3. Comprehensive Health Check (CHC)

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Part 2 Survey Results

3. Comprehensive Health Check (CHC)

Radiation Medical Science Center for the Fukushima Health Management Survey
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1. Purpose

As a result of the Great East Japan Earthquake and the accident at TEPCO's Fukushima Daiichi Nuclear Power Plant (Fukushima Daiichi), many people had to live as evacuees, and their living environment changed drastically, including their productive activities, school life, neighborhood, and eating habits. The purpose of the Comprehensive Health Check (CHC) is to understand the health status of residents, to prevent lifestyle-related diseases, and to detect and treat diseases in their early stages.

2. Outline

1) Eligible persons

- Those who were registered as residents in the covered area* from March 11, 2011 to April 1, 2012 (even after moving out of the area)
- Those who are registered as residents in the officially designated evacuation zone as of April 1 of each year of the CHC
- Other than those above, as necessary, based on Basic Survey results.

*Covered area: 13 municipalities designated by the national government as evacuation zones in 2011 (hereinafter "13 municipalities")
Hirono Town, Naraha Town, Tomioka Town, Kawauchi Village, Okuma Town, Futaba Town, Namie Town, Katsurao Village, Iitate Village, Minamisoma City, Tamura City, Kawamata Town, and parts of Date City (specific spots recommended for evacuation)

- The number of eligible persons changes slightly every year depending on the number of residents who have moved in and out of the covered area. In the FY2018 survey, 214,718 residents (22,744 aged 15 and under and 191,974 aged 16 and above) were eligible.

2) Contents

(1) Health check items

Health check items differ according to age group (Table 1). Blood tests for children aged 15 and under are conducted upon request.

Table 1. Health check items by age group

Age group	Health check items
Ages 0-6 (preschool children and infants)	Height, weight [The items below are performed upon request] CBC (number of red blood cells, hematocrit, hemoglobin, platelet count, number of white blood cells, differential white blood count)
Ages 7-15 (1st to 9th grade)	Height, weight, blood pressure, CBC (number of red blood cells, hematocrit, hemoglobin, platelet count, number of white blood cells, differential white blood count) [The items below are performed upon request] Blood biochemistry (AST, ALT, γ-GT, TG, HDL-C, LDL-C, HbA1c, plasma glucose, serum creatinine, uric acid)
Age 16 and above	Height, weight, abdominal circumference (BMI), blood pressure, CBC (Number of red blood cells, hematocrit, hemoglobin, platelet count, number of white blood cells, differential white blood count), Urine test (urine sugar, urine protein, urine occult blood), Blood biochemistry (AST, ALT, γ-GT, TG, HDL-C, LDL-C, HbA1c, plasma glucose, serum creatinine, estimated glomerular filtration rate [eGFR], uric acid) *The underlined values are not measured in specific health checks.

(2) Method of CHC

Considering that residents in the designated evacuation zone have relocated within and outside the prefecture, venues for health checks are to be arranged for their convenience (Table 2).

(3) Timeline of CHC

Since FY2012, each type of health checks has been conducted in the same season every year (Figure 1).

<For residents living in the prefecture>

For those aged 16 and above residing in 12 municipalities of the designated evacuation zone (excluding Date City), additional health check items are added to the specific health checks (health checks focusing on metabolic syndrome) or general health checks conducted by the municipalities.

In addition, group and individual health checks at health check facilities are conducted from January to March for those who were not able to take the above health checks (Figures 2 and 3).

For those aged 15 and under, health checks are conducted from July to December (Figure 4).

<For residents living outside the prefecture>

Health check facilities near their residence in other prefectures are arranged for residents living outside the prefecture. Information is sent to them from the end of June.

(4) Participation rates

The participation rate of individuals aged 15 and under was 19.7% in FY2018, a decrease of 44.8 points compared to 64.5% in FY2011, and a decrease of 3.1 points compared to 22.8% in

Table 2. Implementation method

Age	Place of residence	Implementation method	No. of cooperating health check facilities in FY2018	Health check type
16 and above	In the prefecture	Additional health check items are added to specific health checks or general health checks conducted by the municipalities	—	General health check conducted by municipalities in the covered area
		Individual health checks conducted at designated health check facilities in the prefecture	471 facilities	Individual health check in the prefecture
		Group health checks conducted by FMU	29 venues in the prefecture (48 times in total)	Group health check in the prefecture
	Outside the prefecture	Additional health check items are added to the specific health checks or general health checks conducted by the municipalities	—	General health check offered by municipalities in the covered area
		Individual health checks conducted outside the prefecture	635 facilities (249 of them are also offering pediatric health checks)	Individual health check outside the prefecture
15 and under	In the prefecture	Pediatric health checks at designated health check facilities in the prefecture	94 facilities	Pediatric health check in the prefecture
	Outside the prefecture	Pediatric health checks at designated health check facilities outside the prefecture	376 facilities (249 of them are also offering health checks for those aged 16 and above)	Pedicatric health check outside the prefecture

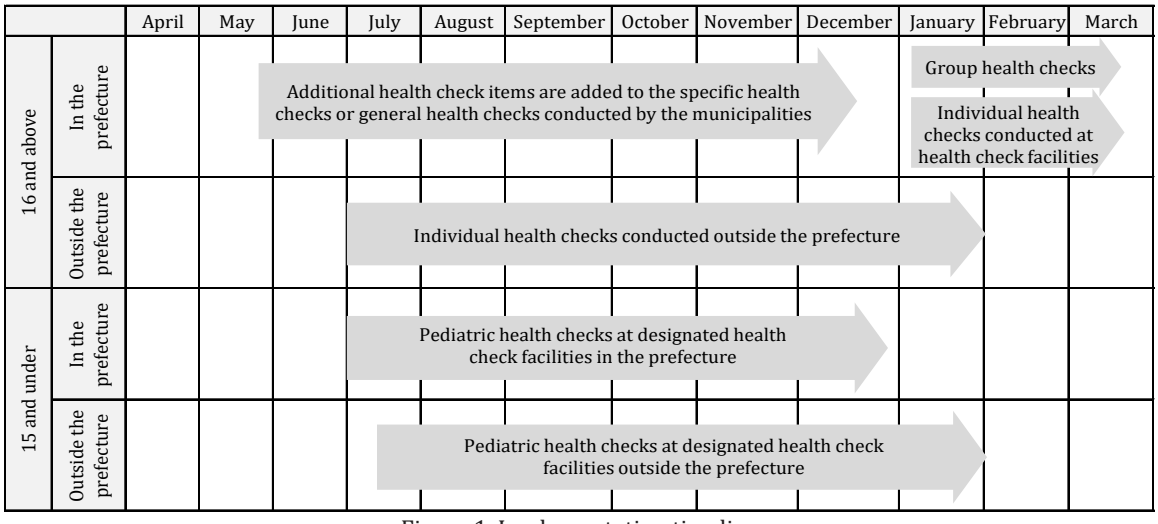
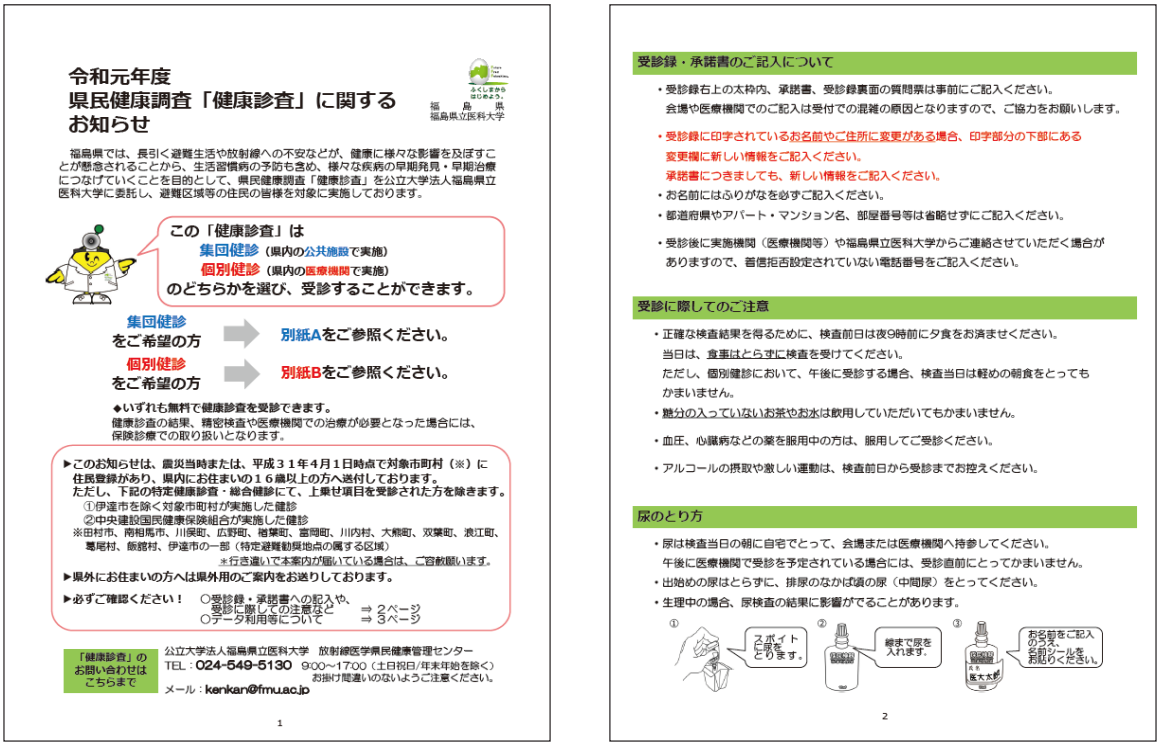


Figure 1. Implementation timeline

FY2017 (Table 3, Figure 5).

The participation rate for individuals aged 16 and above was 20.2% in FY2018, a decrease of 10.7 points compared to 30.9% in FY2011 and a decrease of 0.3 points compared to 20.5% in FY2017 (Table 4, Figure 6).

The numbers of participants in the age groups of 0-6, 7-15, 16-39, and 40-64 have been decreasing year by year, while it has been increasing in the age group of 65 and above (Table 5, Figure 7).



令和元年度
県民健康調査「健康診査」に関する
お知らせ

福島県
福島県立医科大学

福島県では、長引く避難生活や放射線への不安などが、健康に様々な影響を及ぼすことが懸念されることから、生活習慣病の予防も含め、様々な疾病の早期発見・早期治療につなげていくことを目的として、県民健康調査「健康診査」を公立大学法人福島県立医科大学に委託し、避難区域等の住民の皆様を対象に実施しております。

この「健康診査」は
集団健診（県内の公共施設で実施）
個別健診（県内の医療機関で実施）
のどちらかを選び、受診することができます。

集団健診をご希望の方 ⇒ 別紙Aをご参照ください。
個別健診をご希望の方 ⇒ 別紙Bをご参照ください。

◆いずれも無料で健康診査を受診できます。
健康診査の結果、精密検査や医療機関での治療が必要となった場合には、保険診療での取り扱いとなります。

▶このお知らせは、震災当時または、平成３１年４月１日時点で対象市町村（※）に住民登録があり、県内にお住まいの１６歳以上の方へ送付しております。
ただし、下記の特定健康診査・総合健診にて、上乗せ項目を受診された方を除きます。
①伊達市を除く対象市町村が実施した健診
②中央建設国民健康保険組合が実施した健診
※田村市、南相馬市、川俣町、広野町、楢葉町、富岡町、川内村、大熊町、双葉町、浪江町、葛尾村、飯舘村、伊達市の一部（特定避難勧奨地点の属する区域）
＊行き違いで本案内が届いている場合は、ご容赦願います。

▶県外にお住まいの方へは県外用のご案内をお送りしております。

▶必ずご確認ください！ ○受診録・承諾書への記入や、受診に際しての注意など ⇒ 2ページ
○データ利用等について ⇒ 3ページ

「健康診査」のお問い合わせはこちらまで
公立大学法人福島県立医科大学 放射線医学県民健康管理センター
TEL：024-549-5130 9:00～17:00（土日祝日/年末年始を除く）
お掛け間違いのないようご注意ください。
メール：kenkan@fmu.ac.jp

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受診録・承諾書のご記入について

・受診録右上の太枠内、承諾書、受診録裏面の質問票は事前にご記入ください。
会場や医療機関でのご記入は受付での混雑の原因となりますので、ご協力をお願いします。
・受診録に印字されているお名前やご住所に変更がある場合、印字部分の下部にある変更欄に新しい情報をご記入ください。
承諾書につきましても、新しい情報をご記入ください。
・お名前にはふりがなを必ずご記入ください。
・都道府県やアパート・マンション名、部屋番号等は省略せずにご記入ください。
・受診後に実施機関（医療機関等）や福島県立医科大学からご連絡させていただく場合がありますので、着信拒否設定されていない電話番号をご記入ください。

