

## **ESTIMATED DOSES TO EVACUEES IN JAPAN FOR THE FIRST YEAR**

UNSCEAR 2013 Report, Annex A, Levels and effects of radiation exposure due to the nuclear accident after the 2011 great east-Japan earthquake and tsunami, Appendix C (Assessment of doses to the public)

### **Contents**

This attachment details the summary tables for estimates of settlement-average effective doses, absorbed dose to the thyroid and to the red bone marrow of evacuated residents for the first year after the Fukushima-Daiichi nuclear power station accident. These summaries are provided for each age group (adults, 10-year-old children and one-year-old infants) for all 18 evacuation scenarios.

The “evacuation dose” is the dose received during the evacuation; the “destination dose” is the dose received for the remainder of the first year at the location to which the population was evacuated; the “total dose” is the sum of the “evacuation dose” and the “destination dose”. The “projected dose” is the dose for the first year for the locality if it had not been evacuated, and the “averted dose” is the dose saved by evacuation (i.e. the difference between the “projected dose” and the “total dose” received).

The population data are taken from the Japan Census [MIC, 2011].

### **Notes**

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

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This publication has not been formally edited.

**Table C-18.1. Estimated settlement-average<sup>a</sup> effective doses to adults in the first year evacuated from localities in Fukushima Prefecture, including doses received before and during the evacuation and at the destination**

<i>Locality</i>	<i>NIRS Scenario no</i>	<i>Evacuation dose (mSv)</i>	<i>Destination</i>	<i>Destination dose (mSv)</i>	<i>Total dose (mSv)</i>	<i>Projected dose<sup>b</sup> (mSv)</i>	<i>Averted dose (mSv)</i>
Tomiooka Town	1	0.2	Koriyama City	3.1	3.3	51	48
Okuma Town	2	0.0	Tamura City	1.5	1.5	47	45
Futaba Town	3	0.9	Saitama [Saitama]	0.2	1.1	38	37
Futaba Town	4	0.9	Saitama [Saitama]	0.2	1.1	38	37
Naraha Town	5	2.2	Tamura City	1.5	3.7	7	3
Naraha Town	6	1.3	Aizumisato Town	1.2	2.5	7	4
Namie Town	7	1.3	Nihonmatsu City	3.7	5.0	25	20
Tamura City	8	0.4	Koriyama City	3.1	3.5	1.5	-
Minamisoma City	9	1.4	Fukushima City	4.3	5.7	4	-
Hirono Town	10	0.0	Ono Town	1.3	1.3	4	3
Kawauchi Village	11	0.2	Koriyama City	3.1	3.3	2	-
Katsurao Village	12	0.0	Fukushima City	4.3	4.3	6	2
Tsushima Activation Center, Namie Town	13	4.3	Nihonmatsu City	2.7	7.0	25	18
Katsurao Village	14	2.7	Fukushima City	3.3	6.0	6	-
Iitate Village	15	5.7	Fukushima City	2.1	7.8	11	3
Iitate Village	16	6.2	Fukushima City	1.8	8.0	11	3
Minamisoma City	17	3.8	Minamisoma City	1.0	4.8	4	-
Yamakiya Region, Kawamata Town	18	8.5	Kawamata Town	0.8	9.3	2	-

<sup>a</sup> The estimated doses are settlement-average doses for the evacuation scenarios. They are intended to be characteristic of the average dose received by people evacuated from each settlement and do not reflect the range of doses received by individuals within the population of the evacuated settlement.

<sup>b</sup> Projected dose for the first year for the locality if it had not been evacuated.

**Table C-18.2. Estimated settlement-average<sup>a</sup> effective doses to 10-year-old children in the first year evacuated from localities in Fukushima Prefecture, including doses received before and during the evacuation and at the destination**

