99.6%	4,460	99.6%
	Subtotal	267,199	58,243	21.8%	56,043	21.0%	55,960	99.9%	55,951	99.8%
Minami-Aizu area	Shimogou Town	6,649	1,257	18.9%	1,199	18.0%	1,199	100.0%	1,199	100.0%
	Hinoemata Village	614	142	23.1%	133	21.7%	133	100.0%	133	100.0%
	Tadami Town	5,030	1,152	22.9%	1,090	21.7%	1,090	100.0%	1,090	100.0%
	Minamiaizu Town	18,495	3,870	20.9%	3,692	20.0%	3,691	100.0%	3,690	99.9%
	Subtotal	30,788	6,421	20.9%	6,114	19.9%	6,113	100.0%	6,112	100.0%
Soso area	Soma City	37,366	13,319	35.6%	12,812	34.3%	12,811	100.0%	12,792	99.8%
	Minamisoma City	70,013	30,303	43.3%	29,503	42.1%	29,503	100.0%	29,482	99.9%
	Hirono Town	5,165	2,236	43.3%	2,146	41.5%	2,145	100.0%	2,143	99.9%
	Naraha Town	7,963	4,191	52.6%	4,033	50.6%	4,033	100.0%	4,025	99.8%
	Tomioka Town	15,749	8,640	54.9%	8,424	53.5%	8,424	100.0%	8,415	99.9%
	Kawauchi Village	2,996	1,543	51.5%	1,489	49.7%	1,489	100.0%	1,489	100.0%
	Okuma Town	11,473	6,092	53.1%	5,868	51.1%	5,865	99.9%	5,864	99.9%
	Futaba Town	7,051	3,953	56.1%	3,853	54.6%	3,853	100.0%	3,846	99.8%
	Namie Town	21,334	12,994	60.9%	12,700	59.5%	12,700	100.0%	12,685	99.9%
	Katsurao Village	1,541	825	53.5%	768	49.8%	768	100.0%	768	100.0%
	Shinchi Town	8,356	2,711	32.4%	2,612	31.3%	2,612	100.0%	2,609	99.9%
	Iitate Village	6,588	3,446	52.3%	3,335	50.6%	3,335	100.0%	3,328	99.8%
	Subtotal	195,595	90,253	46.1%	87,543	44.8%	87,538	100.0%	87,446	99.9%
—	Iwaki City	348,240	88,734	25.5%	86,666	24.9%	86,632	100.0%	86,620	99.9%
	Total	2,055,251	568,632	27.7%	554,517	27.0%	554,320	100.0%	554,132	99.9%

*Rates (%) are rounded for each of the estimated dose levels.

C) Response rate by age bracket

Table 4 shows response rates for respective age brackets (ages at the time of the earthquake). From October 31, 2012, to March 31, 2016, when activities for raising response rates were discontinued, the response rate for people aged 0 to 9 increased by around 18 points and that for people aged 10 to 19 increased by around 16 points, and the response rate for people aged 19 or younger eventually reached approximately 40%. Such efforts as sending of copies of the simplified version to Thyroid Screening targets (those aged 18 or younger at the time of the earthquake) (at the end of November 2013) and providing support for filling in questionnaire sheets at venues of the Thyroid Screen are considered to have contributed to this increase in the response rate for people aged 19 or younger.

Table 4: Changes in Response Rates by Age Bracket

Age bracket	0-9	10-19	20-29	30-39	40-49	50-59	60-	Total
Response rate (A) (as of Oct. 31, 2012)	28.4%	19.4%	16.6%	21.9%	19.9%	21.6%	27.0%	23.0%
Response rate (B) (as of Mar. 31, 2016)	46.4%	35.6%	18.0%	24.6%	22.3%	22.9%	27.9%	27.5%
Difference (B-A) (points)	18.0	16.2	1.4	2.7	2.4	1.3	0.9	4.5

(2) Estimated external doses

A) External doses for the prefecture as a whole and by area

Table 5 shows the progress of dose estimation work from the time when the Basic Survey was commenced. Dose distribution was published for the first time at the fifth Prefectural Oversight Committee Meeting, where it was reported that estimated external doses were less than 1 mSv for approximately 63% out of 1,589 people, which remained after excluding radiation workers from the 1,727 people of the areas targeted for the initial screening for whom dose estimation was completed.

At the sixth Meeting, it was reported that dose estimation had been completed for a total of 10,468 people of the areas targeted for the initial screening and that among 9,747 people, which remained after excluding radiation workers, estimated external doses were less than 1 mSv for 57.8% and were less than 5 mSv for 94.6%. Based on this report, it became clear that external doses were estimated to be less than 5 mSv for most of the people of the areas targeted for the initial screening, where doses are considered to have been relatively high.

Immediately after the Basic Survey was commenced, an enormous number of responses arrived in a short period of time and estimation work could not keep up with the rapid increase in the number of responses at first, but by increasing the number of staff members significantly thereafter, the number of cases of completing dose estimation increased gradually as shown in Table 5, to 25,667 cases as of May 31, to 122,798 cases as of August 31, and to 233,901 cases as of October 31, 2012, reaching approximately 50% (49%) of the total number of responses. The number of cases of completing dose estimation further increased to 394,369 cases as of January 31, 2013, exceeding 80% of the total number of responses.

Table 5: Progress of Dose Estimation Work

Base date for tabulation	Number of responses	Numbers of cases where dose estimation was completed (all data)	Date of report	Prefectural Oversight Committee Meeting where the report was made
2011/10/11	93,428	－	Oct. 17, 2011	4th meeting
2012/1/20	426,932	1,727	Jan. 25, 2012	5th meeting
2012/3/31	451,446	10,468	Apr. 26, 2012	6th meeting
2012/5/31	465,041	25,667	Jun. 12, 2012	7th meeting
2012/8/31	470,593	122,798	Sep. 11, 2012	8th meeting
2012/10/31	473,841	233,901	Nov. 18, 2012	9th meeting
2013/1/31	477,121	394,369	Feb. 13, 2013	10th meeting
2013/3/31	481,423	420,543	Jun. 5, 2013	11th meeting
2013/7/31	483,088	445,015	Aug. 20, 2013	12th meeting
2013/9/30	484,864	460,887	Nov. 12, 2013	13th meeting
≀	－	－	－	≀
2020/3/31	568,632	554,320	2020/5/25	38th meeting

Dose estimation has been continued thereafter as well and the overall distribution of external doses as of March 31, 2020, is shown in Figure 3. This figure shows the distribution of the numbers of people by dose level among people for whom dose estimation was completed (excluding radiation workers) excluding for whom estimation periods were less than four months.

People whose external doses were estimated to be less than 2 mSv accounted for 93.8%, and those less than 5 mSv accounted for approximately 99.8%. It was made clear that estimated external doses were less than 5 mSv for almost all targeted people. The maximum dose was 25 mSv, the average was 0.8 mSv, and the median was 0.6 mSv.

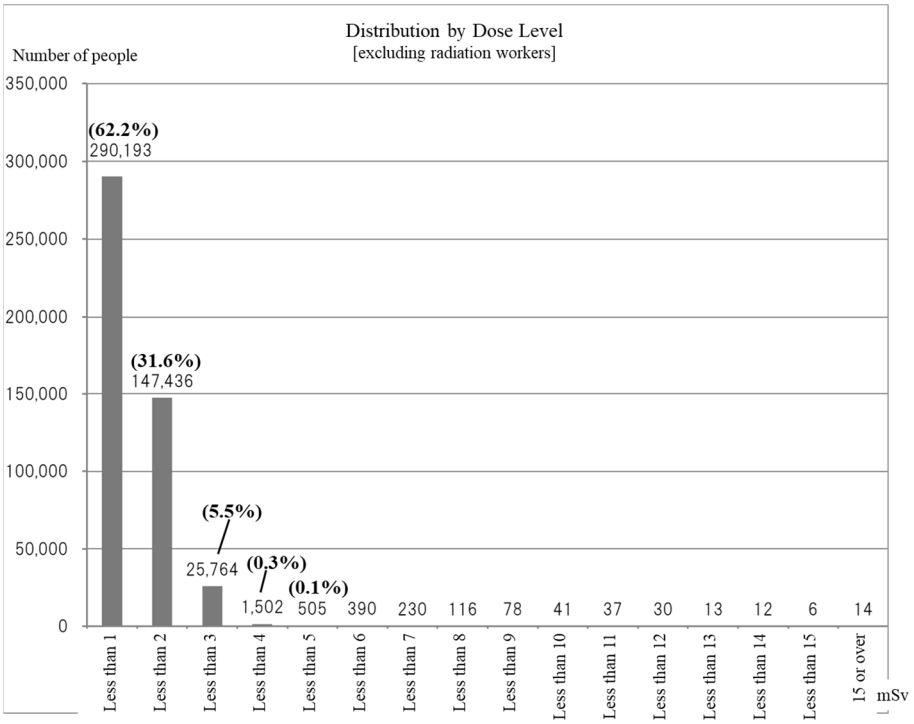


Figure 3: Distribution of All Residents of Fukushima Prefecture by External Dose Level

Table 6 shows dose distribution by area. People for whom estimation periods were less than four months are also excluded here. The estimation results for the 466,367 people, excluding radiation workers out of the aggregated total of 475,579 people, show that estimated external doses were less than 2 mSv for approximately 87% of the people in the northern area and approximately 92% of the people in the central area. People whose external doses were estimated to be less than 1 mSv accounted for approximately 88% in the southern area, over 99% in the Aizu and Minami-Aizu areas, approximately 77% in the Soso area, and over 99% in the Iwaki area.

Table 7 shows dose distribution by municipality in more detail.

Table 6: External Dose Distribution by Area

Estimation of Effective External Doses through Prefecture-wide Survey (Initial Screening + Survey Targeting All People of the Prefecture)

As of March 31, 2020

Effective dose (mSv)	All data	Excluding radiation workers				Breakdown by area of data excluding radiation workers (Percentages show dose rates by area)													
						Northern area (Note 1)		Central area		Southern area		Aizu area		Minami-Aizu area		Soso area (Note 2)		Iwaki area	
Less than 1	295,921	290,193	62.2%	93.8%		24,956	20.0%	58,505	51.5%	26,347	88.2%	46,053	99.3%	4,979	99.3%	55,887	77.3%	73,466	99.1%
Less than 2	149,782	147,436	31.6%			83,847	67.0%	46,394	40.8%	3,505	11.7%	311	0.7%	37	0.7%	12,705	17.6%	637	0.9%
Less than 3	26,138	25,764	5.5%		99.8%	15,720	12.6%	8,281	7.3%	18	0.1%	25	0.1%	0	—	1,690	2.3%	30	0.0%
Less than 4	1,585	1,502	0.3%	5.8%		472	0.4%	428	0.4%	0	—	1	0.0%	0	—	597	0.8%	4	0.0%
Less than 5	551	505	0.1%			40	0.0%	5	0.0%	0	—	0	—	0	—	459	0.6%	1	0.0%
Less than 6	442	390	0.1%	0.2%		19	0.0%	3	0.0%	0	—	0	—	0	—	367	0.5%	1	0.0%
Less than 7	269	230	0.0%			10	0.0%	1	0.0%	0	—	1	0.0%	0	—	218	0.3%	0	—
Less than 8	155	116	0.0%	0.1%	0.2%	1	0.0%	0	—	0	—	0	—	0	—	115	0.2%	0	—
Less than 9	118	78	0.0%			1	0.0%	0	—	0	—	0	—	0	—	77	0.1%	0	—
Less than 10	73	41	0.0%	0.0%		0	—	0	—	0	—	0	—	0	—	41	0.1%	0	—
Less than 11	70	37	0.0%			0	—	1	0.0%	0	—	0	—	0	—	36	0.0%	0	—
Less than 12	52	30	0.0%	0.0%		1	0.0%	0	—	0	—	0	—	0	—	29	0.0%	0	—
Less than 13	37	13	0.0%		0.0%	0	—	0	—	0	—	0	—	0	—	13	0.0%	0	—
Less than 14	36	12	0.0%	0.0%		0	—	0	—	0	—	0	—	0	—	12	0.0%	0	—
Less than 15	27	6	0.0%			0	—	0	—	0	—	0	—	0	—	6	0.0%	0	—
15 or over	323	14	0.0%	0.0%	0.0%	0	—	0	—	0	—	0	—	0	—	14	0.0%	0	—
Total	475,579	466,367	100.0%	100.0%		125,067	100%	113,618	100%	29,870	100%	46,391	100%	5,016	100%	72,266	100%	74,139	100%
Maximum	66mSv	25mSv				11mSv		10mSv		2.6mSv		6.0mSv		1.9mSv		25mSv		5.9mSv	
Average	0.9mSv	0.8mSv				1.4mSv		1.0mSv		0.6mSv		0.2mSv		0.1mSv		0.8mSv		0.3mSv	
Median	0.6mSv	0.6mSv				1.4mSv		0.9mSv		0.5mSv		0.2mSv		0.1mSv		0.5mSv		0.3mSv	

* Rates (%) are rounded for each of the estimated dose levels and the total may not be 100%.

(Note 1) Including the area targeted for the initial screening (Yamakiya District in Kawamata Town)

(Note 2) Including the areas targeted for the initial screening (Namie Town and Iitate Village)

* Tabulation was conducted by excluding data for people for whom estimation periods were less than four months.