受診に際してのご注意

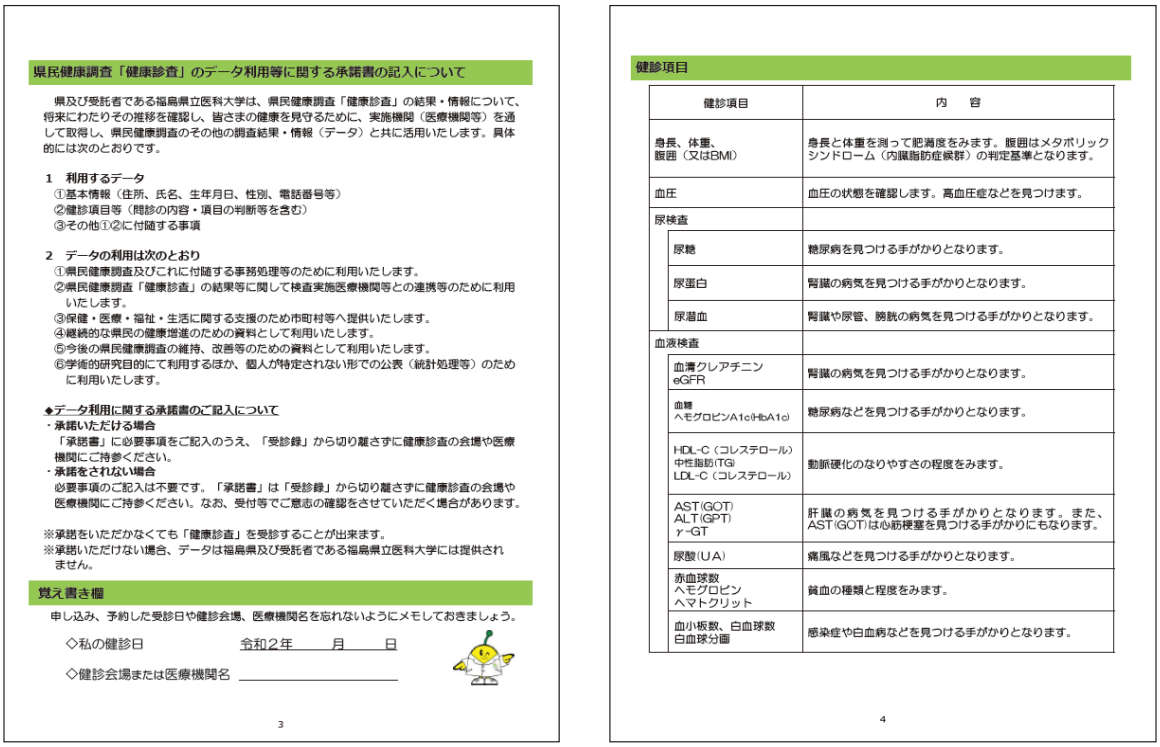
・正確な検査結果を得るために、検査前日は夜9時前に夕食をお済ませください。
当日は、食事はとらずに検査を受けてください。
ただし、個別健診において、午後に受診する場合、検査当日は軽めの朝食をとってもかまいません。
・糖分の入っていないお茶やお水は飲用していただいてもかまいません。
・血圧、心臓病などの薬を服用中の方は、服用してご受診ください。
・アルコールの摂取や激しい運動は、検査前日から受診までお控えください。

尿のとり方

・尿は検査当日の朝に自宅でとって、会場または医療機関へ持参してください。
午後に医療機関で受診を予定されている場合には、受診直前にとってかまいません。
・出始めの尿はとらずに、排尿のなかば頃の尿（中間尿）をとってください。
・生理中の場合、尿検査の結果に影響がでることがあります。

① スポイトで尿をとります。
② 線まで尿を入れます。
③ お名前をご記入のうえ、名前シールを貼りください。

2



県民健康調査「健康診査」のデータ利用等に関する承諾書の記入について

県及び受託者である福島県立医科大学は、県民健康調査「健康診査」の結果・情報について、将来にわたりその推移を確認し、皆さまの健康を見守るために、実施機関（医療機関等）を通して取得し、県民健康調査のその他の調査結果・情報（データ）と共に活用いたします。具体的には次のとおりです。

1 利用するデータ
①基本情報（住所、氏名、生年月日、性別、電話番号等）
②健診項目等（問診の内容・項目の判断等を含む）
③その他①②に付随する事項

2 データの利用は次のとおり
①県民健康調査及びこれに付随する事務処理等のために利用いたします。
②県民健康調査「健康診査」の結果等に関して検査実施医療機関等との連携等のために利用いたします。
③保健・医療・福祉・生活に関する支援のため市町村等へ提供いたします。
④継続的な県民の健康増進のための資料として利用いたします。
⑤今後の県民健康調査の維持、改善等のための資料として利用いたします。
⑥学術的研究目的にて利用するほか、個人が特定されない形での公表（統計処理等）のために利用いたします。

◆データ利用に関する承諾書のご記入について
・承諾いただける場合
「承諾書」に必要事項をご記入のうえ、「受診録」から切り離さずに健康診査の会場や医療機関にご持参ください。
・承諾をされない場合
必要事項のご記入は不要です。「承諾書」は「受診録」から切り離さずに健康診査の会場や医療機関にご持参ください。なお、受付等でご意志の確認をさせていただく場合があります。

※承諾をいただかなくても「健康診査」を受診することが出来ます。
※承諾いただけない場合、データは福島県及び受託者である福島県立医科大学には提供されません。

覚え書き欄

申し込み、予約した受診日や健診会場、医療機関名を忘れないようにメモしておきましょう。

◇私の健診日 令和２年 月 日

◇健診会場または医療機関名 ＿＿＿＿＿＿＿＿

3

健診項目

健診項目	内 容
身長、体重、腹囲（又はBMI）	身長と体重を測って肥満度をみます。腹囲はメタボリックシンドローム（内臓脂肪症候群）の判定基準となります。
血圧	血圧の状態を確認します。高血圧症などを見つけます。
尿検査	
尿糖	糖尿病を見つける手がかりとなります。
尿蛋白	腎臓の病気を見つける手がかりとなります。
尿潜血	腎臓や尿管、膀胱の病気を見つける手がかりとなります。
血液検査	
血清クレアチニン eGFR	腎臓の病気を見つける手がかりとなります。
血糖 ヘモグロビンA1c(HbA1c)	糖尿病などを見つける手がかりとなります。
HDL-C（コレステロール） 中性脂肪(TG) LDL-C（コレステロール）	動脈硬化のなりやすさの程度をみます。
AST(GOT) ALT(GPT) γ-GT	肝臓の病気を見つける手がかりとなります。また、AST(GOT)は心筋梗塞を見つける手がかりにもなります。
尿酸(UA)	痛風などを見つける手がかりとなります。
赤血球数 ヘモグロビン ヘマトクリット	貧血の種類と程度をみます。
血小板数、白血球数 白血球分画	感染症や白血病などを見つける手がかりとなります。

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Figure 3. Invitation to group and individual health checks (FY2019, p. 3, p. 4)

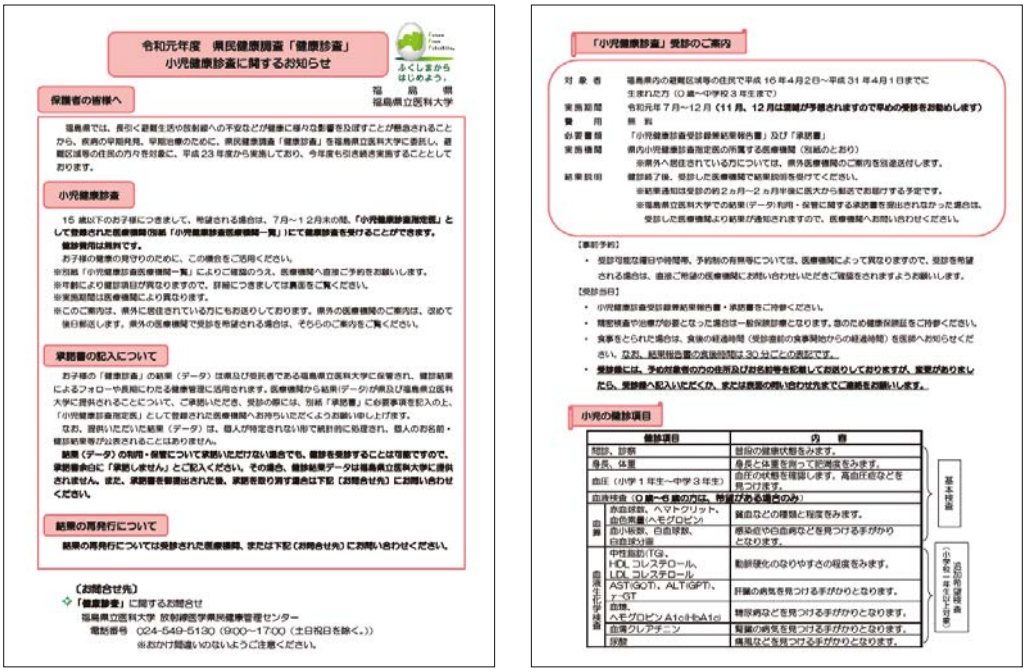


Figure 4. Invitation to pediatric health checks (FY2019)

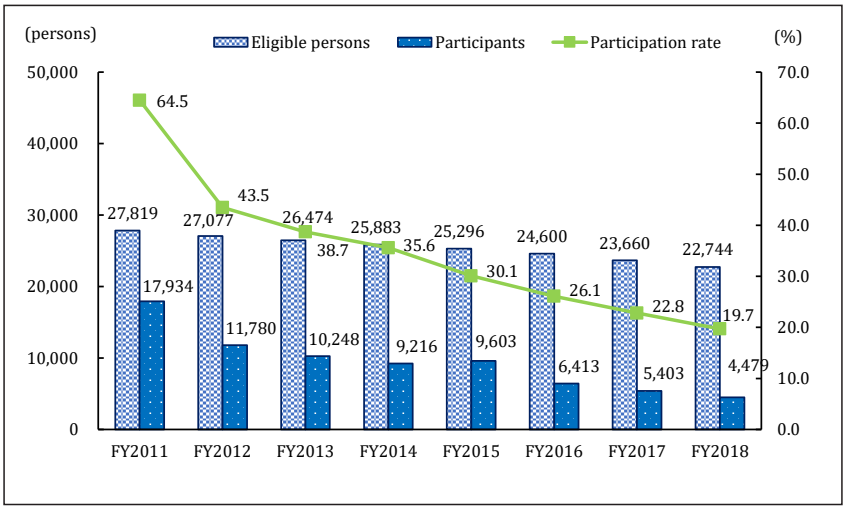


Figure 5. Number of eligible persons, number of participants, and participation rates (residents aged 15 and under)

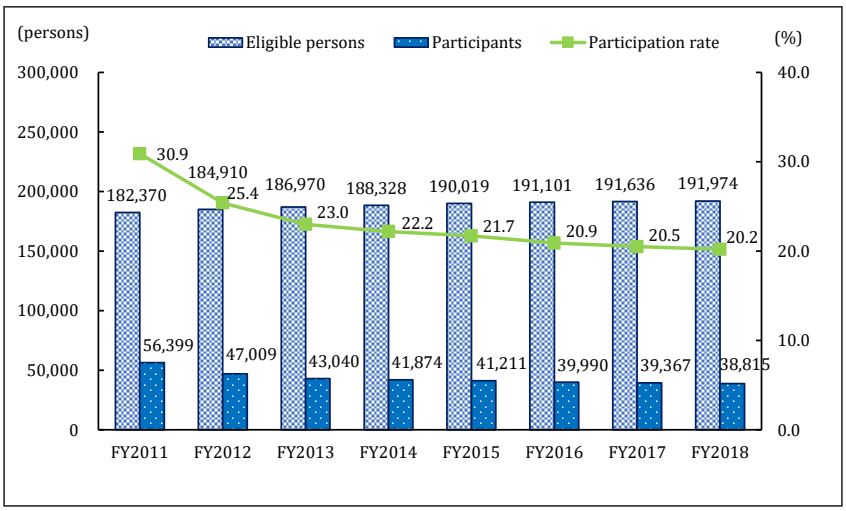


Figure 6. Number of eligible persons, number of participants, and participation rates (residents aged 16 and above)

Table 3. Number of participants (aged 15 and under), by healath check type and venue (in or outside the prefecture)

	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
	Data as of Sep. 11, 2012	Data as of Jul. 5, 2013	Data as of Sep. 1, 2014	Data as of Sep. 1, 2015	Data as of Sep. 1, 2016	Data as of Dec. 31, 2017	Data as of Mar. 31, 2018	Data as of Mar. 31, 2019
Eligible persons	27,819	27,077	26,474	25,883	25,296	24,600	23,660	22,744
Pediatric health check in the prefecture	15,002	9,534	8,432	7,432	6,206	5,193	4,474	3,648
Pediatric health check outside the prefecture	2,949	2,283	1,822	1,792	1,403	1,226	929	834
Those who participated in more than one of the above	17	37	6	8	6	6	0	3
Total (excl. duplicates)	17,934	11,780	10,248	9,216	7,603	6,413	5,403	4,479
Participation rate (%)	64.5%	43.5%	38.7%	35.6%	30.1%	26.1%	22.8%	19.7%

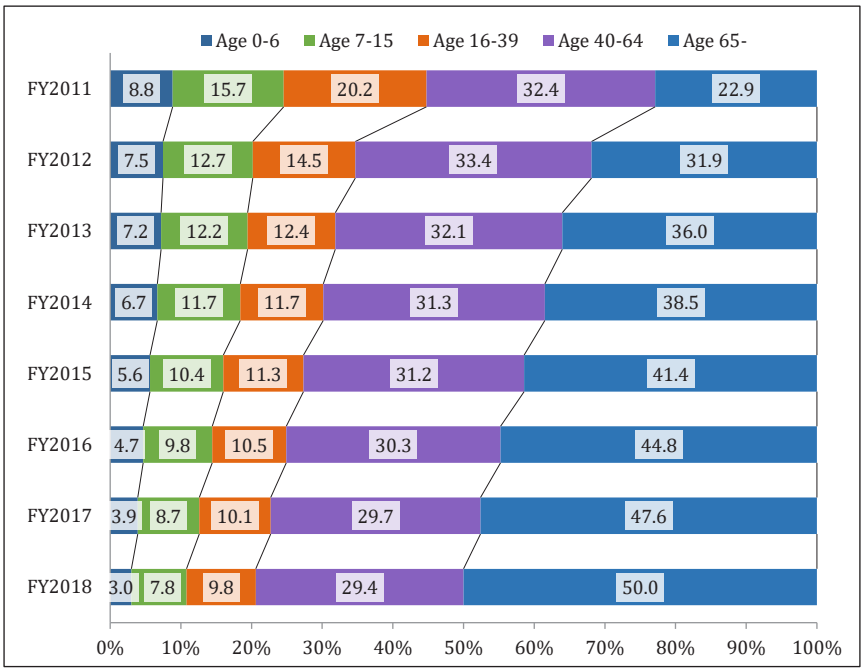
Table 4. Number of participants (aged 16 and above), by healath check type and venue (in or outside the prefecture)