<i>Locality</i>	<i>NIRS Scenario No</i>	<i>Evacuation dose (mSv)</i>	<i>Destination</i>	<i>Destination dose (mSv)</i>	<i>Total dose (mSv)</i>	<i>Projected dose<sup>b</sup> (mSv)</i>	<i>Averted dose (mSv)</i>
Tomioka Town	1	0.3	Koriyama City	4.3	4.5	77	72
Okuma Town	2	0.0	Tamura City	2.0	2.0	68	66
Futaba Town	3	1.0	Saitama [Saitama]	0.3	1.3	54	53
Futaba Town	4	1.1	Saitama [Saitama]	0.3	1.4	54	53
Naraha Town	5	2.8	Tamura City	2.0	4.8	11	6
Naraha Town	6	1.7	Aizumisato Town	1.5	3.2	11	8
Namie Town	7	2.0	Nihonmatsu City	5.1	7.0	35	28
Tamura City	8	0.4	Koriyama City	4.3	4.7	2.0	--
Minamisoma City	9	1.4	Fukushima City	5.9	7.3	4.9	--
Hirono Town	10	0.0	Ono Town	1.6	1.6	5.8	4
Kawauchi Village	11	0.2	Koriyama City	4.3	4.5	2.7	--
Katsurao Village	12	0.0	Fukushima City	5.9	5.9	8.8	3
Tsushima Activation Center, Namie Town	13	5.2	Nihonmatsu City	3.7	8.9	35	26
Katsurao Village	14	3.4	Fukushima City	4.5	7.9	8.8	--
Iitate Village	15	6.2	Fukushima City	2.5	8.7	16	7
Iitate Village	16	6.7	Fukushima City	2.3	9.0	16	7
Minamisoma City	17	4.1	Minamisoma City	1.3	5.4	3.4	--
Yamakiya Region, Kawamata Town	18	9.1	Kawamata Town	1.1	10.2	3.3	--

<sup>a</sup> The reported doses are the ranges of the settlement-average doses for the evacuation scenarios. These estimates of dose are intended to be characteristic of the average dose received by people evacuated from each settlement and do not reflect the range of doses received by individuals within the evacuated settlement population.

<sup>b</sup> Projected dose for the first year for the locality if it had not been evacuated.

**Table C-18.3. Estimated settlement-average<sup>a</sup> effective doses to one-year-old infants in the first year evacuated from localities in Fukushima Prefecture, including doses received before and during the evacuation and at the destination**

<i>Locality</i>	<i>NIRS Scenario No</i>	<i>Evacuation dose (mSv)</i>	<i>Destination</i>	<i>Destination dose (mSv)</i>	<i>Total dose (mSv)</i>	<i>Projected dose<sup>b</sup> (mSv)</i>	<i>Averted dose (mSv)</i>
Tomioka Town	1	0.3	Koriyama City	5.6	5.9	91	85
Okuma Town	2	0.0	Tamura City	2.9	2.9	80	77
Futaba Town	3	1.2	Saitama [Saitama]	0.3	1.6	65	63
Futaba Town	4	1.4	Saitama [Saitama]	0.3	1.8	65	63
Naraha Town	5	3.3	Tamura City	2.9	6.2	13	7
Naraha Town	6	2.0	Aizumisato Town	2.3	4.3	13	9
Namie Town	7	2.3	Nihonmatsu City	6.5	8.8	42	33
Tamura City	8	0.5	Koriyama City	5.6	6.1	2.9	--
Minamisoma City	9	1.8	Fukushima City	7.5	9.3	4.5	--
Hirono Town	10	0.0	Ono Town	2.5	2.5	7.4	5
Kawauchi Village	11	0.3	Koriyama City	5.6	5.9	3.7	--
Katsurao Village	12	0.0	Fukushima City	7.5	7.5	10.9	3
Tsushima Activation Center, Namie Town	13	6.6	Nihonmatsu City	4.5	11.1	42	31
Katsurao Village	14	4.2	Fukushima City	5.6	9.8	11	--
Iitate Village	15	8.3	Fukushima City	2.9	11.2	19	8
Iitate Village	16	9.0	Fukushima City	2.5	11.5	19	7
Minamisoma City	17	5.7	Minamisoma City	1.4	7.1	4.5	--
Yamakiya Region, Kawamata Town	18	12.0	Kawamata Town	1.1	13.1	4.4	--

<sup>a</sup> The reported doses are the ranges of the settlement-average doses for the evacuation scenarios. These estimates of dose are intended to be characteristic of the average dose received by people evacuated from each settlement and do not reflect the range of doses received by individuals within the evacuated settlement population.

<sup>b</sup> Projected dose for the first year for the locality if it had not been evacuated.

**Table C-18.4. Estimated settlement-average<sup>a</sup> absorbed doses to the thyroid of adults in the first year evacuated from localities in Fukushima Prefecture, including doses received before and during the evacuation and at the destination**