Table 7: External Dose Distribution by Municipality

As of the end of March 2020

Municipality		External dose (mSv)																Total
		Less than 1	Less than 2	Less than 3	Less than 4	Less than 5	Less than 6	Less than 7	Less than 8	Less than 9	Less than 10	Less than 11	Less than 12	Less than 13	Less than 14	Less than 15	15 or over	
Northern area	Fukushima City	16,187	52,615	9,399	151	13	10	4	0	0	0	0	0	0	0	0	0	78,379
	Nihonmatsu City	1,318	8,664	3,531	90	1	0	0	0	0	0	0	0	0	0	0	0	13,604
	Date City	4,386	9,091	1,135	147	8	2	3	1	1	0	0	0	0	0	0	0	14,774
	Motomiya City	746	5,463	1,259	24	1	0	0	0	0	0	0	0	0	0	0	0	7,493
	Koori Town	315	2,752	66	2	0	1	0	0	0	0	0	0	0	0	0	0	3,136
	Kunimi Town	967	1,436	12	0	0	0	0	0	0	0	0	0	0	0	0	0	2,415
	Kawamata Town	643	2,753	185	56	17	6	3	0	0	0	0	1	0	0	0	0	3,664
	Otama village	394	1,073	133	2	0	0	0	0	0	0	0	0	0	0	0	0	1,602
Subtotal		24,956	83,847	15,720	472	40	19	10	1	1	0	0	1	0	0	0	0	125,067
Central area	Koriyama City	24,041	40,812	7,830	418	5	3	1	0	0	0	0	0	0	0	0	0	73,110
	Sukagawa City	10,865	3,218	335	4	0	0	0	0	0	0	0	0	0	0	0	0	14,422
	Tamura City	7,686	682	24	3	0	0	0	0	0	0	0	0	0	0	0	0	8,395
	Kagamiishi Town	2,369	76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,445
	Tenei Village	405	587	59	1	0	0	0	0	0	0	0	0	0	0	0	0	1,052
	Ishikawa Town	3,196	39	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3,237
	Tamakawa Village	1,183	19	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1,205
	Hirata Village	1,301	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,335
	Asakawa Town	1,232	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,247
	Furudono Town	1,073	14	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1,089
	Miharu Town	3,128	815	24	2	0	0	0	0	0	0	1	0	0	0	0	0	3,970
	Ono Town	2,026	83	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2,111
Subtotal		58,505	46,394	8,281	428	5	3	1	0	0	0	1	0	0	0	0	0	113,618
Southern area	Shirakawa City	12,484	1,281	9	0	0	0	0	0	0	0	0	0	0	0	0	0	13,774
	Nishigo Village	2,248	2,036	3	0	0	0	0	0	0	0	0	0	0	0	0	0	4,287
	Izumizaki Village	1,163	21	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1,185
	Nakajima Village	843	13	1	0	0	0	0	0	0	0	0	0	0	0	0	0	857
	Yabuki Town	3,376	83	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3,460
	Tanagura Town	2,555	28	3	0	0	0	0	0	0	0	0	0	0	0	0	0	2,586
	Yamatsuri Town	1,156	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,165
	Hanawa City	1,869	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,892
	Samegawa Village	653	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	664
Subtotal		26,347	3,505	18	0	0	0	0	0	0	0	0	0	0	0	0	0	29,870
Aizu	Aizuwakamatsu City	23,770	160	13	0	0	0	1	0	0	0	0	0	0	0	0	0	23,944
	Kitakata City	8,940	56	3	1	0	0	0	0	0	0	0	0	0	0	0	0	9,000
	Kitashiobara Village	479	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	483
	Nishiaizu Town	1,016	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,018
	Bandai Town	656	9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	666
	Inawashiro Town	2,861	31	3	0	0	0	0	0	0	0	0	0	0	0	0	0	2,895
	Aizubange Town	2,649	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,664
	Yugawa Village	597	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	601
	Yanaizu Town	554	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	559
	Mishima Town	247	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	247
	Kaneyama Town	406	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	409
	Showa Village	245	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	246
	Aizumisato Town	3,633	23	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3,659
Subtotal		46,053	311	25	1	0	0	1	0	0	0	0	0	0	0	0	0	46,391
Minami-Aizu	Shimogou Town	969	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	974
	Hinoemata Village	103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	103
	Tadami Town	882	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	887
	Minamiaizu Town	3,025	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,052
Subtotal		4,979	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,016
Soso	Soma City	10,029	467	87	20	5	0	0	0	0	2	0	0	0	0	0	0	10,610
	Minamisoma City	19,137	6,225	513	99	35	3	7	4	1	0	0	1	0	0	0	0	26,025
	Hirono Town	1,839	59	2	0	0	0	1	0	1	0	0	0	0	0	0	0	1,902
	Naraha Town	3,403	131	13	2	0	1	1	0	0	0	0	0	0	0	0	0	3,551
	Tomioka Town	5,834	1,104	100	18	3	2	0	3	2	0	0	1	0	0	0	0	7,067
	Kawauchi Village	963	350	16	1	0	1	1	1	0	0	0	0	0	0	0	0	1,333
	Okuma Town	3,371	1,284	112	17	6	4	4	3	0	2	2	1	0	4	0	1	4,811
	Futaba Town	2,676	468	77	19	6	4	3	6	2	1	0	2	0	0	0	1	3,265
	Namie Town	5,767	2,118	383	68	40	17	12	13	9	6	11	7	5	4	3	8	8,471
	Katsurao Village	502	162	24	4	0	1	0	0	0	0	0	0	0	0	0	0	693
	Shinchi Town	2,180	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,200
	Iitate Village	186	317	363	349	364	334	189	85	62	30	23	17	8	4	3	4	2,338
Subtotal		55,887	12,705	1,690	597	459	367	218	115	77	41	36	29	13	12	6	14	72,266
Iwaki	Iwaki City	73,466	637	30	4	1	1	0	0	0	0	0	0	0	0	0	0	74,139
Total (A)		290,193	147,436	25,764	1,502	505	390	230	116	78	41	37	30	13	12	6	14	466,367
Rate		62.2	31.6	5.5	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
		93.8		5.8		0.2		0.1		0.0		0.0		0.0		0.0	0.0	100.0
		99.8					0.2					0.0					0.0	100.0
Temporary visitors, etc. (B)		1,521	278	18	2	0	0	0	0	0	0	0	0	0	0	0	1	1,820
Total (A) + (B)		291,714	147,714	25,782	1,504	505	390	230	116	78	41	37	30	13	12	6	15	468,187

* Rates (%) are rounded for each of the estimated dose levels and the total may not be 100%.

B) External doses by age bracket and by gender

Table 8 and Table 9 show dose distribution by age bracket and by gender, respectively.

Table 8: Dose Distribution by Age Bracket

Breakdown by Age and by Dose Level [excluding radiation workers]

As of the end of March 2020

Effective dose (mSv)	Age at the time of the earthquake (aged)									Total
	0 ～ 9	10 ～ 19	20 ～ 29	30 ～ 39	40 ～ 49	50 ～ 59	60 ～ 69	70 ～ 79	80 ～	
Less than 1	48,242	45,238	21,429	34,397	28,759	32,904	36,334	25,735	17,155	290,193
Less than 2	23,070	21,839	10,174	18,362	16,703	18,558	19,497	12,293	6,940	147,436
Less than 3	6,491	4,296	1,142	2,351	2,251	2,973	3,424	1,996	840	25,764
Less than 4	253	160	81	158	153	230	233	164	70	1,502
Less than 5	19	47	35	39	75	95	81	76	38	505
Less than 6	14	13	29	34	47	86	73	66	28	390
Less than 7	3	6	10	22	24	45	52	47	21	230
Less than 8	4	4	8	9	13	35	22	14	7	116
Less than 9	2	6	2	7	8	16	16	12	9	78
Less than 10	0	1	2	3	3	12	11	5	4	41
Less than 11	1	1	2	2	6	11	5	6	3	37
Less than 12	0	0	1	3	0	5	8	11	2	30
Less than 13	0	0	0	0	1	6	4	1	1	13
Less than 14	0	0	1	1	1	4	3	2	0	12
Less than 15	0	0	0	0	0	3	3	0	0	6
15 or over	0	0	0	0	2	3	6	1	2	14
Total	78,099	71,611	32,916	55,388	48,046	54,986	59,772	40,429	25,120	466,367

Table 9: Dose Distribution by Gender

Breakdown by Gender and by Dose Level [excluding radiation workers]

As of the end of March 2020

Effective dose (mSv)	By gender				Total	Rate by dose level at left (%)
	Male	Rate by dose level at left (%)	Female	Rate by dose level at left (%)		
Less than 1	129,469	60.6	160,724	63.6	290,193	62.2
Less than 2	68,307	32.0	79,129	31.3	147,436	31.6
Less than 3	13,993	6.6	11,771	4.7	25,764	5.5
Less than 4	953	0.4	549	0.2	1,502	0.3
Less than 5	282	0.1	223	0.1	505	0.1
Less than 6	199	0.1	191	0.1	390	0.1
Less than 7	130	0.1	100	0.0	230	0.0
Less than 8	64	0.0	52	0.0	116	0.0
Less than 9	49	0.0	29	0.0	78	0.0
Less than 10	24	0.0	17	0.0	41	0.0
Less than 11	23	0.0	14	0.0	37	0.0
Less than 12	16	0.0	14	0.0	30	0.0
Less than 13	6	0.0	7	0.0	13	0.0
Less than 14	8	0.0	4	0.0	12	0.0
Less than 15	3	0.0	3	0.0	6	0.0
15 or over	11	0.0	3	0.0	14	0.0
Total	213,537	100.0	252,830	100.0	466,367	100.0

* Rates (%) are rounded for each of the estimated dose levels and the total may not be 100%.

(3) Verification of the representativeness of responses

In order to examine the representativeness of responses, we randomly selected people from the Basic Survey targets in each of the seven areas in Fukushima Prefecture and visited non-respondents from among the selected people, excluding those who had already made responses (previous respondents). Although we were not able to make contact with many of them by only one visit as they were out, we made visits several times to secure a sufficient number of responses.

As a result, out of the 2,645 people subject to door-to-door visits, we were able to obtain responses from 990 people., Excluding three of those people who were residing outside of Fukushima during the estimation period, two who were born after the earthquake, and 24 who responded that they were radiation workers, we compared the doses for the remaining 961 people and the doses for the previous respondents.

Table 10 shows the comparison results. When subtracting the average doses for respondents through door-to-door visits from the average doses for the previous respondents (those who were randomly selected as mentioned above and who had already made responses prior to the examination) respectively for the seven areas, the differences were between -0.09 mSv and +0.12 mSv. A Two One-Sided Test on average doses revealed that doses for both groups were equivalent with a probability beyond 95% (a significance level of 5%) based on the equivalence standard within 0.25 mSv.

Table 10: Comparison of Doses in Examination on Representativeness

Area	Item	Previous respondents among the randomly selected people ((B) in Figure 1)	Respondents through door-to-door visits ((D) in Figure 1)	Difference of the average effective doses (D-B) (mSv)
Northern	Average effective dose (mSv)	1.41	1.53	0.12
	Number of the relevant people	168	171	
Central	Average effective dose (mSv)	1.04	0.95	-0.09
	Number of the relevant people	190	224	
Southern	Average effective dose (mSv)	0.73	0.68	-0.05
	Number of the relevant people	41	71	
Aizu	Average effective dose (mSv)	0.19	0.24	0.05
	Number of the relevant people	11	34	
Nminami-Aizu	Average effective dose (mSv)	0.19	0.19	0.00
	Number of the relevant people	15	49	
Soso	Average effective dose (mSv)	0.73	0.81	0.08
	Number of the relevant people	1,138	388	
Iwaki	Average effective dose (mSv)	0.32	0.40	0.08
	Number of the relevant people	25	24	

4. Evaluation of Survey Results

In the "Interim Report on the Fukushima Health Management Survey" compiled in March 2016, the Prefectural Oversight Committee presented its evaluation of the results of the past surveys and future directions as follows.

(i) The results of the dose estimation and behavioral records obtained through the Basic Survey were data only limited to people's external exposure for the four months after the accident but will serve as the very basis for monitoring radiation effects on their health in the longer term.

(ii) The estimated dose levels obtained through the Basic Survey (effective external doses for the four month after the accident: less than 5 mSv for 99.8%) were able to be evaluated as not having any health effects that are confirmable with a statistically significant difference, in light of the currently available scientific knowledge.

(iii) Through the examination on the representativeness, it was confirmed that external dose distribution tabulated and published so far were not biased, reflecting the status of all residents of Fukushima Prefecture correctly. Therefore, the aim of the survey should be shifted to the offering of consultation services to residents eager to know their own exposure doses from a further improvement of response rates.

5. Publication and Feedback of Survey Results

The Prefectural Oversight Committee has published the results of individuals' doses tabulated by area and by municipality, and has also fed back estimation results individually to all respondents.

Immediately after the Basic Survey was commenced, it took time to process an enormous number of responses. As of October 31, 2012, estimation results had been fed back to 97.1% of respondents in the areas targeted for the initial screening, while the same percentage was 23% for respondents in the other areas (reported at the 9th Prefectural Oversight Committee Meeting).

As of January 31, 2013, dose estimation was completed for 394,369 cases across the prefecture and results were fed back for 361,752 cases, with the percentage of the latter number against the total number of responses being 75.8%. Thereafter, the number of cases where estimation results were fed back came to catch up with the number of cases where dose estimation was completed, and the percentage of the former reached 89.4% as of December 31, 2013, (reported at the 14th Prefectural Oversight Committee Meeting) and 95.9% as of December 31, 2014 (reported at the 18th Prefectural Oversight Committee Meeting). As there were responses for which dose estimation could not be conducted due to difficulties in making supplements, the relevant percentage (the percentage of cases where estimation results were fed back against the total number of responses) had shown only a slight increase, but on or after March 31, 2018, when the tabulation of the number of valid responses (responses excluding incomplete ones based on which doses could not be estimated) was commenced, the percentage of cases where estimation results were fed back against the total number of valid responses has been 99.9% or over.

At present, estimation results have been fed back to almost all people for whom dose estimation was completed.

6. Overview (Roles Having Been Played by the Survey)

(1) Ascertain residents' evacuation behavior and external dose levels immediately after the accident

Immediately after the accident, air dose rates increased notably within Fukushima Prefecture. However, at that time, measuring equipment, such as personal dosemeters and monitoring posts, had not been made available broadly and residents were not able to ascertain their external doses easily. Under such circumstances, the Basic Survey was an effective means to evaluate individuals' initial external doses by obtaining information based on individuals' behavioral records (records of their evacuation behavior immediately after the accident). Dose levels of all residents of Fukushima Prefecture immediately after the accident, when air dose levels were high, were able to be ascertained by tabulating individuals' doses obtained through the Basic Survey. Additionally, obtained records of evacuation behavior, etc. also serve as precious data for the reconstruction of early internal doses.