	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
	Data as of Sep. 11, 2012	Data as of Jul. 5, 2013	Data as of Sep. 1, 2014	Data as of Sep. 1, 2015	Data as of Sep. 1, 2016	Data as of Dec. 31, 2017	Data as of Mar. 31, 2018	Data as of Mar. 31, 2019
Eligible persons	182,370	184,910	186,970	188,328	190,019	191,101	191,636	191,974
General health check conducted by municipalities	8,798	23,907	25,604	25,913	26,195	26,636	26,411	26,140
Individual health check in the prefecture	—	6,692	5,806	4,927	4,443	3,941	3,782	3,730
Group health check in the prefecture	41,949	10,603	6,767	5,808	5,183	4,341	3,963	3,776
Individual health check outside the prefecture	3,815	3,055	3,205	3,418	3,332	2,118	2,102	2,087
Other *1, *2	2,045	3,206	2,017	1,846	2,113	3,011	3,154	3,122
Those who participated in more than one of the above	208	454	359	38	55	57	45	40
Total (excl. duplicates)	56,399	47,009	43,040	41,874	41,211	39,990	39,367	38,815
Participation rate (%)	30.9%	25.4%	23.0%	22.2%	21.7%	20.9%	20.5%	20.2%

*1 Other health checks conducted in the prefecture by local medical associations or health check facilities entrusted by each municipality
*2 Other health checks conducted outside the prefecture by health check facilities entrusted by each municipality

Table 5. Number of participants by age group (persons)

	Ages 0-6	Ages 7-15	Ages 16-39	Ages 40-64	Ages 65-
FY2011	6,462	11,481	14,762	23,651	16,726
FY2012	4,365	7,437	8,480	19,553	18,642
FY2013	3,802	6,429	6,536	16,922	18,969
FY2014	3,328	5,840	5,843	15,594	19,166
FY2015	2,655	4,903	5,354	14,748	19,559
FY2016	2,057	4,315	4,632	13,386	19,768
FY2017	1,647	3,712	4,309	12,677	20,299
FY2018	1,220	3,169	3,979	11,948	20,337



(The numbers in the graph are rounded off, so their total may not be exactly 100%.)

Figure 7. Age structure of participants

3. Results and analyses

1) Results

(1) Results of pediatric health checks (for residents aged 15 and under)

A) Height and weight

a Results

In FY2018, the average height of boys was 0.4 cm lower than in FY2011 in those aged 10 months to less than 1 year, and was slightly lower than in FY2011 in those aged 1 year to less than 1 year 2 months, 1 year 4 months to less than 1 year 8 months, 1 year 10 months to less than 3 years, 4 years 6 months to less than 5 years, and 5 years 6 months to less than 6 years. The average height was slightly higher than in FY2011 in those aged 1 year 2 months to less than 1 year 4 months, 1 year 8 months to less than 1 year 10 months, 3 years to less than 4 years 6 months, and 5 years to less than 5 years 6 months (Table 6).

In FY2018, the average weight of boys was 0.7 kg less than in FY2011 in those aged 10 months to less than 1 year, and was slightly less than in FY2011 in those aged 1 year to less than 5 years and 5 years 6 months to less than 6 years. The average weight was slightly greater than in FY2011 in those aged 5 years to less than 5 years 6 months (Table 7).

In FY2018, the average height of girls was 1.2 cm lower than in FY2011 in those aged 10 months to less than 1 year, and was slightly lower than in FY2011 in those aged 1 year to less than 1 year 4 months, 1 year 8 months to less than 1 year 10 months, and 2 years to less than 2 years 6 months. The average height was unchanged compared with FY2011 in those aged 5 years to less than 5 years 6 months and was slightly higher than in

FY2011 in those aged 1 year 4 months to less than 1 year 8 months, 1 year 10 months to less than 2 years, 2 years 6 months to less than 5 years, and 5 years 6 months to less than 6 years (Table 8).

In FY2018, the average weight of girls was 0.6 kg less than in FY2011 in those aged 10 months to less than 1 year, and was slightly less than in FY2011 in those aged 1 year to less than 2 years 6 months, 3 years to less than 4 years 6 months, and 5 years to less than 5 years 6 months. There was no change in those aged 2 years 6 months to less than 3 years, and was slightly greater than in FY2011 in those aged 4 years 6 months to less than 5 years and 5 years 6 months to less than 6 years (Table 9).

For boys aged 6 and above, the average height of elementary and junior high school boys (aged 6 to 14) was higher in FY2018 than in FY2011 for all ages, and higher than the national average for

Table 6. Pediatric health check results (Boys/Height)

Boys/Height		FY2011		FY2018		
Age group		Number	Average (cm)	Number	Average (cm)	Median (cm)
10 mo - < 2 yr	10 mo - < 1 yr	44	73.6	21	73.2	73.0
	1 yr -	77	74.8	28	74.3	74.3
	1 yr 2 mo -	68	76.5	20	76.6	76.4
	1 yr 4 mo -	93	78.7	18	77.9	77.5
	1 yr 6 mo -	80	81.2	13	78.1	78.0
	1 yr 8 mo -	73	82.1	16	82.2	82.5
	1 yr 10 mo - < 2 yr	83	83.8	17	82.5	82.5
2 yr - < 6 yr	2 yr -	281	86.6	58	86.0	86.0
	2 yr 6 mo -	269	90.7	48	90.6	90.6
	3 yr -	281	94.8	55	94.9	94.7
	3 yr 6 mo -	257	98.6	54	99.0	99.1
	4 yr -	258	101.7	58	102.3	102.3
	4 yr 6 mo -	280	105.7	45	104.2	104.0
	5 yr -	286	108.5	41	109.8	110.3
	5 yr 6 mo - < 6 yr	293	111.4	57	111.2	111.2
	Total	2,723		549		

Table 7. Pediatric health check results (Boys/Weight)

Boys/Weight		FY2011		FY2018		
Age group		Number	Average (kg)	Number	Average (kg)	Median (kg)
10 mo - < 2 yr	10 mo - < 1 yr	44	9.8	21	9.1	9.1
	1 yr -	77	9.9	28	9.4	9.3
	1 yr 2 mo -	68	10.4	20	10.0	10.1
	1 yr 4 mo -	93	10.9	18	10.0	10.2
	1 yr 6 mo -	80	11.2	13	10.0	9.9
	1 yr 8 mo -	73	11.6	16	11.4	11.8
	1 yr 10 mo - < 2 yr	83	12.0	17	11.6	11.4
2 yr - < 6 yr	2 yr -	281	12.7	58	12.1	12.0
	2 yr 6 mo -	269	13.8	48	13.2	13.3
	3 yr -	281	14.8	55	14.5	14.5
	3 yr 6 mo -	257	15.9	54	15.3	15.3
	4 yr -	258	16.8	58	16.7	16.1
	4 yr 6 mo -	280	17.9	45	16.9	16.6
	5 yr -	286	18.7	41	19.2	19.1
	5 yr 6 mo - < 6 yr	293	20.0	57	19.5	19.0
	Total	2,723		549		

Table 8. Pediatric health check results (Girls/Height)

Girls/Height		FY2011		FY2018		
Age group		Number	Average (cm)	Number	Average (cm)	Median (cm)
10 mo - < 2 yr	10 mo - < 1 yr	36	71.5	13	70.3	70.8
	1 yr -	79	73.7	21	73.0	73.0
	1 yr 2 mo -	85	75.1	11	74.7	75.5
	1 yr 4 mo -	80	77.4	14	78.0	78.0
	1 yr 6 mo -	78	78.9	13	80.4	80.3
	1 yr 8 mo -	86	81.2	15	80.9	80.4
	1 yr 10 mo - < 2 yr	98	82.0	15	82.5	83.2
2 yr - < 6 yr	2 yr -	263	85.4	52	85.3	85.0
	2 yr 6 mo -	288	89.9	45	90.9	91.2
	3 yr -	255	93.5	54	93.9	94.3
	3 yr 6 mo -	246	97.3	44	97.9	98.2
	4 yr -	275	100.6	65	100.9	101.5
	4 yr 6 mo -	253	104.2	40	105.9	106.0
	5 yr -	286	107.6	43	107.6	108.3
	5 yr 6 mo - < 6 yr	296	110.3	61	113.0	113.1
	Total	2,704		506		

Table 9. Pediatric health check results (Girls/Weight)

Girls/Weight		FY2011		FY2018		
Age group		Number	Average (kg)	Number	Average (kg)	Median (kg)
10 mo - < 2 yr	10 mo - < 1 yr	36	8.9	13	8.3	7.9
	1 yr -	79	9.4	21	8.8	8.8
	1 yr 2 mo -	85	9.7	11	9.4	9.3
	1 yr 4 mo -	80	10.3	14	10.2	10.6
	1 yr 6 mo -	79	10.5	13	10.3	10.6
	1 yr 8 mo -	86	11.0	15	10.7	10.7
	1 yr 10 mo - < 2 yr	98	11.2	15	11.1	11.0
2 yr - < 6 yr	2 yr -	263	12.1	52	11.7	11.9
	2 yr 6 mo -	288	13.2	45	13.2	13.3
	3 yr -	255	14.1	54	13.9	13.7
	3 yr 6 mo -	246	15.2	44	14.8	14.9
	4 yr -	275	16.4	65	16.2	16.0
	4 yr 6 mo -	253	17.2	40	17.7	17.4
	5 yr -	286	18.4	43	17.9	17.5
	5 yr 6 mo - < 6 yr	296	19.3	61	20.8	20.1
	Total	2,705		506		

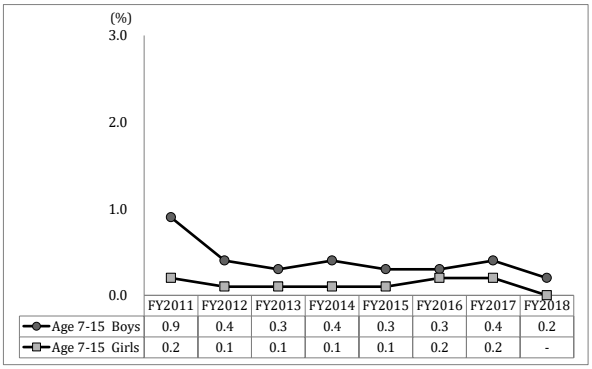
the same year in all ages. A similar trend was observed for the height of high school boys (aged 15) in FY2018. In addition, compared to the national average, Fukushima children were taller in age groups of 7 years and 10-15 years in FY2011, and taller in all age groups in FY2018 (Table 10).

For boys aged 6 and above, the average weight of elementary and junior high school boys (aged 6 to 14) was higher in FY2018 than in FY2011 at all ages except 6, 8, 12, and 13, and higher than the national average for the same year at all ages. The weight of high school boys (aged 15) was lower in FY2018 than that in FY2011, but higher than the national average for the same year. Compared to the national averages, Fukushima's averages were higher at all ages in both FY2011 and FY2018 (Table 10).

For girls aged 6 and above, the average height of elementary and junior high school girls (aged 6 to 14) was higher in FY2018 than in FY2011 for ages 6, 7, 9, 11, 13, and 14, and higher than the national average for the same year for ages 6, 7, 9, and 11. The average height of high school girls (aged 15) was lower in FY2018 than in FY2011, and also lower than the national average for the same year. Compared to the national averages, Fukushima children aged 8 to 12 were taller in FY2011, and children aged 6, 7, 9, and 11 were taller than the national average in FY2018 (Table 10).

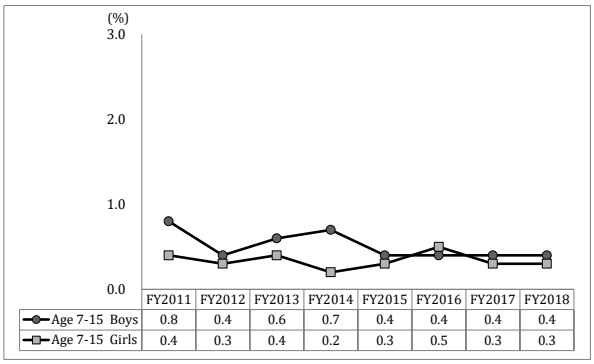
For girls aged 6 and above, the average weight of elementary and junior high school girls (aged 6 to 14) was less in FY2018 than in FY2011 for all ages except for ages 6 and 7, but was greater than the national averages for the same year at all ages except for age 12. The average weight of high school girls (aged 15) was less in FY2018 than in FY2011, but greater than the national average for the same year. In addition, compared to the national averages, Fukushima's averages were higher in FY2011 for all ages and also higher in FY2018 for all ages except for age 12.

However, due to the small number of participants, representativeness of these results requires careful consideration (Table 10).



