eTable 1. Comparison of thyroid cancer prevalence among children and adolescents detected by ultrasound: Fukushima; Aomori, Yamanashi and Nagasaki; and Chernobyl.

Study	Study Areas	Age of Subjects at Accident	Age of Subjects at Investigation	Study Period	Number of Subjects	Number of Cases	Cases per 1,000,000 (Prevalence)	95% CI of Prevalence
Japan								
Watanobe et al.[a]	Fukushima	18 and younger	mean 6.1±4.6SD	2012–2013	1,137	0	0	0, 3,244
JME [b]	Aomori, Yamanashi, Nagasaki	–	3–18	2012	4,365	1	229	6, 1,276
Chernobyl		–	–					
IPHCA[c]	Gomel	18 and younger	–	1990–1992	–	15	2,200	–
	Kyiv and Zytomyr	–	15 and younger	1992–1994	–	5	400	–
Sasakawa, 1st screening[c]	Gomel	10 and younger	–	1991–1996	–	38	1,900	–
	Mogilev	10 and younger	–	1991–1996	–	2	80	–
	Kyiv	10 and younger	–	1991–1996	–	6	220	–
	Zhytomyr	10 and younger	–	1991–1996	–	9	310	–
Sasakawa, 2nd screening[c]	Kyiv	18 and younger	–	1996–2000	–	25	2,300	–
	Zhytomyr	14 and younger	–	1996–2000	–	11	1,300	–
Belarus screening programme[c]	Belarus	–	14 and younger	1990–1991	–	7	6,400	–
	Gomel	–	18 and younger	2002	–	2	53	–
Ukraine–USA cohort study[c]	Kyiv, Chernihiv and Zhytomyr	18 and younger	–	1998–2000	–	43	3,200	–
Ito et al.[d]	Mogilev	0–10	−	1991–1993	12,285	0	0	0, 300
Demidchik et al.[e]	Gomel	–	14 and younger	2002	25,446	0	0	0, 145
Shibata et al.[e]	Gomel	–	8–13	1998–2000	9,472	0	0	0, 389

Abbreviations: CI: confidence interval; JME: Japanese Ministry of Environment

[a] The subjects of the study by Watanobe et al. (ref. 6) were Fukushima residents who were 18 years old or younger (including fetuses) at the time of the accident.

[b]Conducted by the Japanese Ministry of Environment (ref. 8).

[c]From Table 1 by Jacob et al. (ref. 30): In the table, the number of subjects was not indicated, so a 95% confidence interval could not be estimated.

[d]The study by Ito et al. (*Thyroid*. 1995;5:365–8) was supported by the Sasagawa Memorial Health Foundation, so it may overlap with "Sasagawa 1st screening" listed by Jacob et al (ref. 30).

[e]Demidchik et al. (*Arq Bras Endocrinol Metabol*. 2007;51:748–62) and Shibata et al. (*Lancet*. 2001;358:1965–6) investigated subjects born after 1987, and their ages at the time of the accident are not applicable.

eTable 2. Approximate distance and direction from Fukushima Daiichi nuclear power plant, number of subjects, and air dose rate in each area and district on March 30, 2011 when the earliest data of all the studied areas and districts became available.

Area	District	Representative city	Approximate distance (Direction) from FDN	No. of subjects	Air-dose rate (μg/hr)*
Nearest		Minami-Soma	24 km (N)	12,526	0.97
Middle	North middle	Fukushima	62 km (NW)	53,553	2.80
	Central middle	Motomiya	57 km (W)	6,112	2.08
		Nihonmatsu	56 km (WNW)	10,256	2.88
	Koriyama City	Koriyama	58 km (W)	64,383	2.39
	South middle	Shirakawa	81 km (SW)	12,161	0.76
Least Contaminated	Iwaki City	Iwaki	47 km (SSW)	62,289	0.67
	Southeastern	Sukagawa	60 km (WSW)	15,309	0.42
	Western	Aizu-wakamatsu	97 km (W)	22,987	0.25
	Northeastern	Soma	42 km (NNW)	6,813	0.61

Abbreviations: FDN: Fukushima Daiichi nuclear power plant; N: North; NW: Northwest; W: West; WNW: West-northwest; SW: Southwest; SSW: South-southwest; WSW: West-southwest; NNW: North-northwest

*: Air dose rate at 10-11 a.m. on March 30, 2011.