(2) Evaluate health effects based on ascertained external doses

By cross-checking dose estimation results based on the Basic Survey and currently available scientific knowledge, scientific grounds were able to be presented as to whether or not the estimated doses were at the levels to exert any direct health effects. Obtained data were only external doses for the four months after the accident, but they were able to be evaluated as not having any health effects that are confirmable with a statistically significant difference.

(3) Verify the representativeness of dose distribution

Although the overall response rate across the prefecture was approximately 28%, the examination on the representativeness revealed that the distribution of external doses tabulated and published so far was not biased, reflecting the status of all residents of Fukushima Prefecture correctly. Accordingly, the aim of the survey has been shifted to the offering of consultation services to residents eager to know their own exposure doses from merely a further improvement of response rates.

(4) Feed back estimated dose levels immediately after the accident to individuals

The Basic Survey characteristically has two aspects: the aspect as a survey to tabulate individuals' doses by municipality and by area and publicize dose distribution, etc. and the aspect as a health service to residents to feed back estimation results to enable them to utilize the data in health management into the future. We have fed back estimation results for 554,132 cases in total. While there were various kinds of information concerning radiation exposure immediately after the accident, we were able to inform residents of their external doses estimated respectively based on their individual behavior.

(5) Disseminate survey results among people in the prefecture

We have not only publicized the results of the dose estimation through the Basic Survey at meetings of the Prefectural Oversight Committee and fed them back to individuals but have also provided explanations at meetings of responsible municipal personnel and open symposiums, etc., thereby having endeavored to disseminate survey results among people in Fukushima Prefecture.

Summary of the Basic Survey and Papers

1. Exposure doses of the general public published by international organizations within two or three years after the NPS accident were generally overestimated. A realistic evaluation shows that the average dose for the first year after the accident was less than 10 mSv even in the most significantly affected areas.

   Individual doses to the public after the Fukushima nuclear accident
   Ishikawa T. *J Radiat Prot Res*. 2020; 45(2): 53-68.

2. Through the analysis of the association between the behavioral records obtained through the Basic Survey and individuals' internal doses, it was made clear that detection rates for Cesium were higher for people who were slow in taking refuge and this may have been caused by inhalation of the plume passing over in the afternoon on March 12.

   Difference in the Cesium body contents of affected area residents depending on the evacuation timepoint following the 2011 Fukushima nuclear disaster
   Igarashi Y, et al. *Health Phys*. 2020; 119(6): 733-745.

3. By the use of an elaborate dose evaluation method while utilizing individuals' behavioral records, etc., average thyroid internal doses for one year-olds in the seven municipalities in the evacuation areas were respectively estimated to be 1.2 mSv to 15 mSv. These figures were much smaller than the estimation by the United Nations Scientific Committee on the Effects of Atomic Radiation.

   Reconstruction of residents' thyroid equivalent doses from internal radionuclides after the Fukushima Daiichi nuclear power station accident
   Ohba T, et al. *Sci Rep*. 2020; 10: 3639.

4. Dose levels estimated through the Basic Survey did not exhibit much age dependence. In non-evacuation areas, doses for young children (aged 0 to 5) and for children (aged 6 to 15) were 1.08 times and 1.06 times of those of adults, respectively.

   Age dependence of individual external doses in an early stage after the Fukushima nuclear accident
   Ishikawa T, et al. *Radiat Prot Dosim*. 2020; 188(2): 238-245.

5. There was no significant difference between dose distribution based on recent responses and dose distribution obtained earlier, which suggests that dose estimation is unlikely to be affected by a bias in respondents and the loss of memory.

   The latest update on individual external doses in an early stage after the Fukushima nuclear accident
   Ishikawa T, et al. *Radiat Prot Dosim*. 2019; 187(3): 402-406.

6. Various activities for raising response rates for the Basic Survey, such as the provision of support for filling in questionnaire sheets, which were conducted from FY2012 to FY2015, worked to increase the response rate among people who were aged 0 to 9 at the time of the earthquake to nearly 50% and otherwise achieved certain outcomes.

   Experience in individual dose estimation after the Fukushima nuclear accident using self-administered questionnaires - activities to encourage responses to the questionnaires and resulting response rate-
   Ishikawa T, et al. *Radiat Environ Med*. 2019; 8(2): 118-126.

7. This paper overviews various problems in the process of conducting the Basic Survey (handling of an enormous number of questionnaire sheets, need to supplement questionnaire sheets with incomplete behavioral records, etc.) and compiled them as lessons for any radiation emergency in the future.

   External dose estimation in an early stage after the Fukushima Daiichi Nuclear Power Plant accident - lessons learned from behavior surveys using self-administered questionnaires
   Ishikawa T, et al. *Jpn J Health Phys*. 2018; 53(2): 100-110.

8. Thyroid equivalent doses having been reported by international organizations are estimations all through computer simulations based on conservative assumptions and are therefore apt to be overestimated, compared with doses estimated based on direct measurement results.

   A review of studies on thyroid dose estimation after the Fukushima accident
   Ishikawa T. *Thyroid Cancer and Nuclear Accidents*. 2017; 135-143.

9. A tool was developed to calculate early internal doses through a simulation based on individuals' behavioral records. Comparing doses calculated by the use of this tool and doses estimated based on measurement results, it was found that further review would be required for the reproduction of measured values.

   Development of a tool for calculating early internal doses in the Fukushima Daiichi nuclear power plant accident based on atmospheric dispersion simulation
   Kurihara O, et al. *Eur Phys J*. 2017; 153: 08008.

10. An analysis of the relevance between evacuation behavior and internal doses revealed a tendency that people with higher doses had stayed within 20km from the NPS and this suggests the possibility that the timing of evacuation is one of the factors exerting an influence on early internal doses.

    Early intake of radiocesium by residents living near the TEPCO Fukushima Dai-ichi Nuclear Power Plant after the accident part 2: relationship between internal dose and behavior in individuals
    Kunishima N, et al. *Health Phys*. 2017; 112(6): 512-525.

11. Through an examination on the representativeness, it was suggested that the distribution of external doses for respondents to the Basic Survey (approximately one-fourth of all residents of Fukushima Prefecture) represents the status of the residents of the prefecture as a whole.

    Representativeness of individual external doses estimated for about a quarter of whole residents in Fukushima Prefecture after the nuclear disaster: The Fukushima Health Management Survey
    Ishikawa T, et al. *J Radiol Prot*. 2017; 37(3): 584-605.

12. When reviewing major papers published in or after 2015, external and internal doses reported therein were generally lower than those estimated by the UNSCEAR.

    Radiation doses and associated risk from the Fukushima nuclear accident - a review of recent publications
    Ishikawa T. *Asia Pacific J Public Health*. 2017; 29(2_suppl): 18S-28S.

13. The following are considered as means to reconstruct thyroid internal doses: (i) estimation based on direct measurement of the thyroid gland; (ii) estimation based on measurement of cesium after the disappearance of iodine; and (iii) estimation using a map showing simulated iodine concentration in the air and individuals' behavioral records. However, issues still remain for all of these.

Estimation of internal thyroid doses to Fukushima residents and remaining issues
Kim E, et al. *J Radiat Res*. 2016; 57(Suppl 1): i118-i126.

14. A survey focusing on Iitate Village regarding behavioral records obtained through the Basic Survey revealed that the average number of hours which people spent outdoors per day was 2.08 hours. External doses are often estimated based on the assumption that people stay outdoors for eight hours per day, but if estimation is conducted using the 2.08 hours instead, resulting doses decrease by approximately 25%.

    An influential factor for external dose estimation for residents after the Fukushima Daiichi Nuclear Power Plant accident - time spent outdoors for residents in Iitate village
    Ishikawa T, et al. *J Radiol Prot*. 2016; 36(2): 255-268.

15. Doses immediately after the accident that have been reported inside and outside Japan are estimates based on assumed evacuation behavior, but through the Basic Survey, people's external doses for the four months after the accident were estimated based on their actual evacuation behavior. The estimation results were less than 3 mSv for 99.4% of the respondents.

    The Fukushima Health Management Survey: estimation of external doses to residents in Fukushima Prefecture
    Ishikawa T, et al. *Sci Rep*. 2015; 5: 12712.

16. A simplified version of the questionnaire sheet for the Basic Survey was developed to make it easier to enter behavioral records. Differences between estimated doses based on the simplified version and those based on the detailed version were within a range from -0.4 mSv to +0.6 mSv.

    Studies on dose estimation in the Fukushima Health Management Survey – Validity of the simplified questionnaire –
    Hayashi Masayuki, et al. *Fukushima J Med Sci. 2015; 65(4): 149-161.*

17. In the results of the survey on internal exposure conducted by Fukushima Prefecture, residents for whom cesium was not detected were included in the category of people whose internal doses were less than 1 mSv. However, in reality, it was suggested that internal doses for most of the survey targets were below the detection limit.

    An overview of internal dose estimation using whole-body counter in Fukushima Prefecture
    Miyazaki M, et al. *Fukushima J Med Sci*. 2014; 60(1): 95-100.

18. Based on the information published up to September 2012, the UNSCEAR issued a report on the accident at Fukushima Daiichi NPS in April 2014. Thereafter as well, estimation of doses has progressed with various reports published, such as the results of the Basic Survey.

    Progress in estimation of dose due to the Fukushima Daiichi Nuclear Power Plant accident
    Ishikawa T. *Jpn J Health Phys*. 2014; 49(3): 157-160.

19. Many papers have been published regarding exposure doses due to radiation derived from the accident at the NPS, but it should be noted that estimated doses vary depending on used assumptions (such as the number of hours spent outdoors to be used for estimating external doses).

    A brief review of dose assessment studies conducted after the Fukushima Dai-ichi nuclear power plant accident
    Ishikawa T. *Radiat Emerg Med*. 2014; 3(1): 21-27.

20. Individuals' dose data are significant for evaluating influences of the accident. Based on the results of the Basic Survey, it was found that, among a total of 386,572 people, effective external doses were less than 3 mSv for 99.3% and thyroid equivalent doses measured using survey meters were less than 10 mSv for 95.7% (the maximum dose was 35 mSv).

    Measurements of individual radiation doses in residents living around the Fukushima nuclear power plant
    Nagataki S, et al. *Radiat Res*. 2013; 180(5): 439-447.

21. 2As of July 31, 2013, external dose estimation was completed for 445,015 people, and out of the 435,788 people excluding radiation workers, estimated external doses were 5 mSv or more for 1,025 people, with the maximum dose being 25 mSv.

    Fukushima Health Management data: external radiation dose estimates
    Sakai A. *Fukushima J Med Sci*. 2013; 59(2): 110

Report on the Fourth-Round Thyroid Survey
(Third Full-Scale Thyroid Survey)

1. Summary

1.1 Purpose

In order to monitor the long-term health of children, we are now engaged in the third Full-Scale Thyroid Survey (the Fourth-Round Survey), following the Preliminary Baseline Survey for background assessment of thyroid glands, and two Full-Scale Thyroid Surveys (the Second- and Third-Round Surveys) to continuously confirm the status of thyroid glands.

1.2 Survey Population

All the Fukushima residents approximately 18 years old or younger at the time of earthquake (born between 2 April 1992 and 1 April 2012).

1.3 Implementation Period

From April 2018 (schedule of FY 2018 and FY 2019):

1.3-1 For those 18 years old or younger

The examination will be carried out for each municipality in FY 2018 and FY 2019.

1.3-2 19 years old or older

The examination will be carried out for each age (school grade).
FY 2018: those who were born in FY 1996 and FY 1998
FY 2019: those who were born in FY 1997 and FY 1999

1.3-3 For those 25 years old

For those who are older than 20, examination will be carried out with 5-year interval.
FY 2018: those who were born in FY 1993
FY 2019: those who were born in FY 1994
The results of these examinations will be reported separately.

1.4 Responsible Organizations

Fukushima Prefecture commissioned Fukushima Medical University (FMU) to conduct the survey in cooperation with organizations inside and outside Fukushima for the convenience to examination participants (the number of contracts is as of 30 June 2020).

1.4-1 The primary examination

Inside Fukushima Prefecture	83 medical facilities
Outside Fukushima Prefecture	124 medical facilities

1.4-2 The confirmatory examination

Inside Fukushima Prefecture	5 medical facilities including FMU
Outside Fukushima Prefecture	37 medical facilities

1.5 Method

1.5-1 The primary examination

We use ultrasonography for examination of the thyroid gland.

Assessments are made by specialists on the basis of the following criteria:

-Diagnostic Criteria (A)

A1: No nodules / cysts

A2: Nodules ≤5.0 mm or cysts ≤20.0 mm

-Diagnostic Criteria (B)

B: Nodules ≥5.1 mm or cysts ≥20.1 mm

Some A2 test results may be re-classified as B results when clinically indicated.

-Diagnostic Criteria (C)

C: Immediate need for confirmatory examination judging from the condition of the thyroid gland.

1.5-2 The confirmatory examination

We conduct ultrasonography, blood test, urine test, and fine needle aspiration cytology (FNAC) if needed for those with B or C test results. Priority is given to those in urgent clinical need.

We recommend medical follow-up for those requiring it due to confirmatory exam results.