<i>Locality</i>	<i>NIRS Scenario No</i>	<i>Evacuation dose (mGy)</i>	<i>Destination</i>	<i>Destination dose (mGy)</i>	<i>Total dose (mGy)</i>	<i>Projected dose<sup>b</sup> (mGy)</i>	<i>Averted dose (mGy)</i>
Tomioka Town	1	2.6	Koriyama City	13	15	390	380
Okuma Town	2	0.0	Tamura City	9.2	9.2	250	240
Futaba Town	3	6.4	Saitama [Saitama]	0.8	7.2	140	130
Futaba Town	4	7.7	Saitama [Saitama]	0.8	8.5	140	130
Naraha Town	5	23	Tamura City	9.2	32	61	29
Naraha Town	6	17	Aizumisato Town	8.3	25	61	36
Namie Town	7	19	Nihonmatsu City	15	34	67	33
Tamura City	8	1.0	Koriyama City	13	14	9.2	--
Minamisoma City	9	3.5	Fukushima City	16	20	11	--
Hirono Town	10	0.0	Ono Town	8.6	8.6	30	21
Kawauchi Village	11	2.5	Koriyama City	13	15	11	--
Katsurao Village	12	0.0	Fukushima City	16	16	23	7
Tsushima Activation Center, Namie Town	13	28	Nihonmatsu City	6.9	35	67	32
Katsurao Village	14	21	Fukushima City	8.0	29	23	--
Iitate Village	15	19	Fukushima City	1.9	21	33	12
Iitate Village	16	19	Fukushima City	1.6	21	33	12
Minamisoma City	17	15	Minamisoma City	1.1	16	11	--
Yamakiya Region, Kawamata Town	18	25	Kawamata Town	0.9	26	14	--

<sup>a</sup> The reported doses are the ranges of the settlement-average doses for the evacuation scenarios. These estimates of dose are intended to be characteristic of the average dose received by people evacuated from each settlement and do not reflect the range of doses received by individuals within the evacuated settlement population.

<sup>b</sup> Projected dose for the first year for the locality if it had not been evacuated.

**Table C-18.5. Estimated settlement-average<sup>a</sup> absorbed doses to the thyroid of 10-year old children in the first year evacuated from localities in Fukushima Prefecture, including doses received before and during the evacuation and at the destination**

<i>Locality</i>	<i>NIRS Scenario No</i>	<i>Evacuation dose (mGy)</i>	<i>Destination</i>	<i>Destination dose (mGy)</i>	<i>Total dose (mGy)</i>	<i>Projected dose<sup>b</sup> (mGy)</i>	<i>Averted dose (mGy)</i>
Tomiooka Town	1	4.4	Koriyama City	23	27	650	630
Okuma Town	2	0.0	Tamura City	18	18	410	400
Futaba Town	3	10	Saitama [Saitama]	1.5	12	230	220
Futaba Town	4	12	Saitama [Saitama]	1.5	14	230	210
Naraha Town	5	37	Tamura City	18	55	103	48
Naraha Town	6	29	Aizumisato Town	16	45	103	58
Namie Town	7	31	Nihonmatsu City	27	58	110	51
Tamura City	8	1.5	Koriyama City	23	25	18	--
Minamisoma City	9	5.3	Fukushima City	29	34	21	--
Hirono Town	10	0.0	Ono Town	17	17	52	35
Kawauchi Village	11	4.2	Koriyama City	23	27	21	--
Katsurao Village	12	0.0	Fukushima City	29	29	38	9
Tsushima Activation Center, Namie Town	13	45	Nihonmatsu City	13	58	109	51
Katsurao Village	14	35	Fukushima City	14	49	38	--
Iitate Village	15	31	Fukushima City	2.6	34	55	21
Iitate Village	16	32	Fukushima City	2.2	34	55	21
Minamisoma City	17	25	Minamisoma City	1.4	27	21	--
Yamakiya Region, Kawamata Town	18	41	Kawamata Town	1.1	42	25	--

<sup>a</sup> The reported doses are the ranges of the settlement-average doses for the evacuation scenarios. These estimates of dose are intended to be characteristic of the average dose received by people evacuated from each settlement and do not reflect the range of doses received by individuals within the evacuated settlement population.

<sup>b</sup> Projected dose for the first year for the locality if it had not been evacuated.

**Table C-18.6. Estimated settlement-average<sup>a</sup> absorbed doses to the thyroid of one-year old infants in the first year evacuated from localities in Fukushima Prefecture, including doses received before and during the evacuation and at the destination**