	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Age 7-15 Boys	0.9	0.4	0.3	0.4	0.3	0.3	0.4	0.2
Age 7-15 Girls	0.2	0.1	0.1	0.1	0.1	0.2	0.2	-

Figure 9. Proportion of boys and girls with systolic blood pressure of 140 mmHg or higher



	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Age 7-15 Boys	0.8	0.4	0.6	0.7	0.4	0.4	0.4	0.4
Age 7-15 Girls	0.4	0.3	0.4	0.2	0.3	0.5	0.3	0.3

Figure 10. Proportion of boys and girls with diastolic blood pressure of 90 mmHg or higher

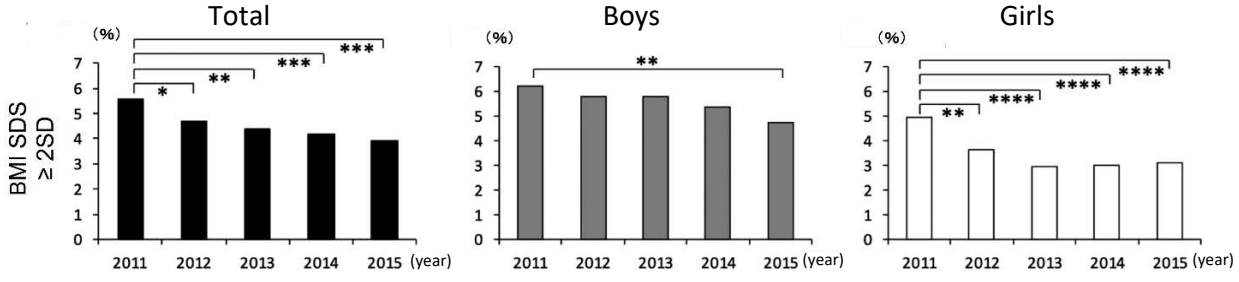


Figure 8. Children's BMI over 5 years after the earthquake[2)]

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Table 10. Comparison with the School Health Statistics Survey of the Ministry of Education, Culture, Sports, Science and Technology

Boys (Ages 6-15)/Height

(cm)

	Age	MEXT School Health Statistics Survey						Pediatric Health Check (Fukushima)				Difference	
		National average in FY2011	National average in FY2018	FY2011 vs. FY2018 in Japan	Fukushima's average in FY2012	Fukushima's average in FY2018	FY2011 vs. FY2018 in Fukushima	Average in FY2011		Average in FY2018		FY2011 vs. FY2018 in Fukushima	National vs. Fukushima in FY2018
		(a)	(b)	(b)-(a)	(c)	(d)	(d)-(c)	persons	(e)	persons	(f)	(f)-(e)	(f)-(b)
Elementary School	6	116.6	116.5	△ 0.1	116.6	116.6	0.0	584	116.6	121	117.3	0.7	0.8
	7	122.6	122.5	△ 0.1	122.3	122.5	0.2	630	122.8	169	123.3	0.5	0.8
	8	128.2	128.1	△ 0.1	128.3	128.7	0.4	692	128.1	201	128.4	0.3	0.3
	9	133.5	133.7	0.2	133.7	133.6	△ 0.1	633	133.4	194	134.0	0.6	0.3
	10	138.8	138.8	0.0	138.8	139.0	0.2	682	139.3	177	139.7	0.4	0.9
	11	145.0	145.2	0.2	145.6	145.8	0.2	669	145.5	174	147.1	1.6	1.9
Junior high school	12	152.3	152.7	0.4	153.3	153.5	0.2	662	153.2	183	153.8	0.6	1.1
	13	159.6	159.8	0.2	160.1	160.3	0.2	568	160.1	170	160.3	0.2	0.5
	14	165.1	165.3	0.2	165.2	165.4	0.2	621	165.3	167	165.9	0.6	0.6
High school	15	168.3	168.4	0.1	168.6	168.4	△ 0.2	513	168.4	92	169.0	0.6	0.6

Boys (Ages 6-15)/Weight

(kg)

	Age	MEXT School Health Statistics Survey						Pediatric Health Check (Fukushima)				Difference	
		National average in FY2011	National average in FY2018	FY2011 vs. FY2018 in Japan	Fukushima's average in FY2012	Fukushima's average in FY2018	FY2011 vs. FY2018 in Fukushima	Average in FY2011		Average in FY2018		FY2011 vs. FY2018 in Fukushima	National vs. Fukushima in FY2018
		(a)	(b)	(b)-(a)	(c)	(d)	(d)-(c)	persons	(e)	persons	(f)	(f)-(e)	(f)-(b)
Elementary School	6	21.3	21.4	0.1	21.7	21.7	0.0	584	22.1	121	21.8	△ 0.3	0.4
	7	24.0	24.1	0.1	24.3	24.8	0.5	632	24.8	170	25.2	0.4	1.1
	8	27.0	27.2	0.2	27.5	28.4	0.9	692	28.4	200	28.3	△ 0.1	1.1
	9	30.3	30.7	0.4	31.6	31.5	△ 0.1	633	32.6	194	32.8	0.2	2.1
	10	33.8	34.1	0.3	34.3	34.9	0.6	682	36.0	177	36.0	0.0	1.9
	11	38.0	38.4	0.4	39.7	39.2	△ 0.5	721	40.5	174	40.6	0.1	2.2
Junior high school	12	43.8	44.0	0.2	45.7	45.9	0.2	662	46.9	183	44.7	△ 2.2	0.7
	13	49.0	48.8	△ 0.2	50.6	49.1	△ 1.5	568	51.2	170	49.6	△ 1.6	0.8
	14	54.2	54.0	△ 0.2	55.1	55.1	0.0	621	56.1	167	56.2	0.1	2.2
High school	15	59.4	58.6	△ 0.8	61.7	60.3	△ 1.4	513	60.0	92	58.9	△ 1.1	0.3

Girls (Ages 6-15)/Height

(cm)

	Age	MEXT School Health Statistics Survey						Pediatric Health Check (Fukushima)				Difference	
		National average in FY2011	National average in FY2018	FY2011 vs. FY2018 in Japan	Fukushima's average in FY2012	Fukushima's average in FY2018	FY2011 vs. FY2018 in Fukushima	Average in FY2011		Average in FY2018		FY2011 vs. FY2018 in Fukushima	National vs. Fukushima in FY2018
		(a)	(b)	(b)-(a)	(c)	(d)	(d)-(c)	persons	(e)	persons	(f)	(f)-(e)	(f)-(b)
Elementary School	6	115.6	115.6	0.0	115.7	115.8	0.1	533	115.6	131	116.9	1.3	1.3
	7	121.6	121.5	△ 0.1	122.0	121.7	△ 0.3	611	121.5	170	121.9	0.4	0.4
	8	127.4	127.3	△ 0.1	128.1	127.5	△ 0.6	623	127.5	199	127.3	△ 0.2	△ 0.0
	9	133.5	133.4	△ 0.1	133.5	133.8	0.3	652	133.6	178	134.0	0.4	0.6
	10	140.2	140.1	△ 0.1	139.7	140.6	0.9	675	140.4	191	139.8	△ 0.6	△ 0.3
	11	146.7	146.8	0.1	146.9	146.9	0.0	581	146.9	192	147.5	0.6	0.7
Junior high school	12	151.9	151.9	0.0	151.6	151.8	0.2	641	152.2	179	151.2	△ 1.0	△ 0.7
	13	155.0	154.9	△ 0.1	155.1	154.9	△ 0.2	645	154.6	143	154.8	0.2	△ 0.1
	14	156.6	156.6	0.0	156.2	156.7	0.5	610	156.4	156	156.5	0.1	△ 0.1
High school	15	157.1	157.1	0.0	156.7	156.5	△ 0.2	562	157.0	71	156.4	△ 0.6	△ 0.7

Girls (Ages 6-15)/Weight

(kg)

	Age	MEXT School Health Statistics Survey						Pediatric Health Check (Fukushima)				Difference	
		National average in FY2011	National average in FY2018	FY2011 vs. FY2018 in Japan	Fukushima's average in FY2012	Fukushima's average in FY2018	FY2011 vs. FY2018 in Fukushima	Average in FY2011		Average in FY2018		FY2011 vs. FY2018 in Fukushima	National vs. Fukushima in FY2018
		(a)	(b)	(b)-(a)	(c)	(d)	(d)-(c)	persons	(e)	persons	(f)	(f)-(e)	(f)-(b)
Elementary School	6	20.8	20.9	0.1	21.0	21.4	0.4	533	21.7	131	22.0	0.3	1.1
	7	23.4	23.5	0.1	24.1	24.0	△ 0.1	611	24.1	170	24.1	△ 0.0	0.6
	8	26.4	26.4	0.0	27.2	27.0	△ 0.2	623	27.4	199	26.8	△ 0.6	0.4
	9	29.8	30.0	0.2	30.2	31.0	0.8	652	31.0	178	30.1	△ 0.9	0.1
	10	34.0	34.1	0.1	34.0	34.6	0.6	675	35.7	191	35.0	△ 0.7	0.9
	11	38.8	39.1	0.3	40.0	40.3	0.3	641	40.5	192	40.2	△ 0.3	1.1
Junior high school	12	43.6	43.7	0.1	45.1	44.9	△ 0.2	641	45.8	179	42.9	△ 2.9	△ 0.8
	13	47.1	47.2	0.1	48.7	48.7	0.0	645	48.5	143	47.7	△ 0.8	0.5
	14	49.9	49.9	0.0	51.2	50.8	△ 0.4	610	51.8	156	50.3	△ 1.5	0.4
High school	15	51.4	51.6	0.2	53.1	52.6	△ 0.5	562	53.5	71	52.5	△ 1.0	0.9

b Analysis: *Relationship between post-disaster evacuation and obesity in children*

In the pediatric health check conducted from FY2011 to FY2012, some children aged 15 and under were found to be obese. To clarify changes in the number of obese children five years after the earthquake, we examined the body mass index (BMI: weight/height^2) standard deviation score (SDS) in the pediatric health check. The average BMI SDS value for all pediatric health check participants in 2011 was 0.113, and the average BMI SDS value gradually decreased from 2011 to 2015. This suggests that many children were obese after the earthquake, but the obesity score seems to have improved over the 5 years of follow-up[1), 2)] (Figure 8).

B) Hypertension

The number of those with hypertension tended to be higher in boys than in girls in all years. The number of boys with hypertension was the highest in FY2011, then decreased, and no substantial change was observed after FY2015. No substantial change was observed in girls (Figures 9 and 10).

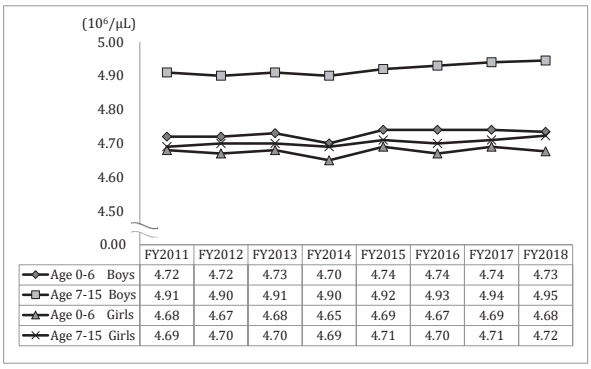
(Systolic blood pressure of 140 mmHg or higher and diastolic blood pressure of 90 mmHg or higher are reference values of hypertension based on the criteria used in group and individual health checks for those aged 16 and above)

C) Red blood cells, hemoglobin, and hematocrit

Averages of red blood cell count, hemoglobin, and hematocrit did not change substantially in any age groups of boys or girls (Figures 11 and 12; no graph for hematocrit).

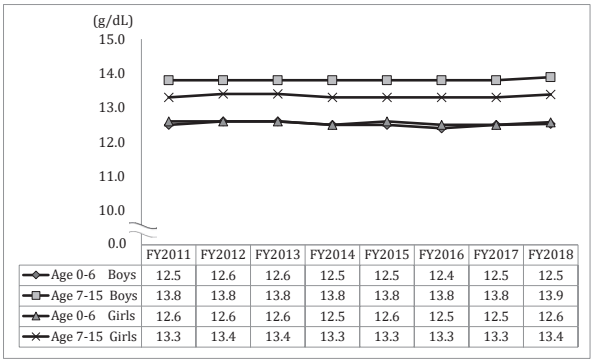
D) Platelet count

No substantial change in the mean platelet count was observed in any age group of boys or girls. (Figure 13)



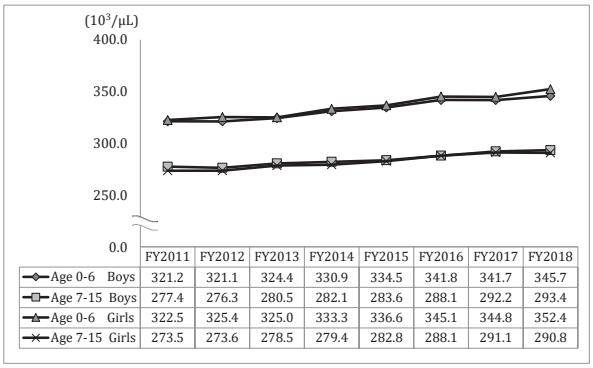
	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Age 0-6 Boys	4.72	4.72	4.73	4.70	4.74	4.74	4.74	4.73
Age 7-15 Boys	4.91	4.90	4.91	4.90	4.92	4.93	4.94	4.95
Age 0-6 Girls	4.68	4.67	4.68	4.65	4.69	4.67	4.69	4.68
Age 7-15 Girls	4.69	4.70	4.70	4.69	4.71	4.70	4.71	4.72

Figure 11. Changes in the mean red blood cell count (10^6/μL) (boys and girls)



	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Age 0-6 Boys	12.5	12.6	12.6	12.5	12.5	12.4	12.5	12.5
Age 7-15 Boys	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.9
Age 0-6 Girls	12.6	12.6	12.6	12.5	12.6	12.5	12.5	12.6
Age 7-15 Girls	13.3	13.4	13.4	13.3	13.3	13.3	13.3	13.4

Figure 12. Changes in the mean value of hemoglobin (g/dL) (boys and girls)

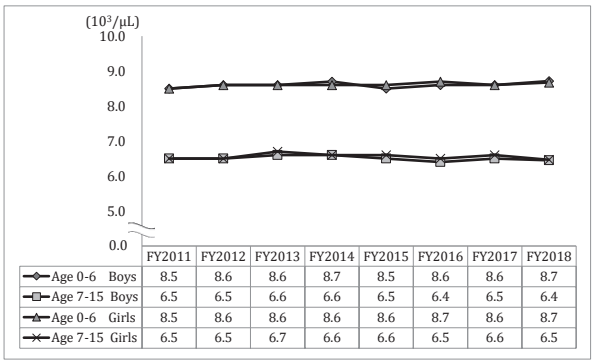


	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Age 0-6 Boys	321.2	321.1	324.4	330.9	334.5	341.8	341.7	345.7
Age 7-15 Boys	277.4	276.3	280.5	282.1	283.6	288.1	292.2	293.4
Age 0-6 Girls	322.5	325.4	325.0	333.3	336.6	345.1	344.8	352.4
Age 7-15 Girls	273.5	273.6	278.5	279.4	282.8	288.1	291.1	290.8

Figure 13. Changes in the mean platelet count (10^3/μL) (boys and girls)

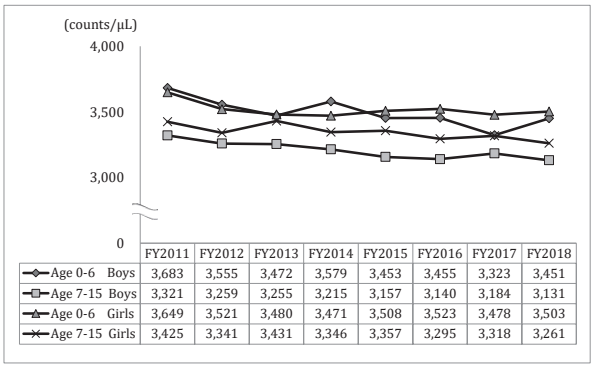
E) White blood cell count and differential

No substantial change was observed in the white blood cell count or differential in any age group of boys or girls (Figures 14 to 16; no graphs for monocyte, eosinophil, and basophil counts).