1.5-3 Flow chart

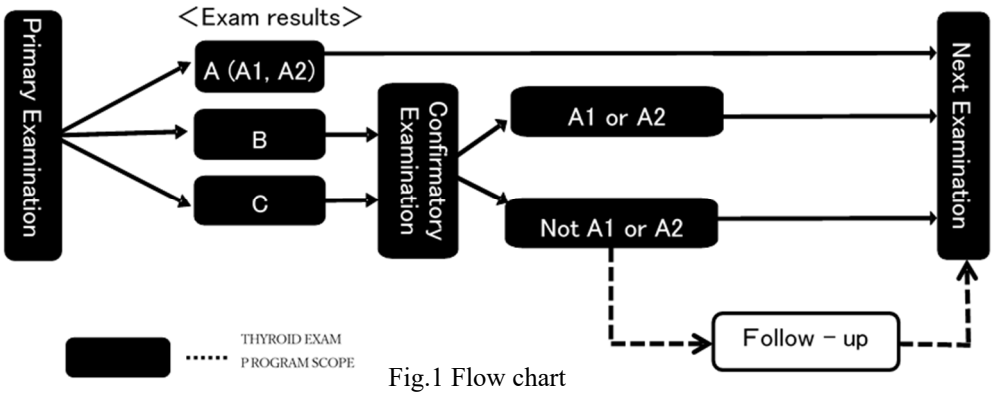


Fig.1 Flow chart

1.6 Municipalities Surveyed

The municipalities where examinations (for those 18 years old or younger) were carried out in FY 2018 and FY 2019 are as follows:

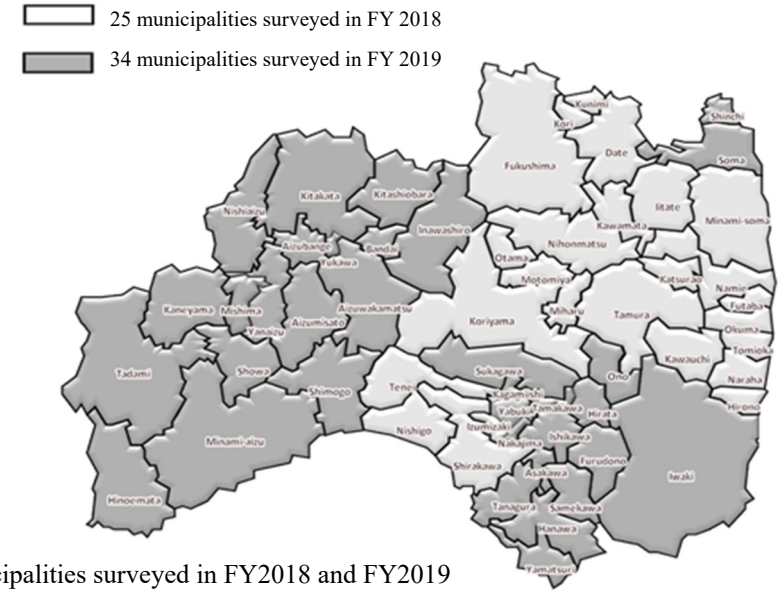


Fig.2 Municipalities surveyed in FY2018 and FY2019

2. Results as of 30 June 2020

2.1 Results of the Primary Examination

2.1-1 Progress report

The examination was carried out for 181,005 (61.5%) participants by 30 June 2020 (Implementation status for each municipality and prefectures other than Fukushima are shown in Appendix 1 and Appendix 2).

Results of 180,978 participants (100.0%) have been confirmed and notifications were sent to them accordingly. (The result for each municipality is shown in Appendix 3).

Of these, 60,901 were classified as A1 (33.7%), 118,715 as A2 (65.6%), 1,362 (0.8%) as B, and none as C.

Table 1 Progress and results of the primary examination

	Survey population	Participants			Exam results				
		Proportion (%)		Outside Fukushima	Proportion (%)	Class (%)			
						A		Requiring confirmatory exam	
	a	b	(b/a)		c (c/b)	A1 d (d/c)	A2 e (e/c)	B f (f/c)	C g (g/c)
FY 2018	168,033	107,652	(64.1)	7,142	107,646 (100.0)	36,788 (34.2)	70,163 (65.2)	695 (0.6)	0 (0.0)
FY 2019	126,207	73,353	(58.1)	2,926	73,332 (100.0)	24,113 (32.9)	48,552 (66.2)	667 (0.9)	0 (0.0)
Total	294,240	181,005	(61.5)	10,068	180,978 (100.0)	60,901 (33.7)	118,715 (65.6)	1,362 (0.8)	0 (0.0)

Table 2. Number and proportion of participants with nodules/cysts

	Number of participants with confirmed results	Number and proportion of participants with nodules/cysts			
		Nodules		Cysts	
	a	≥5.1 mm b (b/a)	≤5.0 mm c (c/a)	≥20.1 mm d (d/a)	≤20.0 mm e (e/a)
FY 2018	107,646	691 (0.6)	364 (0.3)	4 (0.0)	70,516 (65.5)
FY 2019	73,332	667 (0.9)	295 (0.4)	0 (0.0)	48,885 (66.7)
Total	180,978	1,358 (0.8)	659 (0.4)	4 (0.0)	119,401 (66.0)

- Proportions are rounded at a lower decimal place. This applies to other tables as well.
- Those who receive the examination at 5-year intervals (born between FY1992 and FY1995) are excluded. The results of examinations with 5-year intervals will be shown separately.
- The examination for those born in FY 1992 (approx. 23,000) and FY 1993 (approx. 22,000) took place in FY 2017 and FY 2018, respectively. Those born in FY 1994 (approx. 22,000) and FY 1995 (approx. 21,000) will be covered in FY 2019 and FY 2020 surveys, respectively.

2.1-2 Participation rates by age group

The participation rate for each age group as of 1 April of each year is shown in Table 3.

Table 3 Participation rates by age group

		Total	Age group (years)		
FY 2018	Age group (years)		6-11	12-17	18-24
	Survey population (a)	168,033	56,939	64,829	46,265
	Participants (b)	107,652	49,481	52,659	5,512
	Proportion (%) (b/a)	64.1	86.9	81.2	11.9
FY 2019	Age group (years)		7-11	12-17	18-24
	Survey population (a)	126,207	34,204	47,276	44,727
	Participants (b)	73,353	28,344	39,222	5,787
	Proportion (%) (b/a)	58.1	82.9	83.0	12.9
Total	Survey population (a)	294,240	91,143	112,105	90,992
	Participants (b)	181,005	77,825	91,881	11,299
	Proportion (%) (b/a)	61.5	85.4	82.0	12.4

・ Age groups are formed with the age as of 1 April of each fiscal year.

2.1-3 Comparison of Full-scale Thyroid Surveys

Comparison of Fourth- and Third-Round Survey results is shown in Table 4. Among 161,753 participants who were diagnosed as A1 or A2 in the Third-Round Survey, 161,083 (99.6%) had A1 or A2 results, and 670 (0.4%) were diagnosed as B in the Fourth-Round Survey. Among 720 participants who were diagnosed as B in the Third-Round Survey, 145 (20.1%) had A1 or A2 results, and 575 (79.9%) were diagnosed as B in the Fourth-Round Survey.

Table 4 Comparison of Full-scale Thyroid Survey

			Results of the Third-round Survey*1 (%) a	Results of the Fourth-Round Survey*2 A A1 b b/a (%)	A A2 c c/a (%)	B d d/a (%)	C e e/a (%)
Results of the Third-round Survey	A	A1	55,673 (100.0)	42,227 (75.8)	13,341 (24.0)	105 (0.2)	0 (0.0)
		A2	106,080 (100.0)	11,188 (10.5)	94,327 (88.9)	565 (0.5)	0 (0.0)
	B		720 (100.0)	12 (1.7)	133 (18.5)	575 (79.9)	0 (0.0)
	C		0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	No participation		18,505 (100.0)	7,474 (40.4)	10,914 (59.0)	117 (0.6)	0 (0.0)
Total			180,978 (100.0)	60,901 (33.7)	118,715 (65.6)	1,362 (0.8)	0 (0.0)

*1 Upper figures show a previous (Third-Round) diagnosis for the participants in this (Fourth-Round) survey whose results have been confirmed. They are not the breakdown of the total number of the previous-round participants.

*2 Upper figures show the breakdown of the Fourth-Round Survey participants who were diagnosed for each diagnostic class in the Third-Round Survey. Lower figures are their proportion (%).

2.2 Results of the Confirmatory Examination

2.2-1 Progress Report

By 30 June 2020, 819 of 1,362 people (60.1%) have received the examination. Of those, 758 (92.6%) have completed.

Of the foregoing 758 participants, 68 (A1: 2, A2: 66) (9.0%) was confirmed to meet A1 or A2 diagnostic criteria by the Primary Examination standards (including those with other thyroid conditions). Remaining 690 (91.0%) people were confirmed to be outside of A1/A2 criteria.

Table 5 Progress and results of the confirmatory examination

	Number of those requiring confirmatory exam	Participants Proportion (%)	Confirmatory exam coverage (%)	Confirmed exam results			
				A1	A2	Not A1 or A2	
							FNAC
	a	b (b/a)	c (c/b)	d (d/c)	e (e/c)	f (f/c)	g (g/f)
FY 2018	695	471 (67.8)	457 (97.0)	2 (0.4)	41 (9.0)	414 (90.6)	40 (9.7)
FY 2019	667	348 (52.2)	301 (86.5)	0 (0.0)	25 (8.3)	276 (91.7)	24 (8.7)
Total	1,362	819 (60.1)	758 (92.6)	2 (0.3)	66 (8.7)	690 (91.0)	64 (9.3)

2.2-2 Results of fine needle aspiration cytology (FNAC)

Among those who underwent FNAC, 27 had nodules classified as malignant or suspicious for malignancy. 11 of them were male, and 16 were female. Participants' age at the time of the confirmatory examination ranged from 9 to 20 years (mean age: 16.2 ± 3.0 years). The minimum and maximum tumor diameters were 6.1 mm and 29.4 mm. Mean tumor diameter was 12.8 ± 6.1 mm.

21 of these 27 participants had A (A1: 5, A2: 16), 5 had B, and 1 did not participate in the Full-Scale Examination (Third-Round Examination).

Table 6. Results of FNAC

A. Municipalities surveyed in FY 2018
- Malignant or suspicious for malignancy： 17*)
- Male to female ratio： 7:10
- Mean age (SD, min-max): 15.8 (2.8, 11-20), 7.8 (2.8, 2-12) at the time of disaster
- Mean tumor size: 12.0 mm (5.6 mm, 6.9-29.4 mm)

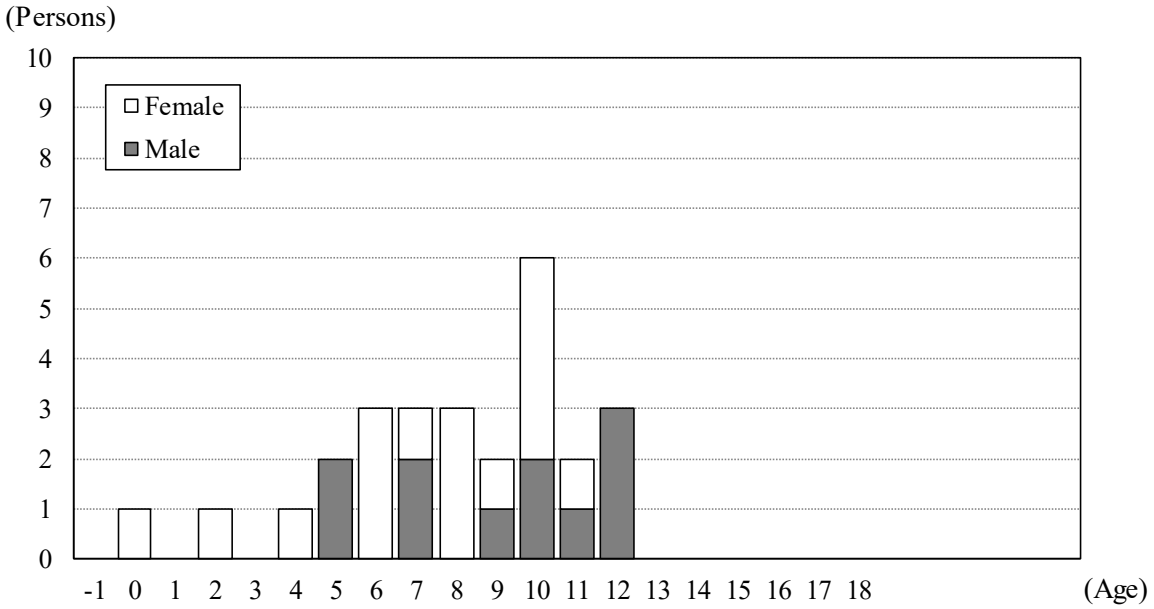
B. Municipalities surveyed in FY 2019
- Malignant or suspicious for malignancy： 10*)
- Male to female ratio： 4:6
- Mean age (SD, min-max): 16.9 (3.3, 9-20), 8.3 (3.6, 0-12) at the time of disaster
- Mean tumor size: 14.2mm (7.0 mm, 6.1-28.3 mm)

C. Total
- Malignant or suspicious for malignancy： 27*)
- Male to female ratio： 11:16
- Mean age (SD, min-max): 16.2 (3.0, 9-20), 8.0 (3.0, 0-12) at the time of disaster
- Mean tumor size: 12.8 mm (6.1 mm, 6.1-29.4 mm)

*) Surgical cases are as shown in Appendix 6.

2.2-3 Age distribution of malignant or suspicious-for-malignancy cases diagnosed by FNAC

Age distributions of 16 people with nodules classified as malignant or suspicious with their age as of 11 March 2011 is as Fig. 3, with their age as of confirmatory examination is as Fig. 4.



Note: Those who were 15 and 18 at the time of the disaster were not included in the Fourth-Round Survey participants.

The horizontal axis begins at -1 to include residents of Fukushima Prefecture born between 2 April 2011 and 1 April 2012

Fig.3 Age as of 11 March 2011

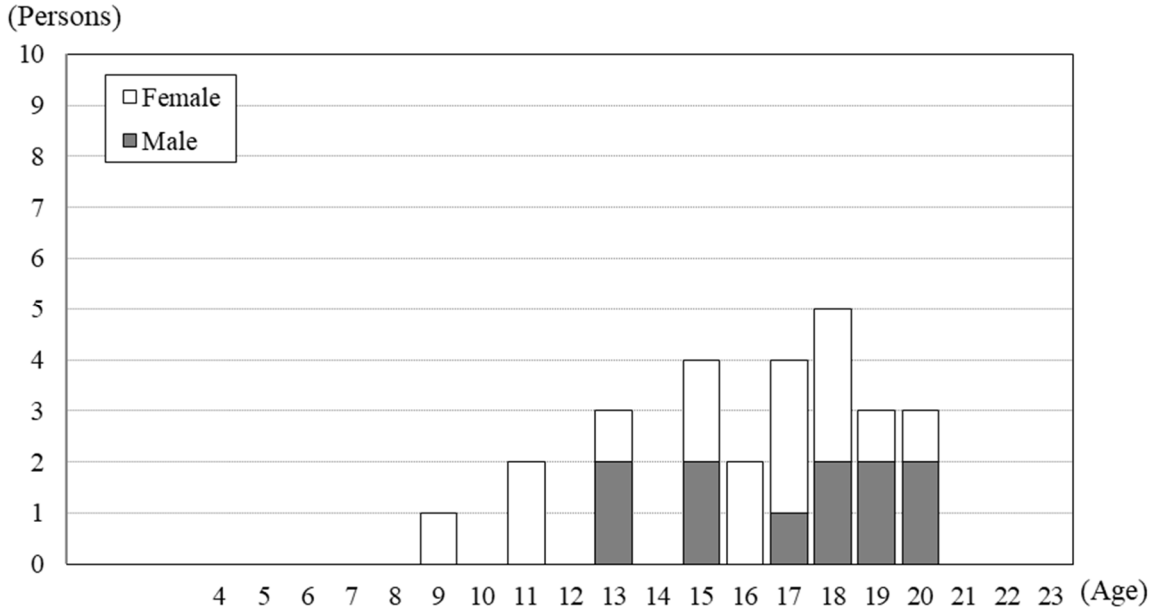


Fig. 4 Age as of the date of confirmatory examination

2.2-4 Basic Survey results of those with nodules diagnosed as malignant or suspicious for malignancy by FNAC

11 (40.7%) of the 27 people who were diagnosed as malignant or suspicious cases by FNAC had participated in the Basic Survey (for external radiation dose estimation), and 11 received the results. The highest effective dose documented was 2.4 mSv.