<i>Locality</i>	<i>NIRS Scenario No</i>	<i>Evacuation dose (mGy)</i>	<i>Destination</i>	<i>Destination dose (mGy)</i>	<i>Total dose (mGy)</i>	<i>Projected dose<sup>b</sup> (mGy)</i>	<i>Averted dose (mGy)</i>
Tomiooka Town	1	5.2	Koriyama City	42	47	795	750
Okuma Town	2	0.0	Tamura City	36	36	507	470
Futaba Town	3	12	Saitama [Saitama]	3	15	288	270
Futaba Town	4	16	Saitama [Saitama]	3	19	288	270
Naraha Town	5	46	Tamura City	36	82	138	60
Naraha Town	6	35	Aizumisato Town	34	69	138	70
Namie Town	7	37	Nihonmatsu City	44	81	145	60
Tamura City	8	1.9	Koriyama City	42	44	36	
Minamisoma City	9	6.4	Fukushima City	47	53	39	
Hirono Town	10	0.0	Ono Town	34	34	76	40
Kawauchi Village	11	5.0	Koriyama City	42	47	40	
Katsurao Village	12	0.0	Fukushima City	49	49	61	12
Tsushima Activation Center, Namie Town	13	59	Nihonmatsu City	24	83	145	60
Katsurao Village	14	46	Fukushima City	27	73	61	
Iitate Village	15	52	Fukushima City	3.8	56	80	24
Iitate Village	16	53	Fukushima City	2.7	56	80	24
Minamisoma City	17	45	Minamisoma City	2.3	47	39	-
Yamakiya Region, Kawamata Town	18	63	Kawamata Town	1.9	65	45	-

<sup>a</sup> The reported doses are the ranges of the settlement-average doses for the evacuation scenarios. These estimates of dose are intended to be characteristic of the average dose received by people evacuated from each settlement and do not reflect the range of doses received by individuals within the evacuated settlement population.

<sup>b</sup> Projected dose for the first year for the locality if it had not been evacuated.

**Table C-18.7. Estimated settlement-average<sup>a</sup> absorbed doses to the red bone marrow of adults in the first year evacuated from localities in Fukushima Prefecture, including doses received before and during the evacuation and at the destination**

<i>Locality</i>	<i>NIRS Scenario No</i>	<i>Evacuation dose (mGy)</i>	<i>Destination</i>	<i>Destination dose (mGy)</i>	<i>Total dose (mGy)</i>	<i>Projected dose<sup>b</sup> (mGy)</i>	<i>Averted dose (mGy)</i>
Tomioka Town	1	0.0	Koriyama City	2.6	2.6	32	29
Okuma Town	2	0.0	Tamura City	1.1	1.1	34	33
Futaba Town	3	0.5	Saitama [Saitama]	0.2	0.6	32	31
Futaba Town	4	0.5	Saitama [Saitama]	0.2	0.6	32	31
Naraha Town	5	0.7	Tamura City	1.1	1.8	4.5	3
Naraha Town	6	0.2	Aizumisato Town	0.7	0.9	4.5	4
Namie Town	7	0.4	Nihonmatsu City	3.0	3.4	22	19
Tamura City	8	0.3	Koriyama City	2.6	2.9	2.1	--
Minamisoma City	9	1.1	Fukushima City	3.6	4.7	2.0	--
Hirono Town	10	0.0	Ono Town	0.9	0.9	2.6	--
Kawauchi Village	11	0.0	Koriyama City	2.6	2.6	1.5	--
Katsurao Village	12	0.0	Fukushima City	3.6	3.6	5.3	--
Tsushima Activation Center, Namie Town	13	3.0	Nihonmatsu City	2.4	5.4	22	17
Katsurao Village	14	1.7	Fukushima City	3.0	4.7	5.3	--
Iitate Village	15	4.5	Fukushima City	1.9	6.4	9.8	3
Iitate Village	16	5.0	Fukushima City	1.6	6.6	9.8	3
Minamisoma City	17	2.9	Minamisoma City	1.0	3.9	2.0	--
Yamakiya Region, Kawamata Town	18	6.8	Kawamata Town	0.8	7.6	1.8	--

<sup>a</sup> The reported doses are the ranges of the settlement-average doses for the evacuation scenarios. These estimates of dose are intended to be characteristic of the average dose received by people evacuated from each settlement and do not reflect the range of doses received by individuals within the evacuated settlement population.

<sup>b</sup> Projected dose for the first year for the locality if it had not been evacuated.