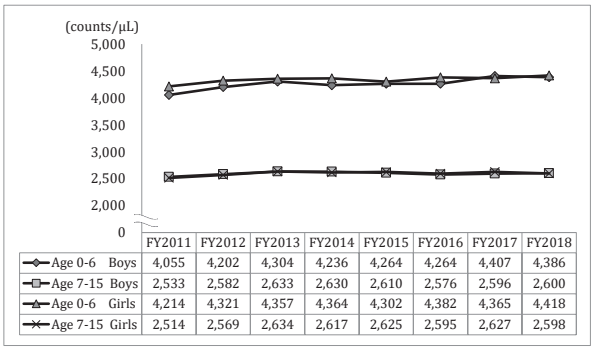
	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Age 0-6 Boys	8.5	8.6	8.6	8.7	8.5	8.6	8.6	8.7
Age 7-15 Boys	6.5	6.5	6.6	6.6	6.5	6.4	6.5	6.4
Age 0-6 Girls	8.5	8.6	8.6	8.6	8.6	8.7	8.6	8.7
Age 7-15 Girls	6.5	6.5	6.7	6.6	6.6	6.5	6.6	6.5

Figure 14. Changes in the mean white blood cell count (10^3/μL) (boys and girls)



	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Age 0-6 Boys	3,683	3,555	3,472	3,579	3,453	3,455	3,323	3,451
Age 7-15 Boys	3,321	3,259	3,255	3,215	3,157	3,140	3,184	3,131
Age 0-6 Girls	3,649	3,521	3,480	3,471	3,508	3,523	3,478	3,503
Age 7-15 Girls	3,425	3,341	3,431	3,346	3,357	3,295	3,318	3,261

Figure 15. Changes in the mean neutrophil count (per μL) (boys and girls)

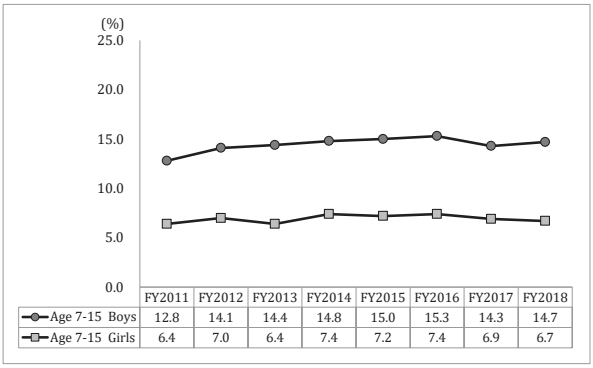


	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Age 0-6 Boys	4,055	4,202	4,304	4,236	4,264	4,264	4,407	4,386
Age 7-15 Boys	2,533	2,582	2,633	2,630	2,610	2,576	2,596	2,600
Age 0-6 Girls	4,214	4,321	4,357	4,364	4,302	4,382	4,365	4,418
Age 7-15 Girls	2,514	2,569	2,634	2,617	2,625	2,595	2,627	2,598

Figure 16. Changes in the mean lymphocyte count (per μL) (boys and girls)

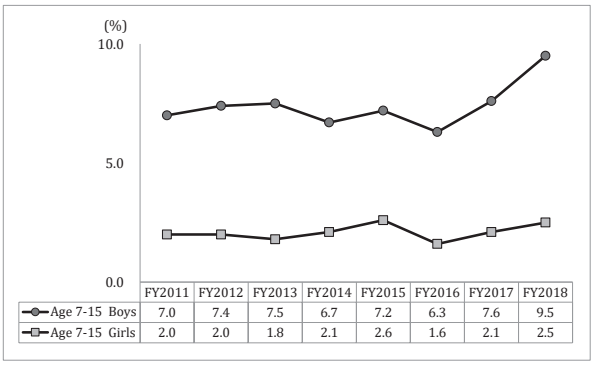
F) Liver function (AST, ALT, γ-GT)

The number of children with liver dysfunction was higher in boys than in girls in all years surveyed. There was no substantial change in these values for either boys or girls (Figures 17 to 19). (AST 31U/L or higher, ALT 31U/L or higher, and γ-GT 51U/L or higher are reference values used in group and individual health checks for those aged 16 and above.)



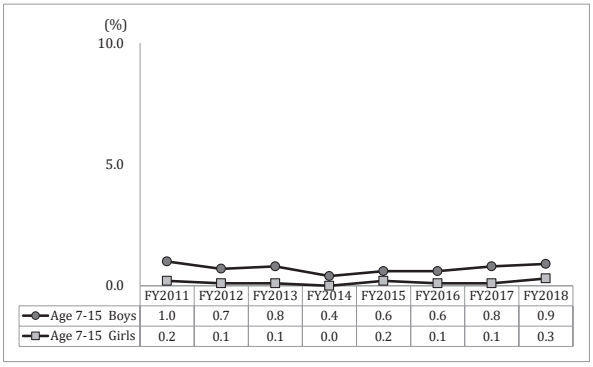
	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Age 7-15 Boys	12.8	14.1	14.4	14.8	15.0	15.3	14.3	14.7
Age 7-15 Girls	6.4	7.0	6.4	7.4	7.2	7.4	6.9	6.7

Figure 17. Changes in the proportion of AST 31U/L or higher (boys and girls)



	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Age 7-15 Boys	7.0	7.4	7.5	6.7	7.2	6.3	7.6	9.5
Age 7-15 Girls	2.0	2.0	1.8	2.1	2.6	1.6	2.1	2.5

Figure 18. Changes in the proportion of ALT 31U/L or higher (boys and girls)



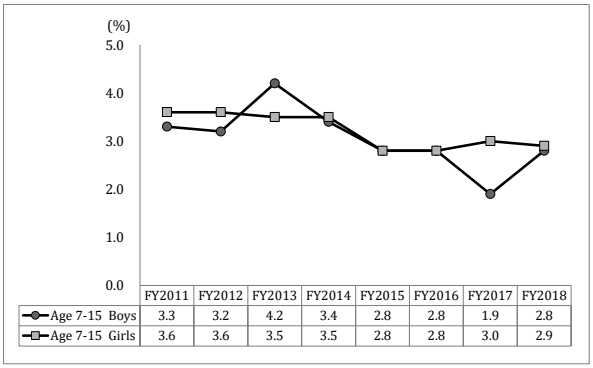
	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Age 7-15 Boys	1.0	0.7	0.8	0.4	0.6	0.6	0.8	0.9
Age 7-15 Girls	0.2	0.1	0.1	0.0	0.2	0.1	0.1	0.3

Figure 19. Changes in the proportion of γ-GT 51U/L or higher (boys and girls)

G) Lipids (LDL cholesterol, triglycerides, and HDL cholesterol)

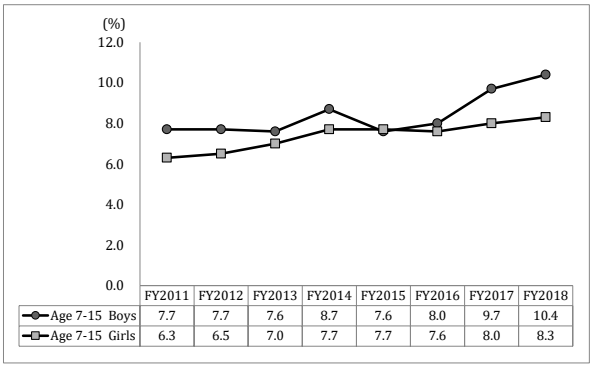
There was no substantial difference between boys and girls in the proportions of those with LDL-C 140 mg/dL or higher, triglycerides 150 mg/dL or higher, or HDL-C less than 40 mg/dL (Figures 20 to 22). There was also no substantial change in these values for either boys or girls.

(LDL-C of 140 mg/dL or higher is above reference values used in group and individual health checks for those aged 16 and above. Triglycerides of 150 mg/dL or more and HDL-C of less than 40 mg/dL are outside of reference values used in group and individual health checks for those aged 16 and above.)



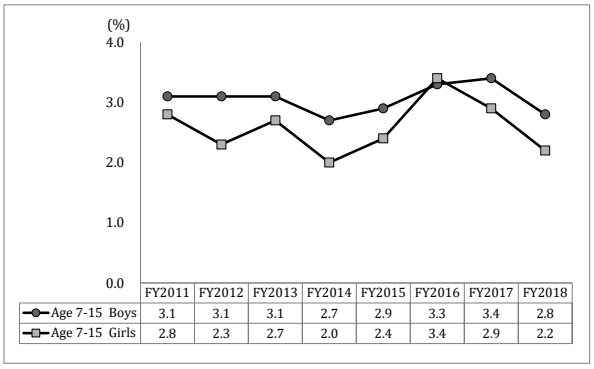
	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Age 7-15 Boys	3.3	3.2	4.2	3.4	2.8	2.8	1.9	2.8
Age 7-15 Girls	3.6	3.6	3.5	3.5	2.8	2.8	3.0	2.9

Figure 20. Changes in the proportion of LDL-C 140 mg/dL or higher (boys and girls)



	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Age 7-15 Boys	7.7	7.7	7.6	8.7	7.6	8.0	9.7	10.4
Age 7-15 Girls	6.3	6.5	7.0	7.7	7.7	7.6	8.0	8.3

Figure 21. Changes in the proportion of TG of 150 mg/dL or more (boys and girls)



	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Age 7-15 Boys	3.1	3.1	3.1	2.7	2.9	3.3	3.4	2.8
Age 7-15 Girls	2.8	2.3	2.7	2.0	2.4	3.4	2.9	2.2

Figure 22. Changes in the proportion of HDL-C less than 40 mg/dL (boys and girls)

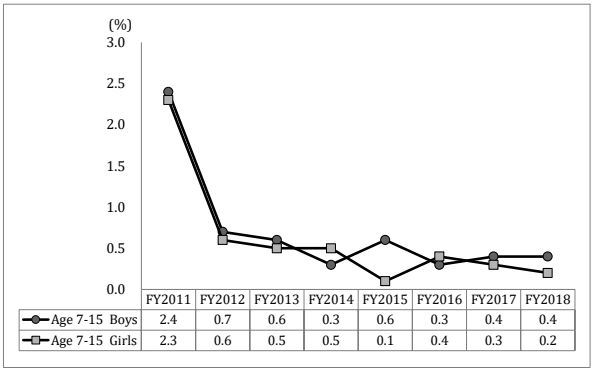
H) Glucose tolerance (fasting plasma glucose, HbA1c)

The proportion of both boys and girls with a fasting plasma glucose level of 110 mg/dL or higher peaked in FY2011, decreased in FY2012, and has not changed substantially since then (Figure 23).

There was no substantial difference in the proportion of boys or girls with HbA1c of 5.8% or higher, for which countermeasures are required. The proportion decreased from FY2011 to FY2013 for both boys and girls, followed by small increases and decreases (Figure 24).

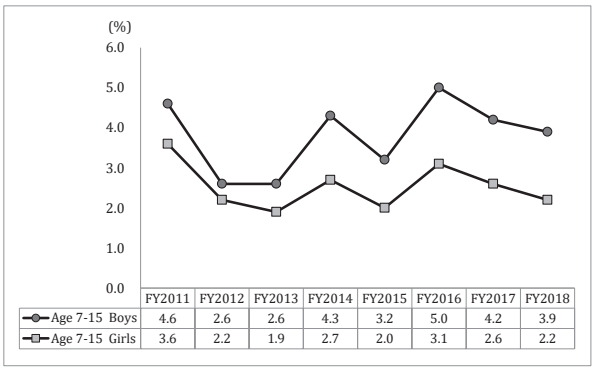
The proportion of those with HbA1c of 6.5% or higher, which is highly suspicious for diabetes, did not differ substantially between boys and girls, nor did it show a substantial change in either boys or girls (Figure 25).