Table 7. A breakdown of dose estimates for participants of the Basic Survey

Effective dose (mSv)	Age at the time of the disaster									
	0-5		6-10		11-15		16-18		Total	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
<1	0	0	1	1	0	0	0	0	1	1
1-1.9	0	0	2	1	1	0	0	0	3	1
2-4.9	2	0	0	2	1	0	0	0	3	2
5-9.9	0	0	0	0	0	0	0	0	0	0
10-19.9	0	0	0	0	0	0	0	0	0	0
≥20	0	0	0	0	0	0	0	0	0	0
Total	2	0	3	4	2	0	0	0	7	4

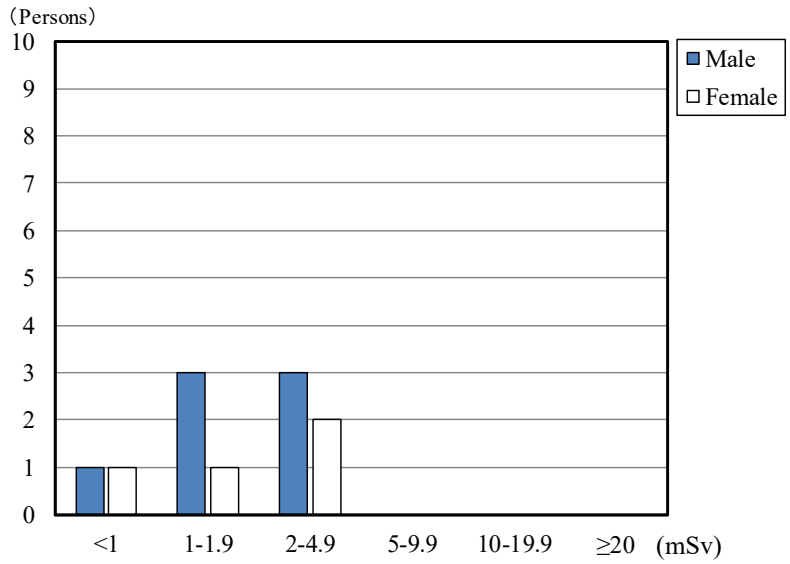


Fig. 5 Effective dose of the participants

2.2-5 Blood and urinary iodine test results

Table 8. Blood test results Mean±SD (Abnormal value)

	FT4 [1] (ng/dL)	FT3 [2] (pg/mL)	TSH [3] (μIU/mL)	Tg [4] (ng/mL)	TgAb [5] (IU/mL)	TPOAb [6] (IU/mL)
Reference Range	0.95～1.74 [7]	2.13～4.07 [7]	0.340～3.880 [7]	≤33.7	<28.0	<16.0
27 malignant or suspicious	1.3 ± 0.1 (0.0%)	3.5 ± 0.5 (0.0%)	1.4 ± 0.8 (3.7%)	24.9± 52.3 (11.1%)	48.1%	33.3%
Other 694	1.2 ± 0.3 (5.5%)	3.6 ± 0.8 (7.1%)	1.2 ± 0.8 (8.8%)	28.0± 89.3 (14.7%)	5.8%	6.8%

1) FT4: free thyroxine; thyroid hormone binding 4 iodines; higher among patients with thyrotoxicosis (such as Graves' disease) and lower with hypothyroidism (such as Hashimoto's thyroiditis).
2) FT3: free triiodothyronine; thyroid hormone binding 3 iodines; higher among patients with thyrotoxicosis (such as Graves' disease) and lower with hypothyroidism (such as Hashimoto's thyroiditis).
3) TSH: thyroid-stimulating hormone; higher among patients with Hashimoto's disease and lower with Graves' disease.
4) Tg: thyroglobulin; higher when thyroid tissue is destroyed or when neoplastic tissue produces thyroglobulin.
5) TgAb: anti-thyroglobulin antibody; higher among patients with Hashimoto's disease and Graves' disease.
6) TPOAb: anti-thyroid peroxidase antibody; higher among patients with Hashimoto's disease or Graves' disease.
7) Reference interval varies according to age.

Table 9 Urinary iodine test results (μg/day)

	Minimum	25th percentile	Median	75th percentile	Maximum
27 malignant or suspicious	35	93	209	500	1783
Other 689	32	120	194	341	17200

2.2-6 Confirmatory Examination results by area

The proportions of participants with nodules diagnosed as malignant or suspicious for malignancy were 0.02% in Nakadori and 0.01% in the 13 municipalities in the nationally-designated evacuation zones, Hamadori, and Aizu.

Table 10 Confirmatory examination results by area

Area	Number of Participants a	Participants who required confirmatory exam b	Proportion who required confirmatory exam (%) b/a	Number who underwent confirmatory exam	Malignant or uspicious cases c	Proportion of malignant or suspicious cases (%) c/a
13 municipalities [1]	22,406	149	0.7	104	2	0.01
Nakadori [2]	103,910	700	0.7	463	18	0.02
Hamadori [3]	31,824	312	1.0	135	4	0.01
Aizu [4]	22,865	201	0.9	117	3	0.01
Total	181,005	1,362	0.8	819	27	0.01

1) Tamura, Minami-soma, Date, Kawamata, Hirono, Naraha, Tomioka, Kawauchi, Okuma, Futaba, Namie, Katsurao, Iitate
2) Fukushima, Koriyama, Shirakawa, Sukagawa, Nihonmatsu, Motomiya, Kori, Kunimi, Otama, Kagamiishi, Tenei, Nishigo, Izumizaki, Nakajima, Yabuki, Tanagura, Yamatsuri, Hanawa, Samegawa, Ishikawa, Tamakawa, Hirata, Asakawa, Furudono, Miharu, Ono
3) Iwaki, Soma, Shinchi
4) Aizuwakamatsu, Kitakata, Shimogo, Hinoemata, Tadami, Minami-aizu, Kitashiobara, Nishiaizu, Bandai, Inawashiro, Aizubange, Yugawa, Yanaizu, Mishima, Kaneyama, Showa, Aizumisato

3. Mental Health Care

We provide the following support.

3.1 Support for the Primary Examination Participants

After the examination, medical doctors explain the results showing the ultrasound image in private consultation booths at the venue. As of 30 June 2020, 2,556 (100%) of 2,557 participants visited the consultation booths.

3.2 Briefing Sessions

To help participants or their parents improve their understanding of the thyroid examination, briefing sessions were carried out. Since April 2018, 1,063 people in 32 venues participated in the briefing sessions as of 31 March 2020. The cumulative total of participants is 15,086.

3.3 Support for the Confirmatory Examination Participants

We have set up a support team for participants of the confirmatory examination within Fukushima Medical University to address their anxiety and concerns, as well as online support for Q&A and counseling.

Since the start of Fourth-Round Survey, 431 participants (146 males and 285 females) have received support as of 30 June 2020. The number of supports provided was 871 in total. Of these, 428 (49.1%) received support at their first examination and 443 (50.9%) at subsequent examination.

For those who proceeded to regular insured medical care, we continue to provide support in cooperation with teams of medical staff at hospitals.

Appendix 1

Thyroid ultrasound examination (TUE) coverage by municipality — As of 30 June 2020

	Survey population	Participants		Proportion (%)	Number and proportion[*2] of participants by age group			Participants living outside Fukushima	Proportion (%)
			Outside Fukushima[*1]		6-11	12-17	18-24		
	a	b		b/a				c[*3]	c/b
Municipalities surveyed in FY 2018									
Kawamata	1,832	1,134	26	61.9	472 41.6	576 50.8	86 7.6	53	4.7
Namie	2,858	1,500	310	52.5	574 38.3	713 47.5	213 14.2	360	24.0
Iitate	852	542	19	63.6	220 40.6	279 51.5	43 7.9	25	4.6
Minami-soma	10,202	5,980	840	58.6	2,483 41.5	2,977 49.8	520 8.7	932	15.6
Date	8,781	5,921	191	67.4	2,333 39.4	3,042 51.4	546 9.2	188	3.2
Tamura	5,435	3,422	70	63.0	1,514 44.2	1,640 47.9	268 7.8	106	3.1
Hirono	801	441	34	55.1	178 40.4	215 48.8	48 10.9	30	6.8
Naraha	1,094	575	50	52.6	204 35.5	290 50.4	81 14.1	60	10.4
Tomioka	2,341	1,170	197	50.0	427 36.5	568 48.5	175 15.0	212	18.1
Kawauchi	267	149	9	55.8	54 36.2	85 57.0	10 6.7	11	7.4
Okuma	2,020	1,109	208	54.9	422 38.1	546 49.2	141 12.7	226	20.4
Futaba	978	357	61	36.5	142 39.8	178 49.9	37 10.4	64	17.9
Katsurao	174	106	3	60.9	37 34.9	56 52.8	13 12.3	4	3.8
Fukushima	43,242	28,995	1,823	67.1	11,762 40.6	14,380 49.6	2,853 9.8	1,811	6.2
Nihonmatsu	8,104	5,468	203	67.5	2,274 41.6	2,780 50.8	414 7.6	184	3.4
Motomiya	4,910	3,196	101	65.1	1,399 43.8	1,563 48.9	234 7.3	100	3.1
Otama	1,287	917	25	71.3	416 45.4	440 48.0	61 6.7	19	2.1
Koriyama	52,560	33,315	2,508	63.4	13,478 40.5	16,704 50.1	3,133 9.4	2,478	7.4
Kori	1,609	1,129	31	70.2	465 41.2	545 48.3	119 10.5	29	2.6
Kunimi	1,204	808	17	67.1	296 36.6	431 53.3	81 10.0	18	2.2
Tenei	839	525	8	62.6	224 42.7	262 49.9	39 7.4	8	1.5
Shirakawa	9,972	6,508	273	65.3	2,620 40.3	3,292 50.6	596 9.2	286	4.4
Nishigo	3,263	2,206	94	67.6	918 41.6	1,082 49.0	206 9.3	99	4.5
Izumizaki	1,025	665	4	64.9	275 41.4	336 50.5	54 8.1	4	0.6
Miharu	2,383	1,514	37	63.5	562 37.1	780 51.5	172 11.4	31	2.0
Subtotal	168,033	107,652	7,142	64.1	43,749 40.6	53,760 49.9	10,143 9.4	7,338	6.8

*1) The number of participants who received the examination at facilities outside Fukushima (as of 31 May 2020)
*2) The upper layer shows number of participants, and the lower layer shows the proportion of participants from each municipality.
*3) The number of participants who have resident registration outside of Fukushima.
・ Age groups were formed based on the age at the Full-Scale Survey (the Fourth-Round Survey). This applies to other tables hereafter.

	Survey population	Participants		Proportion (%)	Number and proportion[*2] of participants by age group			Participants living outside Fukushima	Proportion (%)
			Outside Fukushima[*1]		6-11	12-17	18-24		
	a	b		b/a				c[*3]	c/b
Municipalities surveyed in FY 2019									
Iwaki	49,641	27,964	1,643	56.3	7,885	15,860	4,219	1,507	5.4
					28.2	56.7	15.1		
Sukagawa	12,378	7,535	216	60.9	2,759	3,933	843	193	2.6
					36.6	52.2	11.2		
Soma	5,507	3,184	208	57.8	1,262	1,641	281	228	7.2
					39.6	51.5	8.8		
Kagamiishi	2,133	1,318	32	61.8	490	702	126	30	2.3
					37.2	53.3	9.6		
Shinchi	1,162	676	33	58.2	232	375	69	32	4.7
					34.3	55.5	10.2		
Nakajima	849	505	8	59.5	192	265	48	5	1.0
					38.0	52.5	9.5		
Yabuki	2,672	1,685	28	63.1	727	837	121	28	1.7
					43.1	49.7	7.2		
Ishikawa	2,182	1,345	26	61.6	541	677	127	26	1.9
					40.2	50.3	9.4		
Yamatsuri	816	476	12	58.3	213	238	25	9	1.9
					44.7	50.0	5.3		
Asakawa	1,064	660	22	62.0	238	360	62	22	3.3
					36.1	54.5	9.4		
Hirata	969	608	8	62.7	245	308	55	5	0.8
					40.3	50.7	9.0		
Tanagura	2,399	1,464	29	61.0	589	781	94	29	2.0
					40.2	53.3	6.4		
Hanawa	1,299	706	15	54.3	289	371	46	19	2.7
					40.9	52.5	6.5		
Samegawa	519	306	7	59.0	136	156	14	5	1.6
					44.4	51.0	4.6		
Ono	1,488	876	9	58.9	354	448	74	11	1.3
					40.4	51.1	8.4		
Tamakawa	1,052	658	4	62.5	253	357	48	3	0.5
					38.4	54.3	7.3		
Furudono	817	522	20	63.9	208	251	63	13	2.5
					39.8	48.1	12.1		
Hinoemata	87	36	1	41.4	16	16	4	1	2.8
					44.4	44.4	11.1		
Minami-aizu	2,128	1,162	16	54.6	481	603	78	18	1.5
					41.4	51.9	6.7		
Kaneyama	147	72	1	49.0	21	41	10	1	1.4
					29.2	56.9	13.9		
Showa	115	68	3	59.1	31	33	4	3	4.4
					45.6	48.5	5.9		
Mishima	148	84	0	56.8	29	50	5	0	0.0
					34.5	59.5	6.0		
Shimogo	747	426	4	57.0	179	222	25	5	1.2
					42.0	52.1	5.9		
Kitakata	6,948	4,078	74	58.7	1,484	2,222	372	78	1.9
					36.4	54.5	9.1		
Nishiaizu	761	407	9	53.5	169	190	48	12	2.9
					41.5	46.7	11.8		
Tadami	555	334	5	60.2	138	170	26	5	1.5
					41.3	50.9	7.8		
Inawashiro	2,070	1,203	28	58.1	506	593	104	25	2.1
					42.1	49.3	8.6		
Bandai	477	287	8	60.2	109	157	21	6	2.1
					38.0	54.7	7.3		
Kitashiobara	445	280	3	62.9	115	145	20	3	1.1
					41.1	51.8	7.1		
Aizumisato	2,823	1,722	33	61.0	634	896	192	31	1.8
					36.8	52.0	11.1		
Aizubange	2,402	1,416	36	59.0	540	724	152	29	2.0
					38.1	51.1	10.7		
Yanaizu	464	284	2	61.2	115	143	26	2	0.7
					40.5	50.4	9.2		
Aizuwakamatsu	18,424	10,655	377	57.8	3,888	5,586	1,181	369	3.5
					36.5	52.4	11.1		
Yugawa	519	351	6	67.6	123	178	50	10	2.8
					35.0	50.7	14.2		
Subtotal	126,207	73,353	2,926	58.1	25,191	39,529	8,633	2,763	3.8
					34.3	53.9	11.8		
Total	294,240	181,005	10,068	61.5	68,940	93,289	18,776	10,101	5.6
					38.1	51.5	10.4		