Source: https://www.pref.fukushima.lg.jp/sec_file/monitoring/m-2/zenken0311-0331.pdf in https://www.pref.fukushima.lg.jp/sec/16025d/kako-monitoring.html (Accessed 29 April 2015: ref. 11). The URL was written in Japanese, so the authors extracted here the data on March 30, 2011 from the URL.

eAppendix. Result and Discussion on analysis of the data as of March 31, 2015 (released on May 18, 2015).

Analyses of data from the first round screening released on May 18, 2015 are shown in eTables 3 and 4. There were discrepancies in some data between eTable 3 and Table 1 due to adjustments in the original data for duplicate entries. We, however, followed the release by Fukushima Prefecture. Two thyroid cancer cases (one case in Iwaki City District and one case in Western Least Contaminated District) have been added since the previous release of data on February. A result of the analysis was basically similar to the main text. The number of operated cases, however, increased from 87 in the previous release to 99 on May 18. Post-operative histological diagnosis revealed one case of benign nodule, 95 cases of papillary carcinoma, and 3 cases of poorly-differentiated carcinoma. The mean tumor size of 112 fine needle aspiration positive cancer cases was 14.2±7.8 mm (range: 5.1–45.0 mm). The mean age in March, 2011 was 14.8±2.6 years (range: 6–18 years old). Based on cancer cases confirmed with post-operative histological diagnosis,, the IRRs for external comparisons using a latent duration of 4 years were 28 (95% CI: 15, 47) in the nearest area (excluding one benign case), 31 (95% CI: 23, 41) in the middle area, and 23 (95% CI: 15, 32) in the least contaminated area.

Data from the ongoing second round screening were also released on May 18, 2015. The number of subjects was 219,348. Among them, 148,027 (68%) underwent the primary examination phase of the second round screening, and 121,997 (82%) of them, have confirmed results: 1,043 (0.7%) cases were recommended for the secondary examination; 593 (57%) actually underwent the secondary examination; and the results have been confirmed in 491 (83%). Fine needle aspiration cytology was conducted in 54 (11%), and cancer cells were detected in 15 cases (28%) .

Only one of the second round 15 cancer cases was eligible for the secondary examination in the first round screening. Seven cases were added to the 8 cases previously reported on February 12, 2015 as described in the main text. Regional breakdown of 15 cases shows 8 cases in the nearest area, 6 in the north middle district, and 1 in the central middle. Five among the 15 have already been operated on (all were histologically diagnosed as papillary carcinoma). The mean tumor size of the 15 cases was 9.1±3.4 mm (range: 5.3–17.3 mm). The mean age in March 2011 was 13.1±3.5 years (range: 6–18 years). The first round screening results of the 15 cases showed 8 with no nodules or cysts and 6 with nodules 5.0 mm or smaller and/or cysts 20.0 mm or smaller. Remaining one case had, nodules 5.1 mm or larger and/or cysts 20.1 mm or larger., but the secondary examination was equivocal. Many of their cancers might have grown within about three years since the first round screening.

Even under the assumption that the remaining 121,982 (121,997 minus 15 cancer cases) were disease free, we observed further elevated IRR (external comparison with three years latency which was the maximum time interval from the previous screening) was 13.7 (95% CI: 7.7, 23).

Although the estimate is seriously underestimated due to the incompleteness of the secondary examination in the second round screening, the excess in the second round screening has already become clear. The preliminary result of the second round screening indicates that “screening effect” is an implausible explanation for the excess occurrence of thyroid cancer among children and adolescents in Fukushima Prefecture because “silent cancer” cases had already been harvested in the first round. Then, the second round detected fifteen thyroid cancer cases whose first round screening results showed no cancer.