(HbA1c of 5.8% or higher and 6.5% or higher are indicators of concern, as described in the "Treatment Guide for Diabetes 2012-2013")



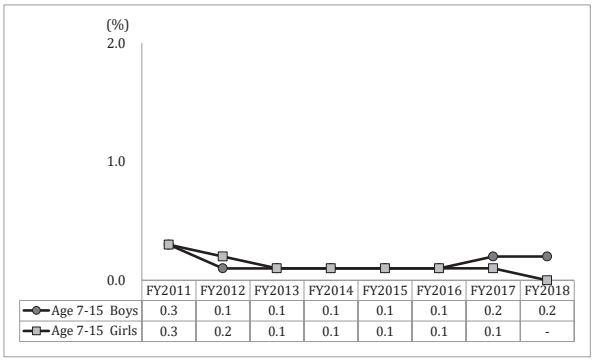
	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Age 7-15 Boys	2.4	0.7	0.6	0.3	0.6	0.3	0.4	0.4
Age 7-15 Girls	2.3	0.6	0.5	0.5	0.1	0.4	0.3	0.2

Figure 23. Changes in the proportion of those with fasting blood glucose of 110 mg/dL or higher (boys and girls)



	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Age 7-15 Boys	4.6	2.6	2.6	4.3	3.2	5.0	4.2	3.9
Age 7-15 Girls	3.6	2.2	1.9	2.7	2.0	3.1	2.6	2.2

Figure 24. Changes in the proportion of those with HbA1c of 5.8% or higher (boys and girls)



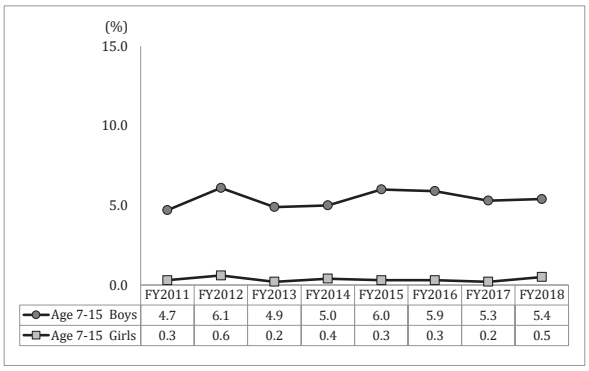
	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Age 7-15 Boys	0.3	0.1	0.1	0.1	0.1	0.1	0.2	0.2
Age 7-15 Girls	0.3	0.2	0.1	0.1	0.1	0.1	0.1	-

Figure 25. Changes in the proportion of those with HbA1c of 6.5% or higher (boys and girls)

I) Uric acid

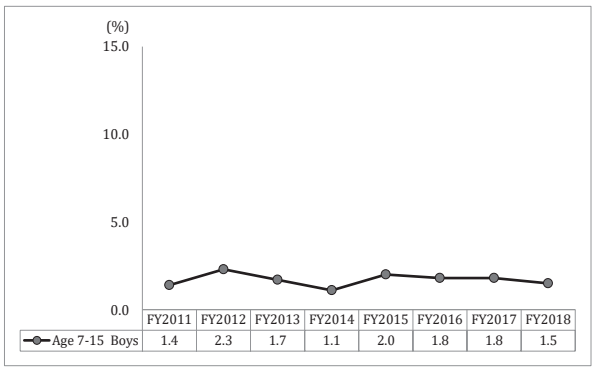
There was no substantial change in the proportion of uric acid levels of 7.1 mg/dL or higher in either boys or girls (Figures 26 to 28).

(Uric acid of 7.1 mg/dL or higher is a threshold in the "Guideline for the management of hyperuricemia and gout" by the Japanese Society of Gout and Uric & Nucleic Acids. Uric acid of 7.9 mg/dL or higher for boys and 5.6 mg/dL or higher for girls are the upper limits of the reference interval by the Japanese Committee for Clinical Laboratory Standards)



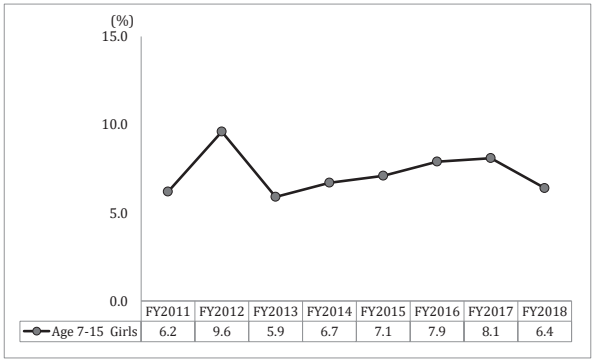
	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Age 7-15 Boys	4.7	6.1	4.9	5.0	6.0	5.9	5.3	5.4
Age 7-15 Girls	0.3	0.6	0.2	0.4	0.3	0.3	0.2	0.5

Figure 26. Changes in the proportion of those with uric acid levels of 7.1 mg/dL or higher (boys and girls)



	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Age 7-15 Boys	1.4	2.3	1.7	1.1	2.0	1.8	1.8	1.5

Figure 27. Changes in the proportion of those with uric acid levels of 7.9 mg/dL or higher (boys)



	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Age 7-15 Girls	6.2	9.6	5.9	6.7	7.1	7.9	8.1	6.4

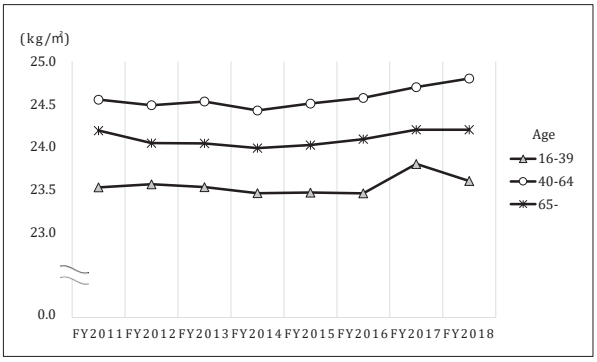
Figure 28. Changes in the proportion of those with uric acid levels of 5.6 mg/dL or higher (girls)

(2) Results of CHC for those aged 16 and above

A) Body Mass Index (BMI: weight/height^2)

a Results

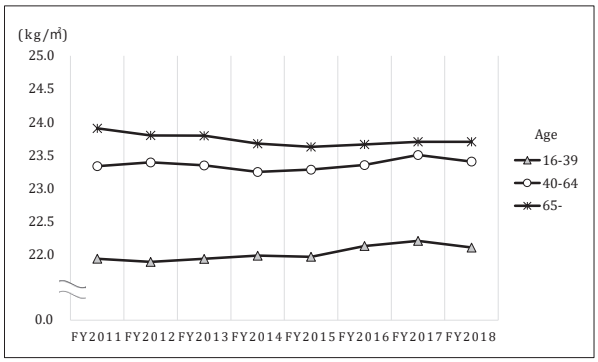
The average BMI for the age group of 16 to 39 and the proportion of males with a BMI of 25 kg/m^2 or higher increased in FY2017 and tended to decrease in FY2018, but there was no substantial change in other age groups (Figures 29 to 31).



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	23.5	23.6	23.5	23.5	23.5	23.5	23.8	23.6
40-64	24.6	24.5	24.5	24.4	24.5	24.6	24.7	24.8
65-	24.2	24.0	24.0	24.0	24.0	24.1	24.2	24.2

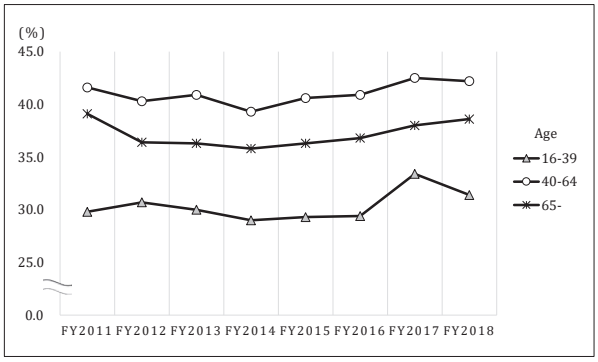
Figure 29. Changes in average BMI (males)

The proportion of females with a BMI of 25 kg/m^2 or higher showed a decreasing trend in the age group of 65 and above from FY2011 to FY2015, but there was no substantial change from FY2016 to FY2018 (Figures 30 to 32).
(BMI of 25 kg/m^2 is a threshold for being overweight used in group and individual health checks.)



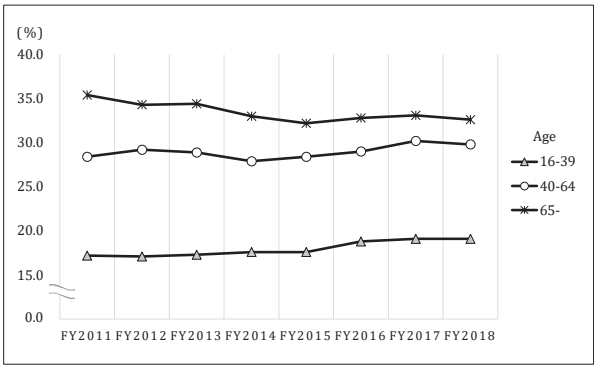
Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	21.9	21.9	21.9	22.0	22.0	22.1	22.2	22.1
40-64	23.3	23.4	23.3	23.2	23.3	23.3	23.5	23.4
65-	23.9	23.8	23.8	23.7	23.6	23.7	23.7	23.7

Figure 30. Changes in average BMI (females)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	29.8	30.7	30.0	29.0	29.3	29.4	33.4	31.4
40-64	41.6	40.3	40.9	39.3	40.6	40.9	42.5	42.2
65-	39.1	36.4	36.3	35.8	36.3	36.8	38.0	38.6

Figure 31. Changes in the proportion of overweight individuals with a BMI of 25 kg/m^2 or higher (males)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	17.2	17.1	17.3	17.6	17.6	18.8	19.1	19.1
40-64	28.4	29.2	28.9	27.9	28.4	29.0	30.2	29.8
65-	35.4	34.3	34.4	33.0	32.2	32.8	33.1	32.6

Figure 32. Changes in the proportion of overweight individuals with BMI of 25 kg/m^2 or higher (females)

b Analysis: *Effect of post-disaster evacuation on body weight* (Figure 33)

Among residents of the 13 municipalities, 41,633 males and females (average age: 67 years) who underwent specific health checks or health checks for citizens aged 75 and above in the period from 2008 to 2010 were selected for follow-up. Among them, those who underwent other health checks after the earthquake (between June 2011 and March 2013) were included in the analysis; their average weight and the proportion of overweight/obese residents before and after the earthquake were compared.

After the earthquake, a total of 27,486 residents underwent other health checks at an average interval of 1.6 years (12,432 males and 15,054 females; follow-up rate: 66%). Mean body weight increased substantially after the earthquake in both evacuees (n=9,671) and non-evacuees (n=17,815), with evacuees in particular showing greater weight gain than non-evacuees. Furthermore, the risk of overweight was found to be greater for males than for females.[3), 4)]

B) Waist circumference

a Results

The proportion of males aged 16 to 39 with a waist circumference of 85.0 cm or more showed a decreasing trend from FY2011 to FY2013, but there was no significant change from FY2014 onward (Figure 34).

The proportion of females aged 40 to 64 with

waist circumference of 90.0 cm or more showed an increasing trend from FY2011 to FY2018 (Figure 35).
(Male waist circumference of 85.0 cm or more and female waist circumference of 90.0 cm or more are criteria for visceral fat obesity used in group and individual health checks.)

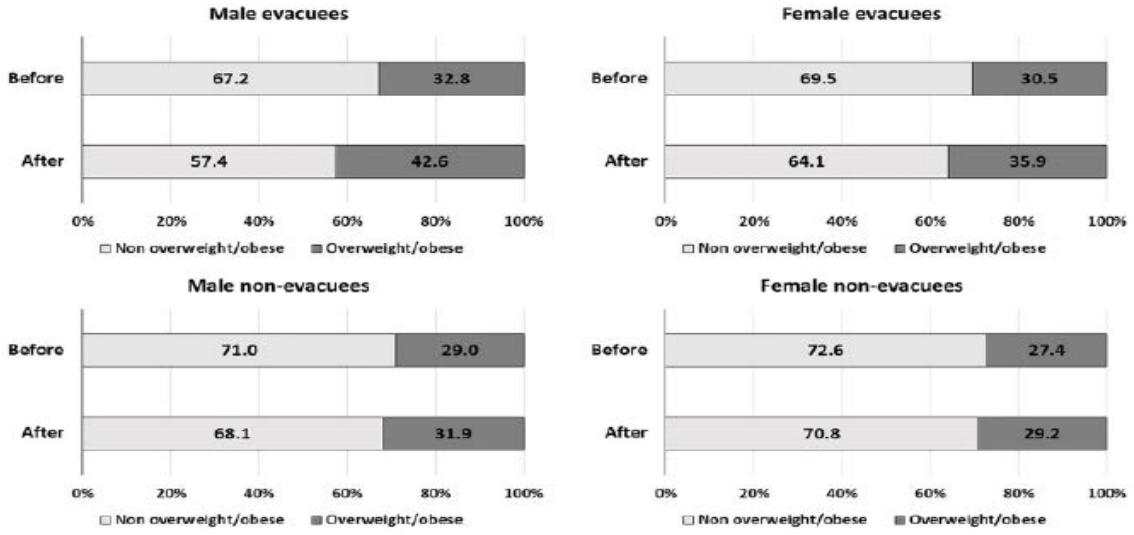
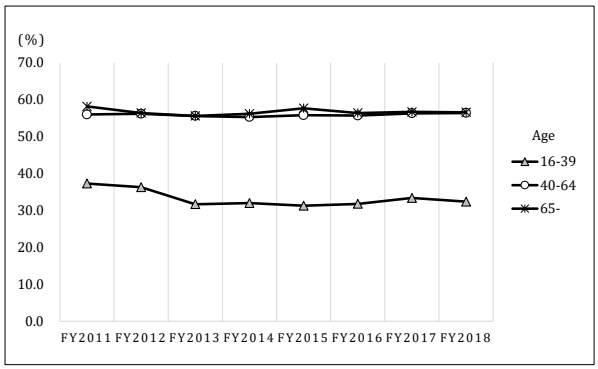