Appendix 2

Thyroid ultrasound examination (TUE) coverage outside Fukushima by prefecture As of 31 May 2020

Prefecture	Number of medeical facilities	Participants *
Hokkaido	7	**274**
Aomori	2	**123**
Iwate	3	**248**
Miyagi	2	**2,227**
Akita	1	**156**
Yamagata	3	**469**
Ibaraki	4	**565**
Tochigi	8	**624**
Gunma	2	**171**
Saitama	3	**527**
Chiba	5	**463**
Tokyo	18	**1,660**
Kanagawa	6	**743**
Niigata	2	**446**
Toyama	2	**26**
Ishikawa	1	**35**

Prefecture	Number of medeical facilities	Participants *
Fukui	1	**18**
Yamanashi	2	**85**
Nagano	3	**121**
Gifu	1	**29**
Shizuoka	2	**83**
Aichi	5	**176**
Mie	1	**17**
Shiga	1	**14**
Kyoto	3	**79**
Osaka	7	**171**
Hyogo	2	**122**
Nara	2	**24**
Wakayama	1	**9**
Tottori	1	**7**
Shimane	1	**11**
Okayama	3	**47**

Prefecture	Number of medeical facilities	Participants *
Hiroshima	2	**24**
Yamaguchi	1	**21**
Tokushima	1	**5**
Kagawa	1	**25**
Ehime	1	**15**
Kochi	1	**11**
Fukuoka	3	**71**
Saga	1	**1**
Nagasaki	3	**25**
Kumamoto	1	**28**
Oita	1	**13**
Miyazaki	1	**20**
Kagoshima	1	**5**
Okinawa	1	**34**

Total	124	**10,068**

*The number of participants represents those who received examination at facilities outside Fukushima

Appendix 3

Results of primary examination by municipality — As of 30 June 2020

	Participants	Confirmed results b	Number by exam results				Nodules		Cysts	
			Proportion (%)				Proportion (%)		Proportion (%)	
		Proportion (%)	A		B	C				
	a	b/a (%)	A1	A2			≥5.1 mm	≤5.0 mm	≥20.1 mm	≤20.0 mm
Municipalities surveyed in FY 2018										
Kawamata	1,134	1,134	408	721	5	0	4	3	1	725
		100.0	36.0	63.6	0.4	0.0	0.4	0.3	0.1	63.9
Namie	1,500	1,500	495	992	13	0	13	6	0	997
		100.0	33.0	66.1	0.9	0.0	0.9	0.4	0.0	66.5
Iitate	542	542	201	337	4	0	4	2	0	340
		100.0	37.1	62.2	0.7	0.0	0.7	0.4	0.0	62.7
Minami-soma	5,980	5,980	2,112	3,825	43	0	43	28	0	3,840
		100.0	35.3	64.0	0.7	0.0	0.7	0.5	0.0	64.2
Date	5,921	5,921	2,039	3,847	35	0	35	19	0	3,868
		100.0	34.4	65.0	0.6	0.0	0.6	0.3	0.0	65.3
Tamura	3,422	3,422	1,270	2,130	22	0	22	10	0	2,140
		100.0	37.1	62.2	0.6	0.0	0.6	0.3	0.0	62.5
Hirono	441	441	168	267	6	0	6	3	0	267
		100.0	38.1	60.5	1.4	0.0	1.4	0.7	0.0	60.5
Naraha	575	574	202	370	2	0	2	1	0	370
		99.8	35.2	64.5	0.3	0.0	0.3	0.2	0.0	64.5
Tomioka	1,170	1,170	416	747	7	0	7	3	0	750
		100.0	35.6	63.8	0.6	0.0	0.6	0.3	0.0	64.1
Kawauchi	149	149	44	103	2	0	2	0	0	105
		100.0	29.5	69.1	1.3	0.0	1.3	0.0	0.0	70.5
Okuma	1,109	1,109	385	716	8	0	8	5	0	723
		100.0	34.7	64.6	0.7	0.0	0.7	0.5	0.0	65.2
Futaba	357	357	108	248	1	0	1	0	0	249
		100.0	30.3	69.5	0.3	0.0	0.3	0.0	0.0	69.7
Katsurao	106	106	33	72	1	0	1	0	0	72
		100.0	31.1	67.9	0.9	0.0	0.9	0.0	0.0	67.9
Fukushima	28,995	28,994	9,995	18,831	168	0	167	93	1	18,914
		100.0	34.5	64.9	0.6	0.0	0.6	0.3	0.0	65.2
Nihonmatsu	5,468	5,468	1,912	3,503	53	0	52	20	1	3,533
		100.0	35.0	64.1	1.0	0.0	1.0	0.4	0.0	64.6
Motomiya	3,196	3,196	1,121	2,061	14	0	14	8	0	2,063
		100.0	35.1	64.5	0.4	0.0	0.4	0.3	0.0	64.5
Otama	917	917	304	606	7	0	7	2	0	609
		100.0	33.2	66.1	0.8	0.0	0.8	0.2	0.0	66.4
Koriyama	33,315	33,312	10,960	22,138	214	0	213	115	1	22,251
		100.0	32.9	66.5	0.6	0.0	0.6	0.3	0.0	66.8
Kori	1,129	1,129	399	723	7	0	7	2	0	726
		100.0	35.3	64.0	0.6	0.0	0.6	0.2	0.0	64.3
Kunimi	808	808	261	538	9	0	9	1	0	545
		100.0	32.3	66.6	1.1	0.0	1.1	0.1	0.0	67.5
Tenei	525	525	192	329	4	0	4	2	0	333
		100.0	36.6	62.7	0.8	0.0	0.8	0.4	0.0	63.4
Shirakawa	6,508	6,508	2,272	4,194	42	0	42	25	0	4,215
		100.0	34.9	64.4	0.6	0.0	0.6	0.4	0.0	64.8
Nishigo	2,206	2,205	737	1,454	14	0	14	9	0	1,461
		100.0	33.4	65.9	0.6	0.0	0.6	0.4	0.0	66.3
Izumizaki	665	665	243	420	2	0	2	2	0	422
		100.0	36.5	63.2	0.3	0.0	0.3	0.3	0.0	63.5
Miharu	1,514	1,514	511	991	12	0	12	5	0	998
		100.0	33.8	65.5	0.8	0.0	0.8	0.3	0.0	65.9
Subtotal	107,652	107,646	36,788	70,163	695	0	691	364	4	70,516
		100.0	34.2	65.2	0.6	0.0	0.6	0.3	0.0	65.5

	Participants	Confirmed results b	Number by exam results				Nodules		Cysts	
			Proportion (%)							
			A		B	C	Proportion (%)		Proportion (%)	
	a	Proportion b/a (%)	A1	A2			≥5.1 mm	≤5.0 mm	≥20.1 mm	≤20.0 mm
Municipalities surveyed in FY 2019										
Iwaki	27,964	27,951	8,780	18,903	268	0	268	116	0	19,029
		100.0	31.4	67.6	1.0	0.0	1.0	0.4	0.0	68.1
Sukagawa	7,535	7,533	2,369	5,096	68	0	68	44	0	5,128
		100.0	31.4	67.6	0.9	0.0	0.9	0.6	0.0	68.1
Soma	3,184	3,184	1,055	2,090	39	0	39	11	0	2,117
		100.0	33.1	65.6	1.2	0.0	1.2	0.3	0.0	66.5
Kagamiishi	1,318	1,318	408	897	13	0	13	5	0	902
		100.0	31.0	68.1	1.0	0.0	1.0	0.4	0.0	68.4
Shinchi	676	676	228	443	5	0	5	3	0	446
		100.0	33.7	65.5	0.7	0.0	0.7	0.4	0.0	66.0
Nakajima	505	505	175	327	3	0	3	1	0	330
		100.0	34.7	64.8	0.6	0.0	0.6	0.2	0.0	65.3
Yabuki	1,685	1,685	611	1,066	8	0	8	7	0	1,070
		100.0	36.3	63.3	0.5	0.0	0.5	0.4	0.0	63.5
Ishikawa	1,345	1,345	457	874	14	0	14	4	0	882
		100.0	34.0	65.0	1.0	0.0	1.0	0.3	0.0	65.6
Yamatsuri	476	476	150	326	0	0	0	2	0	326
		100.0	31.5	68.5	0.0	0.0	0.0	0.4	0.0	68.5
Asakawa	660	660	211	442	7	0	7	3	0	443
		100.0	32.0	67.0	1.1	0.0	1.1	0.5	0.0	67.1
Hirata	608	608	235	371	2	0	2	2	0	372
		100.0	38.7	61.0	0.3	0.0	0.3	0.3	0.0	61.2
Tanagura	1,464	1,464	540	914	10	0	10	7	0	922
		100.0	36.9	62.4	0.7	0.0	0.7	0.5	0.0	63.0
Hanawa	706	706	267	435	4	0	4	2	0	435
		100.0	37.8	61.6	0.6	0.0	0.6	0.3	0.0	61.6
Samegawa	306	306	129	174	3	0	3	0	0	175
		100.0	42.2	56.9	1.0	0.0	1.0	0.0	0.0	57.2
Ono	876	876	272	595	9	0	9	1	0	602
		100.0	31.1	67.9	1.0	0.0	1.0	0.1	0.0	68.7
Tamakawa	658	658	243	404	11	0	11	2	0	410
		100.0	36.9	61.4	1.7	0.0	1.7	0.3	0.0	62.3
Furudono	522	522	202	318	2	0	2	2	0	317
		100.0	38.7	60.9	0.4	0.0	0.4	0.4	0.0	60.7
Hinoemata	36	36	12	24	0	0	0	0	0	24
		100.0	33.3	66.7	0.0	0.0	0.0	0.0	0.0	66.7
Minami-aizu	1,162	1,161	433	716	12	0	12	3	0	722
		99.9	37.3	61.7	1.0	0.0	1.0	0.3	0.0	62.2
Kaneyama	72	72	22	49	1	0	1	0	0	50
		100.0	30.6	68.1	1.4	0.0	1.4	0.0	0.0	69.4
Showa	68	68	23	45	0	0	0	0	0	45
		100.0	33.8	66.2	0.0	0.0	0.0	0.0	0.0	66.2
Mishima	84	84	21	62	1	0	1	0	0	63
		100.0	25.0	73.8	1.2	0.0	1.2	0.0	0.0	75.0
Shimogo	426	426	162	260	4	0	4	0	0	262
		100.0	38.0	61.0	0.9	0.0	0.9	0.0	0.0	61.5
Kitakata	4,078	4,076	1,400	2,645	31	0	31	21	0	2,652
		100.0	34.3	64.9	0.8	0.0	0.8	0.5	0.0	65.1
Nishiaizu	407	407	149	255	3	0	3	1	0	257
		100.0	36.6	62.7	0.7	0.0	0.7	0.2	0.0	63.1
Tadami	334	334	117	216	1	0	1	0	0	217
		100.0	35.0	64.7	0.3	0.0	0.3	0.0	0.0	65.0
Inawashiro	1,203	1,202	417	769	16	0	16	4	0	782
		99.9	34.7	64.0	1.3	0.0	1.3	0.3	0.0	65.1
Bandai	287	287	83	201	3	0	3	1	0	203
		100.0	28.9	70.0	1.0	0.0	1.0	0.3	0.0	70.7
Kitashiobara	280	280	96	182	2	0	2	0	0	184
		100.0	34.3	65.0	0.7	0.0	0.7	0.0	0.0	65.7
Aizumisato	1,722	1,722	552	1,155	15	0	15	8	0	1,159
		100.0	32.1	67.1	0.9	0.0	0.9	0.5	0.0	67.3
Aizubange	1,416	1,416	443	962	11	0	11	6	0	970
		100.0	31.3	67.9	0.8	0.0	0.8	0.4	0.0	68.5
Yanaizu	284	284	103	181	0	0	0	0	0	181
		100.0	36.3	63.7	0.0	0.0	0.0	0.0	0.0	63.7
Aizuwakamatsu	10,655	10,653	3,606	6,950	97	0	97	36	0	7,000
		100.0	33.8	65.2	0.9	0.0	0.9	0.3	0.0	65.7
Yugawa	351	351	142	205	4	0	4	3	0	208
		100.0	40.5	58.4	1.1	0.0	1.1	0.9	0.0	59.3
Subtotal	73,353	73,332	24,113	48,552	667	0	667	295	0	48,885
		100.0	32.9	66.2	0.9	0.0	0.9	0.4	0.0	66.7
Total	181,005	180,978	60,901	118,715	1,362	0	1,358	659	4	119,401
		100.0	33.7	65.6	0.8	0.0	0.8	0.4	0.0	66.0