We show the prevalence of thyroid screening among children and adolescents mainly from Chernobyl and Fukushima in eTable 1.

eTable 3. Demographic data of the analysis: population 18 years old and younger on March 11, 2011; number of first examinees; number of positives in the first examination; number of second examinees; and number of detected cancer cases in each area or district up to March 31, 2015.

Areas and districts	Population <19 y[a]	1st Examinees	Positives in 1st Exam.	2nd Examinees	Cancer Cases
	N	A (A/N, %)	B (B/A, %)	C (C/B, %)	D (Operated cases)
Nearest area (1) (Fiscal Year 2011)	47,768	41,810 (88)	221 (0.53)	199 (90)	15 (15)[b]
Middle area (Fiscal Year 2012)	161,129	139,338 (87)	988 (0.71)	920 (93)	56 (52)
North middle district (2)	57,211	50,618 (89)	312 (0.62)	298 (96)	12 (NA)
Central middle district (3)	21,052	18,194 (86)	115 (0.63)	111 (97)	11 (NA)
Koriyama City district (4)	64,380	54,063 (84)	458 (0.85)	415 (91)	25 (NA)
South middle district (5)	18,486	16,463 (89)	103 (0.63)	96 (93)	8 (NA)
Least contaminated area (Fiscal Year 2013)	158,788	118,395 (75)	1,070 (0.90)	977 (91)	41 (32)
Iwaki City district (6)	62,293	49,405 (79)	452 (0.91)	418 (93)	23 (NA)
Southeastern least contaminated District (7)	38,322	29,815 (78)	242 (0.81)	215 (89)	7 (NA)
Western least contaminated district (8)	49,927	32,821 (66)	323 (0.98)	295 (91)	11 (NA)
Northeastern least contaminated district (9)	8,246	6,354 (77)	53 (0.83)	49 (93)	0 (0)
Total	367,685	299,543 (82)	2,279 (0.76)	2,096 (92)	112 (99)

Abbreviation: NA: not available

[a]As of March 11, 2011

[b]One operated case was diagnosed as a benign tumor by histology, but the case was assessed as cancer in the present study according to cytology results.

eTable 4. Prevalence odds ratios and incidence rate ratios in each district up to March 31, 2015.

Areas and districts (1) through (9)	Prevalence of Thyroid Cancer Cases per 10^6(95% CI)	Internal Comparison		External Comparison	
		POR	(95% CI)	IRR	(95% CI)
Nearest area (1) (Fiscal Year 2011)	359 (201, 592)	1.5	(0.63, 4.0)	30	(17, 49)
Middle area (Fiscal Year 2012)	402 (304, 522)	1.7	(0.82, 4.1)	33	(25, 43)
North middle district (2)	237 (123, 414)	1.0	(0.40, 2.7)	20	(10, 35)
Central middle district (3)	605 (302, 1,082)	2.6	(0.99, 7.1)	50	(25, 90)
Koriyama City district (4)	462 (299, 683)	2.0	(0.88, 4.9)	39	(25, 57)
South Middle district (5)	486 (210, 957)	2.0	(0.73, 6.0)	40	(17, 80)
Least contaminated area (Fiscal Year 2013)	349 (249, 470)	–	–	29	(21, 39)
Iwaki City district (6)	466 (295, 699)	2.0	(0.88, 5.0)	39	(25, 58)
Southeastern least contaminated district (7)	235 (94, 484)	1	Reference	20	(7.9, 40)
Western least contaminated district (8)	335 (167, 600)	1.4	(0.55, 3.9)	28	(14, 50)
Northeastern least contaminated district (9)	0 (0, 581)	0.00	(0.0, 2.5)	0.00	(0.0, 48)

Abbreviations: CI: confidence interval, IRR: incidence rate ratio, POR: prevalence odds ratio