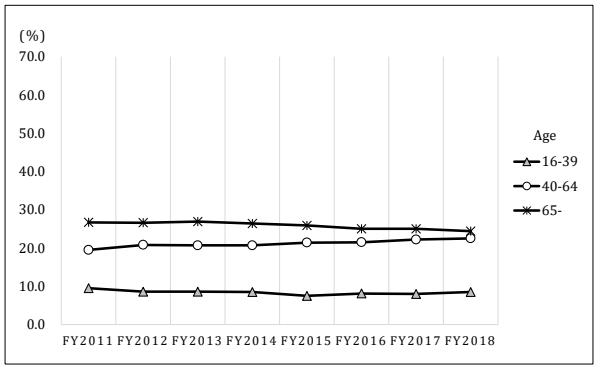
Figure 33. Change in the proportion of obese residents after the Great East Japan Earthquake[4)]

Ohira T, et al. Asia Pac J Public Health, 2017



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	37.3	36.3	31.7	32.0	31.3	31.8	33.4	32.4
40-64	56.0	56.2	55.6	55.3	55.8	55.7	56.3	56.4
65-	58.2	56.4	55.6	56.2	57.7	56.4	56.7	56.6

Figure 34. Changes in the proportion of abdominal circumference of 85.0 cm or more (males)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	9.5	8.6	8.6	8.5	7.5	8.1	8.0	8.5
40-64	19.5	20.8	20.7	20.7	21.4	21.5	22.2	22.5
65-	26.7	26.6	26.9	26.4	25.9	25.0	25.0	24.4

Figure 35. Changes in the proportion of abdominal circumference of 90.0 cm or more (females)

b Analyses

Analysis-1: *Relationship between post-disaster evacuation and development of the metabolic syndrome* (Table 11)

We conducted a cohort survey of residents aged 40 to 74 who lived in the 13 municipalities at the time of the earthquake and who did not have the metabolic syndrome (METS). Follow-up examinations were conducted from right after the earthquake to the end of March 2013 for 8,547 of the 20,269 residents who met the eligibility criteria before the disaster (3,697 males and 4,850 females; follow-up rate: 42.2%). The primary outcome was the incidence of METS as defined in Japanese guidelines. We used data from health checks before and after the earthquake and compared the results by dividing the participants into evacuee and non-evacuee groups. A logistic regression model was used to estimate the odds ratio of METS occurrence, adjusting for potential confounders, age, sex, waist circumference, exercise habits, and alcohol consumption.

The incidence of METS was 19.2% for males and 6.6% for females among evacuees, and 11.0% for males and 4.6% for females among non-evacuees, with evacuees showing higher incidence than non-evacuees in both males and females.[5)]

Analysis-2: *Influence of psychosocial factors and lifestyle habits on metabolic syndrome after the nuclear accident*

Based on the results of the CHC and the Mental Health and Lifestyle Survey (MHLS), both of which have been conducted for residents of the 13 municipalities as part of the Fukushima Health Management Survey, we have reported that the proportion of residents with the metabolic syndrome increased after the earthquake, and that evacuation after the earthquake was a risk factor for the metabolic syndrome.

Further analysis was performed to identify factors associated with METS by linking the results of the CHC and the MHLS. Among 20,920 residents, METS was observed in 19.5% (of whom 30.4% were males and 11.5% were females). In both males and females, aging, smoking cessation, and decreased activity were risk factors for METS. Post-traumatic stress disorder (PTSD) was also found to be a risk factor for METS in females, but moderate alcohol consumption was found to be a risk-reducing factor for METS. Thus, it emerged that various factors were associated with METS after the earthquake.[6)]

Table 11. Factors related to the development of metabolic syndrome

	ORs (95% CIs)			
	Men		Women	
	Crude	Multivariate	Crude	Multivariate
Evacuee (ref: non-evacuee)	1.92 (1.59-2.31)	1.89 (1.55-2.31)	1.44 (1.12-1.85)	1.45 (1.10-1.92)
Age (1-year increase)	1.01 (0.997-1.02)	1.02 (1.004-1.03)	1.02 (1.002-1.04)	1.03 (1.01-1.05)
Waist circumference (1-cm increase)	1.11 (1.10-1.13)	1.11 (1.10-1.13)	1.17 (1.15-1.19)	1.17 (1.15-1.19)
≥ 3-kg weight change during 1 year (ref: no)	1.44 (1.16-1.80)	1.14 (0.90-1.45)	1.81 (1.37-2.39)	1.22 (0.89-1.68)
Exercise 1[a] (ref: no)	1.08 (0.88-1.21)	1.01 (0.80-1.29)	1.18 (0.90-1.54)	1.20 (0.87-1.66)
Exercise 2[b] (ref: no)	1.03 (0.85-1.25)	1.02 (0.81-1.28)	0.97 (0.74-1.26)	0.91 (0.67-1.26)
Good sleep (ref: no)	1.02 (0.82-1.29)	0.91 (0.71-1.17)	1.13 (0.85-1.51)	1.02 (0.74-1.40)
Current smoker (ref: never or former smoker)	0.98 (0.80-1.21)	1.18 (0.94-1.48)	1.27 (0.74-2.17)	1.30 (0.67-2.50)
Current drinker (ref: never or former drinker)				
< 44 g/day	0.81 (0.60-1.10)	0.86 (0.62-1.18)	0.88 (0.69-1.14)	0.86 (0.65-1.13)
≥ 44 g/day	1.17 (0.87-1.57)	1.16 (0.85-1.58)	0.57 (0.21-1.58)	0.65 (0.22-1.95)

ORs (Odds ratios): Odds are the probability (p, between 0 and 1) of an event occurring, divided by the probability of it not occurring, i.e., p/(1-p). An odds ratio is the odds of an event occurring in one group, divided by the odds of it occurring in another group.
Exercise 1[a]: Exercising for 30 minutes or more on 2 or more days a week over one year
Exercise 2[b]: Walking for one hour or more every day

Hashimoto S, et al. J Atheroscler Thromb, 2017

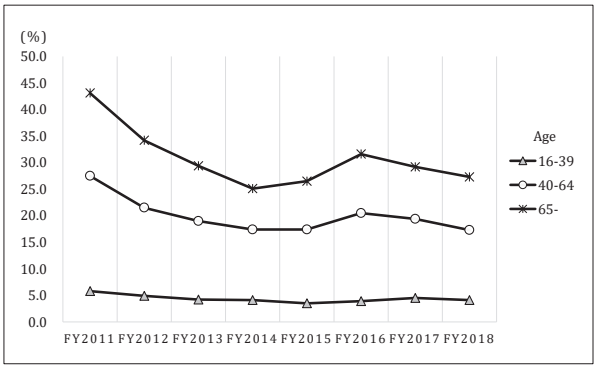
C) Hypertension (untreated and treated)

a Results

The proportion of males and females aged 40 and above with systolic blood pressure of 140 mmHg or higher showed a decreasing trend from FY2011 to FY2014, an increasing trend from FY2015 to FY2016, and a decreasing trend toward FY2018 (Figures 36 and 37).

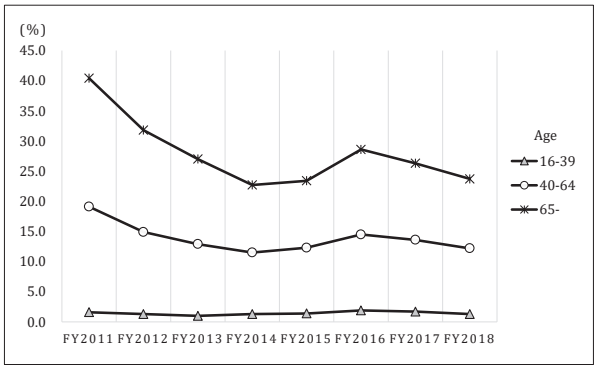
The proportion of males and females aged 40 and above with diastolic blood pressure of 90 mmHg or higher showed a decreasing trend from FY2011 to FY2014, but no substantial change since FY2015 (Figures 38 and 39).

(Systolic blood pressure of 140 mmHg or higher and diastolic blood pressure of 90 mmHg or higher are indicative of hypertension based on the criteria used in group and individual health checks.)



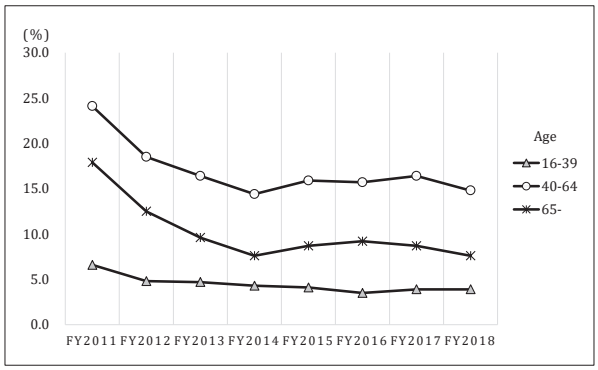
Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	5.8	4.9	4.2	4.1	3.5	3.9	4.5	4.1
40-64	27.5	21.5	19.0	17.4	17.4	20.5	19.4	17.3
65-	43.1	34.2	29.4	25.1	26.5	31.6	29.2	27.3

Figure 36. Changes in the proportion of those with systolic blood pressure of 140 mmHg or higher (males)



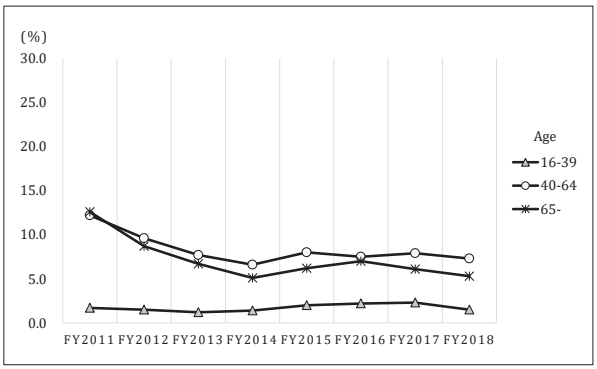
Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	1.6	1.3	1.0	1.3	1.4	1.9	1.7	1.3
40-64	19.1	14.9	12.9	11.5	12.3	14.5	13.6	12.2
65-	40.4	31.8	27.0	22.7	23.4	28.6	26.3	23.7

Figure 37. Changes in the proportion of those with systolic blood pressure of 140 mmHg or higher (females)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	6.6	4.8	4.7	4.3	4.1	3.5	3.9	3.9
40-64	24.1	18.5	16.4	14.4	15.9	15.7	16.4	14.8
65-	17.9	12.5	9.6	7.6	8.7	9.2	8.7	7.6

Figure 38. Changes in the proportion of those with diastolic blood pressure of 90 mmHg or higher (males)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	1.7	1.5	1.2	1.4	2.0	2.2	2.3	1.5
40-64	12.2	9.6	7.7	6.6	8.0	7.5	7.9	7.3
65-	12.6	8.7	6.7	5.1	6.2	7.0	6.1	5.3

Figure 39. Changes in the proportion of those with diastolic blood pressure of 90 mmHg or higher (females)

b Analyses

Analysis-1: *Relationship between post-disaster evacuation and incidence of hypertension* (Table 12)

Among residents aged 40 to 74 who lived in the 13 municipalities, 31,252 males and females who underwent specific health checks between 2008 and 2010 were selected for follow-up.

We prospectively examined the relationship between post-disaster evacuation and the incidence of hypertension after the earthquake for 21,989 males and females who underwent follow-up health checks between 2011 and 2013 (follow-up rate: 70.4%).

In males, evacuation was significantly associated with an increased risk of developing hypertension, and the age-adjusted hazard ratio of evacuation to the development of hypertension was 1.24 (95% confidence interval: 1.11-1.39, p<0.001), but no significant association was found in females.[7)]

Table 12. Incidence of hypertension after the earthquake

Characteristics	Nonevacuees	Evacuees		*P* Value
Men				
No. of at-risk individuals	2977	1538		…
No. of cases	761	481		…
Incidence rate/1000 person-years	118	146		…
Age-adjusted HR (95% CI)	Reference	1.24	1.11–1.39	<0.001
Women				
No. of at-risk individuals	4229	2293		…
No. of cases	855	507		…
Incidence rate/1000 person-years	93	101		…
Age-adjusted HR (95% CI)	Reference	1.05	0.94–1.17	0.37

Ohira T, Hypertension, 2016

Analysis-2: *The incidence of hypertension and the proportions of treated and controlled hypertension* (Figure 40)

Residents aged 40 to 74 who lived in the 13 municipalities at the time of the earthquake and who underwent specific health checks from 2008 to 2014 (approximately 10,000 males and 12,000 females in each age group) were selected for follow-up. The prevalence of hypertension (with systolic/diastolic blood pressure of 140/90 mmHg or higher, or being on medication), proportion under treatment (proportion of medication users among those with hypertension), and proportion under control (proportion of those with systolic/diastolic blood pressure lower than 140/90 mmHg among those under medication) were calculated year by year using health check data provided by the 13 municipalities and standardized by 5-year age groups with the direct method based on the 2010 census population. From 2011 onward, the residents were stratified by evacuation status, and each proportion was calculated in the same way. The ratio of evacuees to non-evacuees was calculated from Poisson regression analysis by adjusting the confounding factors for each year.

The prevalence of hypertension was on an upward trend until 2012, reaching a peak of 48.8% in males and 39.0% in females, and then showed a downward trend. The proportion under treatment and proportion under control continued to rise, and in 2014, the proportion under treatment was 66.3% in males and 70.6% in females, and the proportion under control was 67.1% in males and 68.1% in females. The upward trend in the proportions of those under treatment and of those with controlled blood pressure was particularly pronounced after the earthquake. These trends were also similar when stratified by evacuation status.[8)]

D) Urinalysis (urine glucose, urine protein, urine occult blood)

a Results

The proportion of those with urine glucose 1+ or higher has been on the rise since FY2015 in residents aged 40 and above. The proportion of those with urinary protein 1+ or higher showed an increasing trend from FY2011 to FY2018 in the age group of 16 to 39. The proportion of those with urine occult blood 1+ or higher showed a decreasing trend from FY2011 to FY2018 in the age group of 40 and above (Figures 41 to 43).