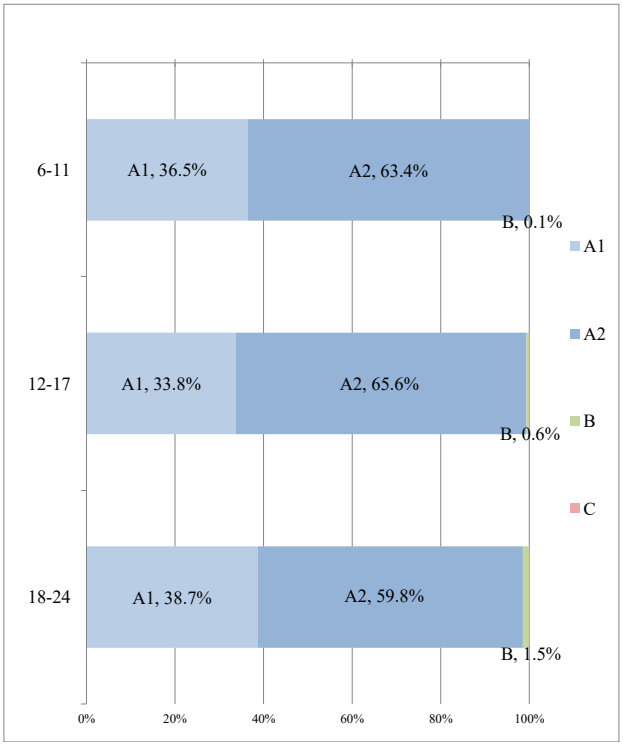
Appendix 4

1 Thyroid ultrasound examination results by age and sex

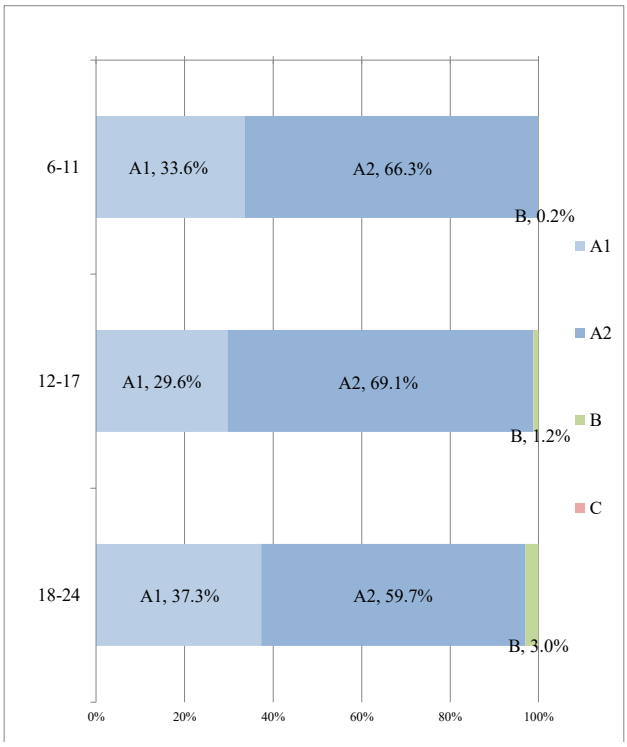
As of 30 June 2020

Class/Sex / Ages	A						B			C			Total		
	A1			A2											
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
6-11	12,887	11,282	24,169	22,415	22,261	44,676	38	56	94	0	0	0	35,340	33,599	68,939
12-17	16,004	13,614	29,618	31,076	31,753	62,829	283	553	836	0	0	0	47,363	45,920	93,283
18-24	3,370	3,744	7,114	5,210	6,000	11,210	129	303	432	0	0	0	8,709	10,047	18,756
Total	32,261	28,640	60,901	58,701	60,014	118,715	450	912	1,362	0	0	0	91,412	89,566	180,978

Results by age group (Male)



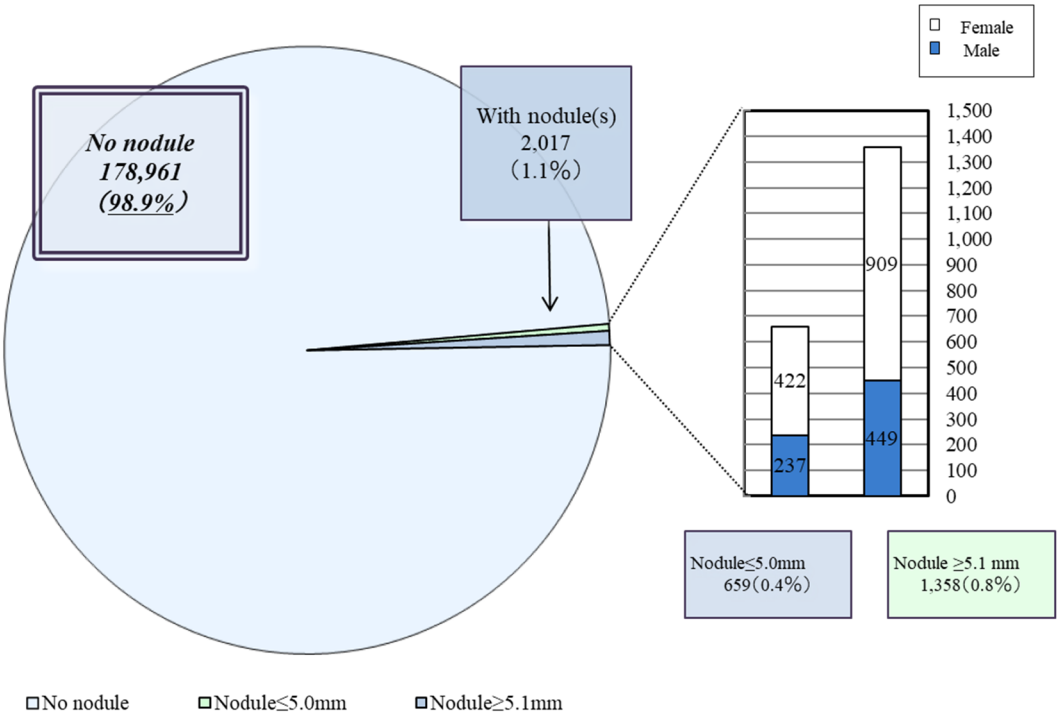
Results by age group (Female)

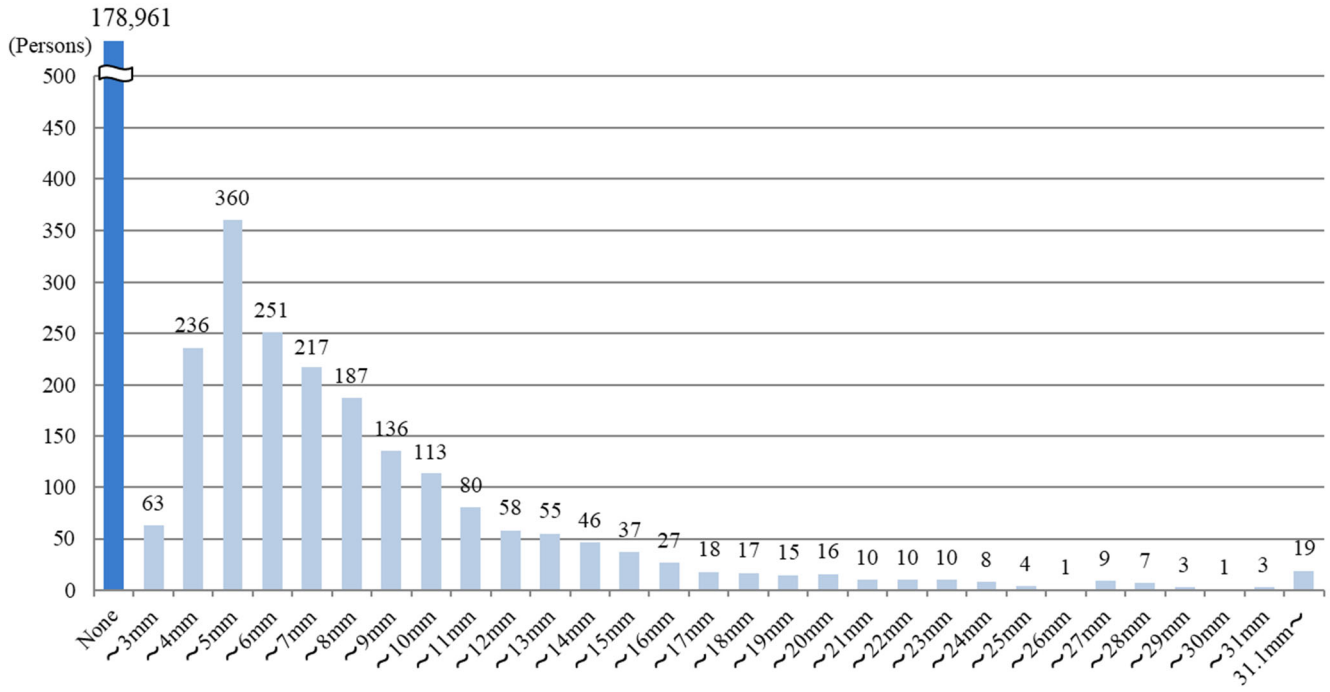


2 Nodule characteristics

As of 30 June 2020

Nodule size	Total	Male	Female	Class	Proportion
None	178,961	90,726	88,235	A1	98.9%
≤ 3.0 mm	63	30	33	A2	0.4%
3.1-5.0 mm	596	207	389		
5.1-10.0 mm	904	305	599	B	0.8%
10.1-15.0 mm	276	93	183		
15.1-20.0 mm	93	27	66		
20.1-25.0 mm	42	13	29		
≥ 25.1 mm	43	11	32		
Total	180,978	91,412	89,566		

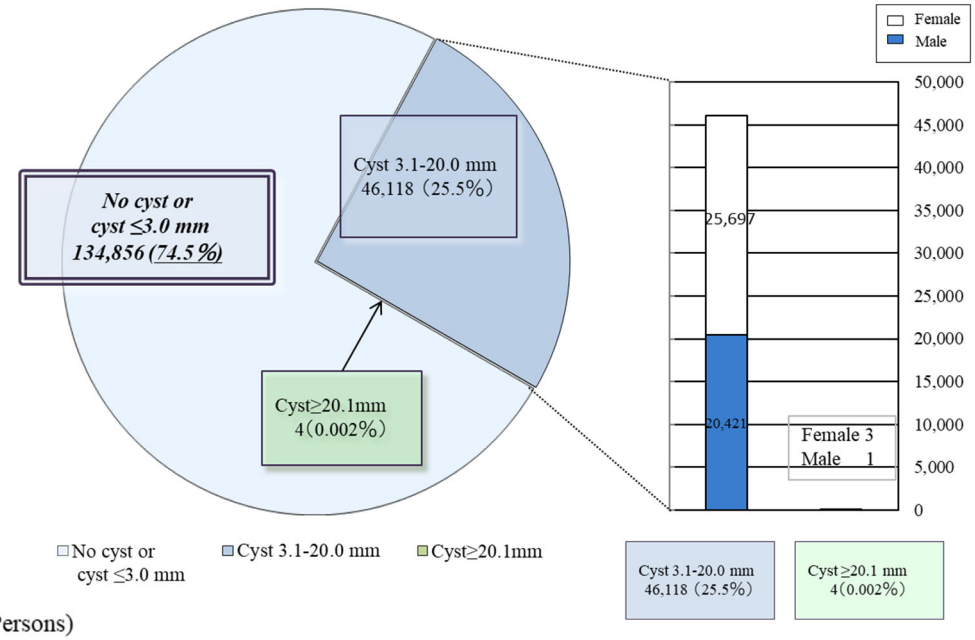


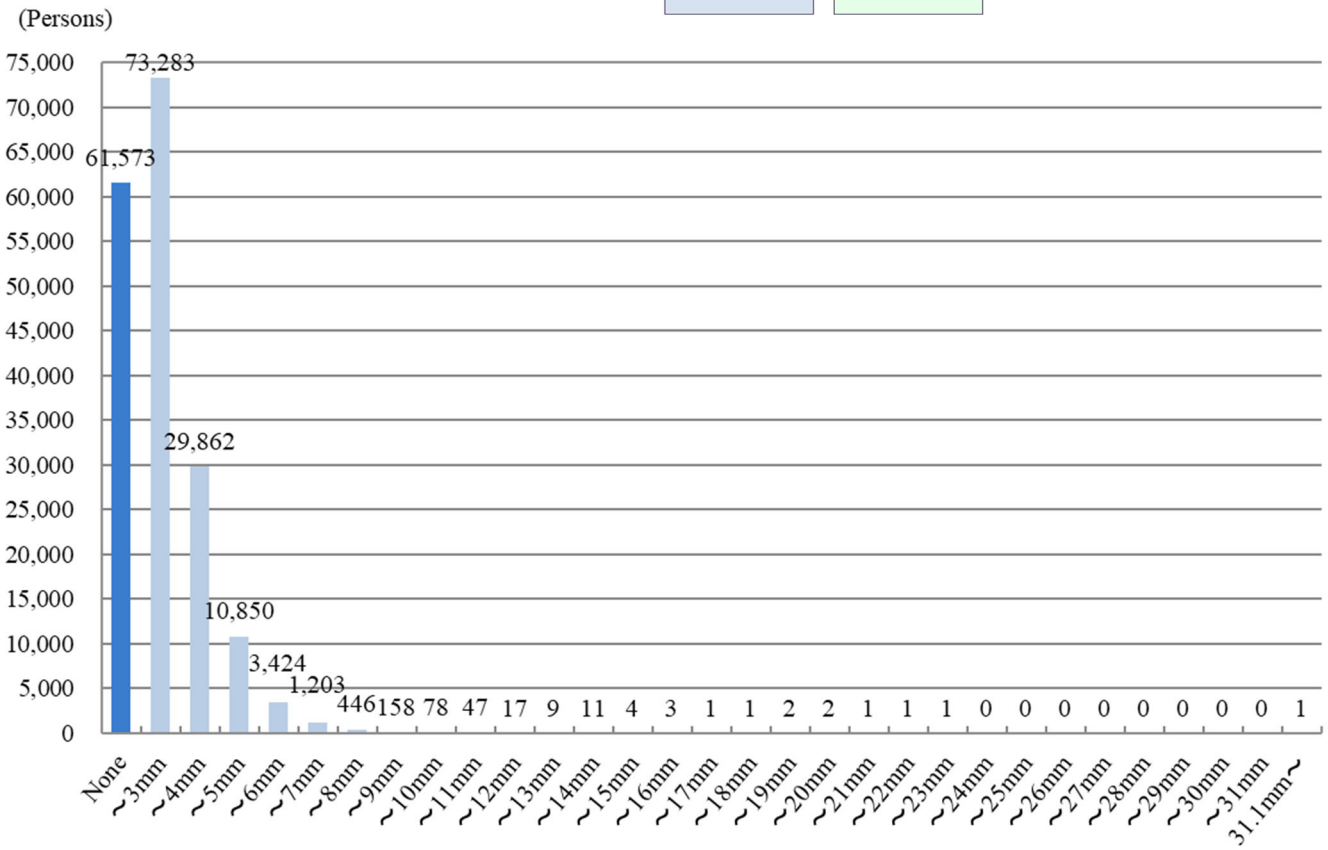


3 Cyst characteristics

As of 30 June 2020

Cyst size	Total	Male	Female	Class	Proportion
None	61,573	32,509	29,064	A1	74.5%
≤ 3.0 mm	73,283	38,481	34,802	A2	25.5%
3.1-5.0 mm	40,712	18,501	22,211		
5.1-10.0 mm	5,309	1,887	3,422		
10.1-15.0 mm	88	32	56		
15.1-20.0 mm	9	1	8		
20.1-25.0 mm	3	0	3	B	0.002%
≥ 25.1 mm	1	1	0		
Total	180,978	91,412	89,566		