**Table C-18.8. Estimated settlement-average<sup>a</sup> absorbed doses to the red bone marrow of 10-year-old children in the first year evacuated from localities in Fukushima Prefecture, including doses received before and during the evacuation and at the destination**

<i>Locality</i>	<i>NIRS Scenario No</i>	<i>Evacuation dose (mGy)</i>	<i>Destination</i>	<i>Destination dose (mGy)</i>	<i>Total dose (mGy)</i>	<i>Projected dose<sup>b</sup> (mGy)</i>	<i>Averted dose (mGy)</i>
Tomiooka Town	1	0.0	Koriyama City	3.2	3.2	45	42
Okuma Town	2	0.0	Tamura City	1.1	1.1	47	46
Futaba Town	3	0.5	Saitama [Saitama]	0.2	0.7	44	43
Futaba Town	4	0.5	Saitama [Saitama]	0.2	0.7	44	43
Naraha Town	5	0.8	Tamura City	1.1	1.9	5.8	4
Naraha Town	6	0.2	Aizumisato Town	0.6	0.8	5.8	5
Namie Town	7	0.4	Nihonmatsu City	3.8	4.2	31	27
Tamura City	8	0.4	Koriyama City	3.2	3.6	1.1	--
Minamisoma City	9	1.2	Fukushima City	4.6	5.8	2.4	--
Hirono Town	10	0.0	Ono Town	0.8	0.8	3.3	3
Kawauchi Village	11	0.0	Koriyama City	3.2	3.2	1.7	--
Katsurao Village	12	0.0	Fukushima City	4.6	4.6	7.1	--
Tsushima Activation Center, Namie Town	13	3.0	Nihonmatsu City	3.1	6.1	31	25
Katsurao Village	14	1.6	Fukushima City	3.9	5.5	7.1	--
Iitate Village	15	4.8	Fukushima City	2.5	7.3	14	6
Iitate Village	16	5.3	Fukushima City	2.3	7.6	14	6
Minamisoma City	17	3.0	Minamisoma City	1.2	4.2	2.4	--
Yamakiya Region, Kawamata Town	18	7.4	Kawamata Town	1.0	8.4	2.1	--

<sup>a</sup> The reported doses are the ranges of the settlement-average doses for the evacuation scenarios. These estimates of dose are intended to be characteristic of the average dose received by people evacuated from each settlement and do not reflect the range of doses received by individuals within the evacuated settlement population.

<sup>b</sup> Projected dose for the first year for the locality if it had not been evacuated.

**Table C-18.9. Estimated settlement-average<sup>a</sup> absorbed doses to the red bone marrow of one-year old infants in the first year evacuated from localities in Fukushima Prefecture, including doses received before and during the evacuation and at the destination**

<i>Locality</i>	<i>NIRS Scenario No</i>	<i>Evacuation dose (mGy)</i>	<i>Destination</i>	<i>Destination dose (mGy)</i>	<i>Total dose (mGy)</i>	<i>Projected dose<sup>b</sup> (mGy)</i>	<i>Averted dose (mGy)</i>
Tomiooka Town	1	0.0	Koriyama City	3.6	3.6	53	49
Okuma Town	2	0.0	Tamura City	1.1	1.1	55	54
Futaba Town	3	0.6	Saitama [Saitama]	0.2	0.8	52	51
Futaba Town	4	0.7	Saitama [Saitama]	0.2	0.9	52	51
Naraha Town	5	1.0	Tamura City	1.1	2.1	6.7	5
Naraha Town	6	0.2	Aizumisato Town	0.6	0.7	6.7	6
Namie Town	7	0.4	Nihonmatsu City	4.3	4.7	37	32
Tamura City	8	0.5	Koriyama City	3.6	4.1	1.1	--
Minamisoma City	9	1.6	Fukushima City	5.3	6.9	2.7	--
Hirono Town	10	0.0	Ono Town	0.7	0.7	3.7	3
Kawauchi Village	11	0.0	Koriyama City	3.6	3.6	1.7	--
Katsurao Village	12	0.0	Fukushima City	5.3	5.3	8.2	3
Tsushima Activation Center, Namie Town	13	3.7	Nihonmatsu City	3.5	7.2	37	30
Katsurao Village	14	2.0	Fukushima City	4.4	6.4	8.2	--
Iitate Village	15	5.9	Fukushima City	2.8	8.7	16	7
Iitate Village	16	6.6	Fukushima City	2.5	9.1	16	7
Minamisoma City	17	3.6	Minamisoma City	1.4	5.0	2.7	--
Yamakiya Region, Kawamata Town	18	9.3	Kawamata Town	1.1	10.4	2.3	--

<sup>a</sup> The reported doses are the ranges of the settlement-average doses for the evacuation scenarios. These estimates of dose are intended to be characteristic of the average dose received by people evacuated from each settlement and do not reflect the range of doses received by individuals within the evacuated settlement population.

<sup>b</sup> Projected dose for the first year for the locality if it had not been evacuated.

## References

MIC. The basic information about the population census for 2010 in Japan. Ministry of Internal Affairs and Communications. [Internet] Available from (<http://www.stat.go.jp/data/kokusei/2010/special/english/index.htm>) on 6 December 2011.