Appendix 5

Results of confirmatory examination coverage by area — As of 30 June 2020

Area	Participants a	Participants who required confirmatory exam b	Number of those who underwent confirmatory exam: Total c	Ages 6-11 d	Ages 12-17 e	≥ 18 f	Number of confirmed results: Total h	A1 i	A2 j	Not A1 or A2: k	Not A1 or A2: FNAC l
		Proportion (%) b/a	Proportion (%) c/b	Proportion (%) d/c	Proportion (%) e/c	Proportion (%) f/c	Proportion (%) h/c	Proportion (%) i/h	Proportion (%) j/h	Proportion (%) k/h	Proportion (%) l/k
13 municipalities [1]	22,406	149	104	7	65	32	102	1	3	98	7
		0.7	69.8	6.7	62.5	30.8	98.1	1.0	2.9	96.1	7.1
Nakadori [2]	103,910	700	463	44	264	155	442	1	50	391	39
		0.7	66.1	9.5	57.0	33.5	95.5	0.2	11.3	88.5	10.0
Hamadori [3]	31,824	312	135	5	74	56	111	0	5	106	10
		1.0	43.3	3.7	54.8	41.5	82.2	0.0	4.5	95.5	9.4
Aizu [4]	22,865	201	117	7	70	40	103	0	8	95	8
		0.9	58.2	6.0	59.8	34.2	88.0	0.0	7.8	92.2	8.4
Total	181,005	1,362	819	63	473	283	758	2	66	690	64
		0.8	60.1	7.7	57.8	34.6	92.6	0.3	8.7	91.0	9.3

1) Tamura, Minami-soma, Date, Kawamata, Hirono, Naraha, Tomioka, Kawauchi, Okuma, Futaba, Namie, Katsurao, Iitate
2) Fukushima, Koriyama, Shirakawa, Sukagawa, Nihonmatsu, Motomiya, Kori, Kunimi, Otama, Kagamiishi, Tenei, Nishigo, Izumizaki, Nakajima, Yabuki, Tanagura, Yamatsuri, Hanawa, Samegawa, Ishikawa, Tamakawa, Hirata, Asakawa, Furudono, Miharu, Ono
3) Iwaki, Soma, Shinchi
4) Aizuwakamatsu, Kitakata, Shimogo, Hinoemata, Tadami, Minami-aizu, Kitashiobara, Nishiaizu, Bandai, Inawashiro, Aizubange, Yugawa, Yanaizu, Mishima, Kaneyama, Showa, Aizumisato

Appendix 6

Surgical cases for malignancy or suspicion of malignancy

1. Municipalities surveyed in FY 2018
   Malignant or suspicious for malignancy: 17 (12 surgical cases: 12 papillary thyroid carcinomas)
2. Municipalities surveyed in FY 2019
   Malignant or suspicious for malignancy: 10 (4 surgical case: 4 papillary thyroid carcinomas)
3. Total
   Malignant or suspicious for malignancy: 27 (16 surgical cases: 16 papillary thyroid carcinomas)

Report on the Fifth-Round Thyroid Survey
(Fourth Full-Scale Thyroid Survey)

1. Summary

1.1 Purpose

In order to monitor the long-term health of children, we are now engaged in the third Full-Scale Thyroid Survey (the Fifth-Round Survey), following the Preliminary Baseline Survey for background assessment of thyroid glands, and two Full-Scale Thyroid Surveys (the Second-, Third-, and Fourth-Round Surveys) to continuously confirm the status of thyroid glands.

1.2 Survey Population

All the Fukushima residents approximately 18 years old or younger at the time of earthquake (born between 2 April 1992 and 1 April 2012).

1.3 Implementation Period

From April 2020 (schedule of FY 2020 and FY 2021):

1.3-1 For those 18 years old or younger

The examination will be carried out for each municipality in FY 2020 and FY 2021.

* Thyroid examinations that had been scheduled to be conducted at elementary, junior high, and high schools in the prefecture during the first semester of FY2020 were canceled due to the spread of COVID-19 pandemic. Examinations were conducted at some schools in the second and third semesters.

1.3-2 For those 19 years old or older

The examination will be carried out based on age (school grade).
FY 2020: those who were born in FY 1998 and FY 2000
FY 2021: those who were born in FY 1999 and FY 2001

1.3-3 For those 25 years old or older

For those who are older than 20, the examination will be carried out in 5-year interval.
FY 2020: those who were born in FY 1995
FY 2021: those who were born in FY 1996
The results of these examinations will be reported separately.

1.4 Responsible Organizations

Fukushima Prefecture commissioned Fukushima Medical University (FMU) to conduct the survey in cooperation with organizations inside and outside Fukushima for the convenience to examination participants (the number of contracts is as of 30 June 2020).

1.4-1 The primary examination

Inside Fukushima Prefecture	83 medical facilities
Outside Fukushima Prefecture	124 medical facilities

1.4-2 The confirmatory examination

Inside Fukushima Prefecture	5 medical facilities including FMU
Outside Fukushima Prefecture	37 medical facilities

1.5 Method

1.5-1 The primary examination

We use ultrasonography for examination of the thyroid gland.

Assessments are made by specialists on the basis of the following criteria:

-Diagnostic Criteria (A)

A1: No nodules / cysts

A2: Nodules ≤5.0 mm or cysts ≤20.0 mm

-Diagnostic Criteria (B)

B: Nodules ≥5.1 mm or cysts ≥20.1 mm

Some A2 test results may be re-classified as B results when clinically indicated.

-Diagnostic Criteria (C)

C: Immediate need for confirmatory examination, judging from the condition of the thyroid gland.

1.5-2 The confirmatory examination

We conduct ultrasonography, blood test, urine test, and fine needle aspiration cytology (FNAC) if needed for those with B or C test results. Priority is given to those in urgent clinical need.

We recommend medical follow-up for those requiring it due to confirmatory exam results.

1.5-3 Flow chart

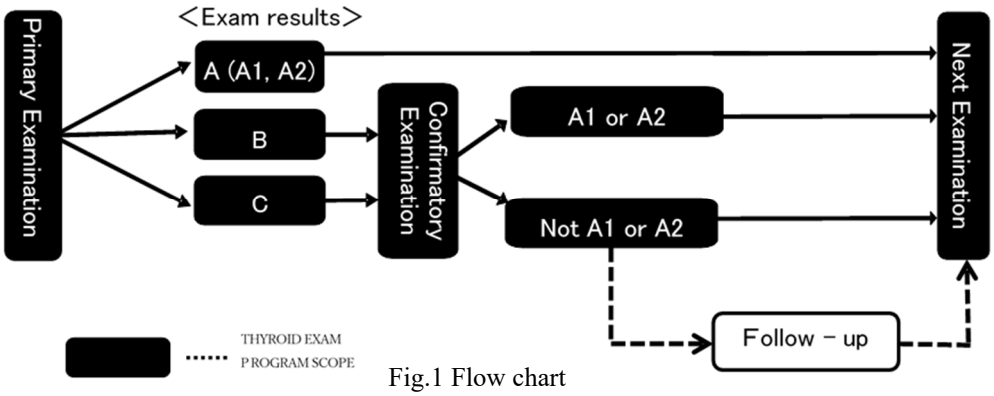


Fig.1 Flow chart

1.6 Municipalities Surveyed

The municipalities where examinations (for those 18 years old or younger) were carried out in FY 2020 and FY 2021 are as follows:

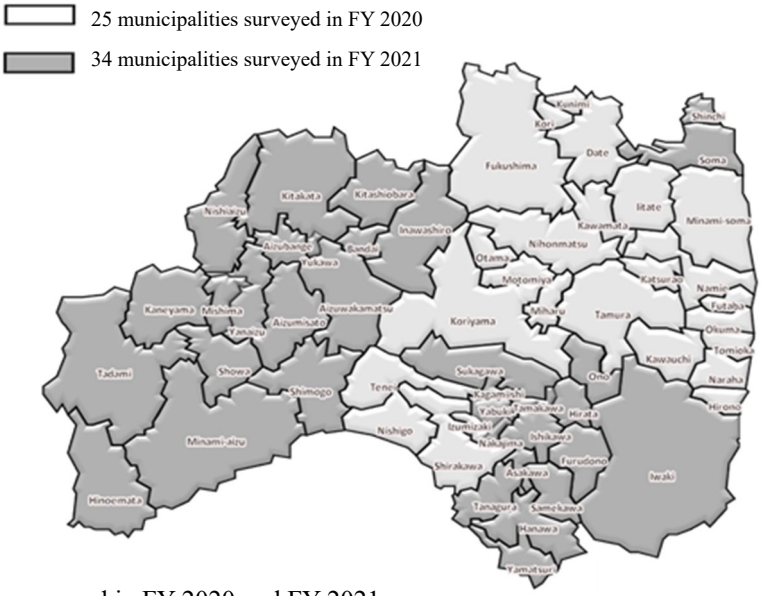


Fig.2 Municipalities surveyed in FY 2020 and FY 2021

2. Results as of 30 June 2020

2.1 Results of the Primary Examination

2.1-1 Progress report

The examination was carried out for 564 (0.2%) participants by 30 June 2020.

Results of 41 participants (7.3%) have been confirmed and notifications were sent to them accordingly.

Of these, 13 were classified as A1 (31.7%), 27 as A2 (65.9%), 1 (2.4%) as B, and none as C.

Table 1 Progress and results of the primary examination

	Survey population	Participants			Exam results					
		Proportion (%)		Outside Fukushima	Proportion (%)	Class (%)				
						A			Requiring confirmatory exam	
	a	b	(b/a)		c (c/b)	A1 d (d/c)		A2 e (e/c)	B f (f/c)	C g (g/c)
FY 2020	144,841	392	(0.3)	78	28 (7.1)	10	(35.7)	17 (60.7)	1 (3.6)	0 (0.0)
FY 2021	107,980	172	(0.2)	2	13 (7.6)	3	(23.1)	10 (76.9)	0 (0.0)	0 (0.0)
Total	252,821	564	(0.2)	80	41 (7.3)	13	(31.7)	27 (65.9)	1 (2.4)	0 (0.0)

- Proportions are rounded at a lower decimal place. This applies to other tables as well.
- Those who receive the examination at 5-year intervals (born between FY1992 and 1997) are excluded. The results of examinations with 5-year intervals will be shown separately.
- The examination for those born in FY 1992 (approx. 23,000) and FY 1993 (approx. 22,000) took place in FY 2017 and FY 2018, respectively. Examination for those born in FY 1994 (approx. 22,000) and FY 1995 (approx. 21,000) took place in FY 2019 and FY 2020, respectively. Examination for those born in FY1996 （approx. 21,000) and FY1997 (approx. 20,000) will be carried out in FY2021 and FY2022, respectively.

Table 2. Number and proportion of participants with nodules/cysts

	Number of participants with confirmed results	Number and proportion of participants with nodules/cysts			
		Nodules		Cysts	
	a	≥5.1 mm b (b/a)	≤5.0 mm c (c/a)	≥20.1 mm d (d/a)	≤20.0 mm e (e/a)
FY 2020	28	1 (3.6)	0 (0.0)	0 (0.0)	18 (64.3)
FY 2021	13	0 (0.0)	0 (0.0)	0 (0.0)	10 (76.9)
Total	41	1 (2.4)	0 (0.0)	0 (0.0)	28 (68.3)

2.1-2 Participation rates by age group

The participation rate for each age group as of 1 April of each year is shown in Table 3.

Table 3 Participation rates by age group

		Total	Age group (years)		
FY 2020	Age group (years)		8-11	12-17	18-24
	Survey population (a)	144,841	37,044	61,908	45,889
	Participants (b)	392	41	36	315
	Proportion (%) (b/a)	0.3	0.1	0.1	0.7
FY 2021	Age group (years)		9-11	12-17	18-24
	Survey population (a)	107,980	19,716	45,057	43,207
	Participants (b)	172	0	0	172
	Proportion (%) (b/a)	0.2	0.0	0.0	0.4
Total	Survey population (a)	252,821	56,760	106,965	89,096
	Participants (b)	564	41	36	487
	Proportion (%) (b/a)	0.2	0.1	0.0	0.5

・ Age groups are formed with the age as of 1 April of each fiscal year.