(Urine glucose 1+ or higher, urine protein 1+ or higher, and urine occult blood 1+ or higher are values of concern based on the criteria used in group and individual health checks.)

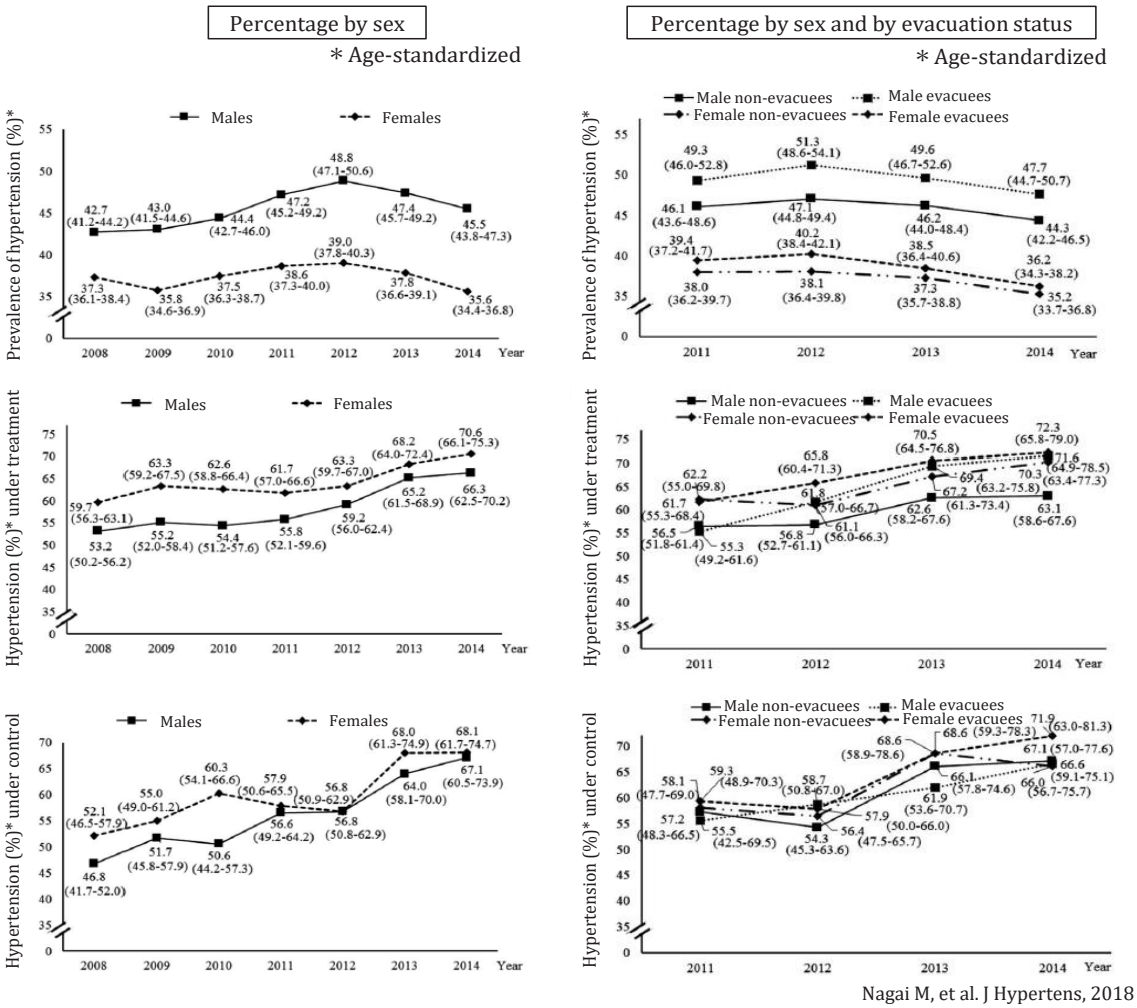
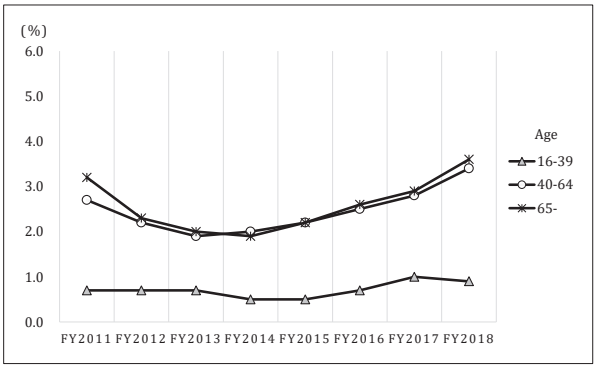
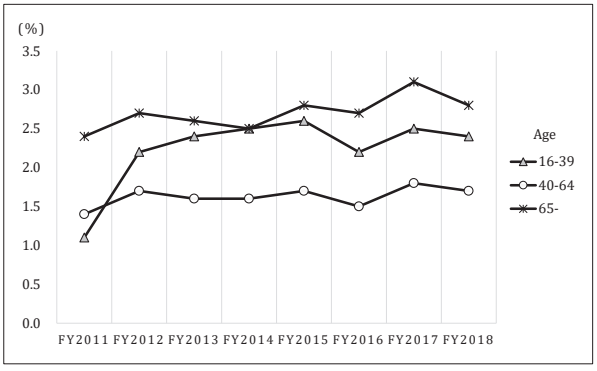


Figure 40. Prevalence of hypertension, proportions of those under treatment, and proportion of those under control before and after the earthquake



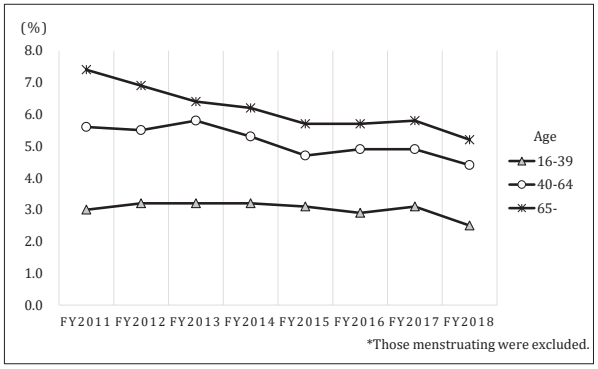
Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	0.7	0.7	0.7	0.5	0.5	0.7	1.0	0.9
40-64	2.7	2.2	1.9	2.0	2.2	2.5	2.8	3.4
65-	3.2	2.3	2.0	1.9	2.2	2.6	2.9	3.6

Figure 41. Changes in the proportion of those with urinary glucose 1+ or higher (overall)



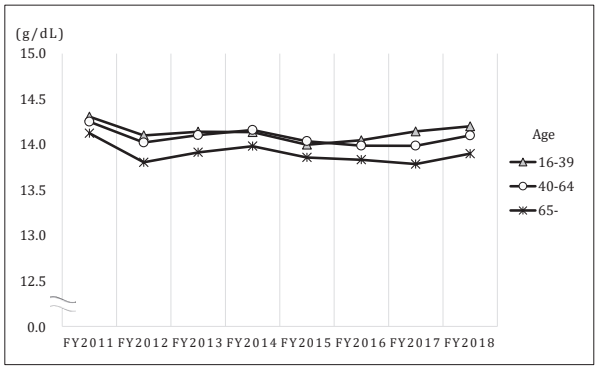
Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	1.1	2.2	2.4	2.5	2.6	2.2	2.5	2.4
40-64	1.4	1.7	1.6	1.6	1.7	1.5	1.8	1.7
65-	2.4	2.7	2.6	2.5	2.8	2.7	3.1	2.8

Figure 42. Changes in the proportion of those with urinary protein 1+ or higher (overall)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	3.0	3.2	3.2	3.2	3.1	2.9	3.1	2.5
40-64	5.6	5.5	5.8	5.3	4.7	4.9	4.9	4.4
65-	7.4	6.9	6.4	6.2	5.7	5.7	5.8	5.2

Figure 43. Changes in the proportion of those with urine occult blood 1+ or higher (overall)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	14.3	14.1	14.1	14.1	14.0	14.0	14.1	14.2
40-64	14.3	14.0	14.1	14.2	14.0	14.0	14.0	14.1
65-	14.1	13.8	13.9	14.0	13.9	13.8	13.8	13.9

Figure 45. Changes in the mean value of hemoglobin (overall)

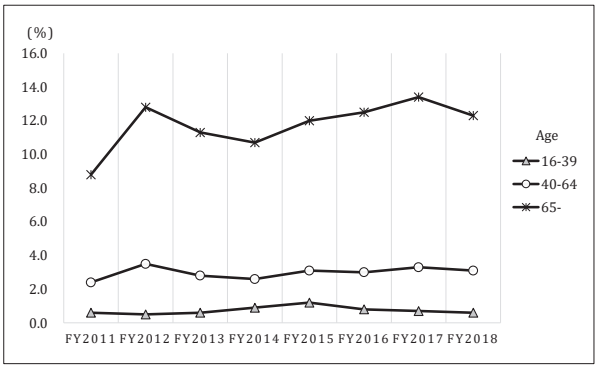
E) Red blood cells, hemoglobin, and hematocrit

a Results

The mean values of red blood cell count and hemoglobin showed a decrease from FY2011 to FY2012 in all age groups, but they increased in FY2013 and have not changed substantially since then (Figures 44 and 45).

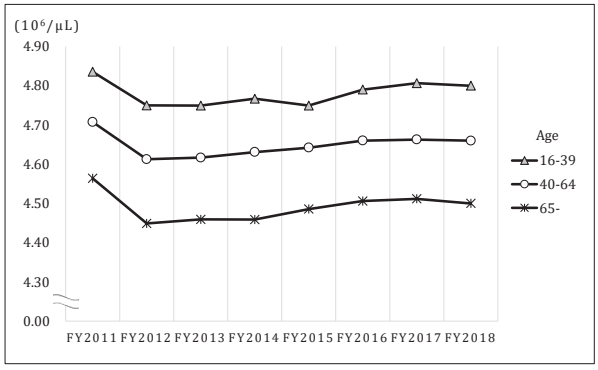
The proportion of males aged 65 and above with hemoglobin of 13.0 g/dL or less increased from FY2011 to FY2012 and remained unchanged thereafter (Figure 46). The proportion of females aged 65 and above with a hemoglobin of 12.0 g/dL or less increased from FY2011 to FY2012, followed by ups and downs (Figure 47).

There was no substantial change in the hema-



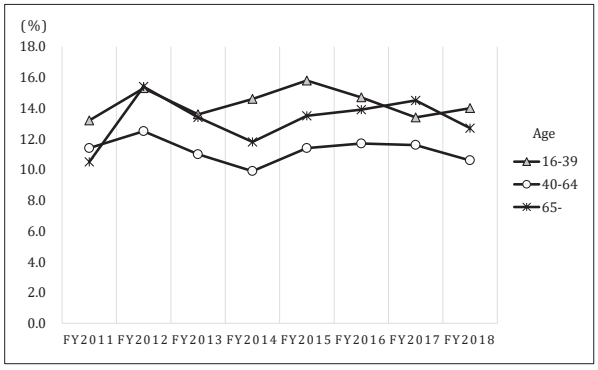
Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	0.6	0.5	0.6	0.9	1.2	0.8	0.7	0.6
40-64	2.4	3.5	2.8	2.6	3.1	3.0	3.3	3.1
65-	8.8	12.8	11.3	10.7	12.0	12.5	13.4	12.3

Figure 46. Changes in the proportion of those with hemoglobin of 13.0 g/dL or less (males)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	4.84	4.75	4.75	4.77	4.75	4.79	4.81	4.80
40-64	4.71	4.61	4.62	4.63	4.64	4.66	4.66	4.66
65-	4.56	4.45	4.46	4.46	4.49	4.51	4.51	4.50

Figure 44. Changes in the mean red blood cell count (10^6/μL) (overall)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	13.2	15.3	13.6	14.6	15.8	14.7	13.4	14.0
40-64	11.4	12.5	11.0	9.9	11.4	11.7	11.6	10.6
65-	10.5	15.4	13.4	11.8	13.5	13.9	14.5	12.7

Figure 47. Changes in the proportion of those with hemoglobin of 12.0 g/dL or less (females)

tocrit in any age group (no graph).
(Hemoglobin of 13.0 g/dL or less for males and 12.0 g/dL or less for females are values of concern based on the criteria used in group and individual health checks).

b Analysis: *Risk factors for the development of polycythemia after the earthquake* (Table 13)
Among the residents aged 40 to 90 who lived in the 13 municipalities at the time of the earthquake and who underwent health checks after the earthquake in 2011 or 2012, those with peripheral blood test data before the earthquake from 2008 to 2010 were selected for follow-up. Those who had been treated for blood diseases or were on renal dialysis in the past were excluded and a total of 10,718 residents (7,446 evacuees, median age: 66.3 years; 3,272 non-evacuees, median age: 69.8 years) were compared.

Red blood cell count, hemoglobin, and hematocrit increased significantly in both male and female evacuees, even after adjustment for age, sex, smoking and drinking, obesity, and pre-disaster hemoglobin levels. In addition, the number of residents who met the criteria for polycythemia increased significantly in the evacuees even after adjustment for smoking and obesity.[9)]

In addition, we analyzed the incidence of polycythemia about 4 years after the earthquake (average 2.5 years since the previous analysis) based on the CHC results from 2013 to 2014.

The results for red blood cell count, hemoglobin, and hematocrit in 2013-2014 showed a decreasing trend compared to those in 2011-2012, but the values for hemoglobin and hematocrit were significantly higher than before the earthquake in both males and females, and the incidence of polycythemia was also significantly higher, especially among evacuees, regardless of whether they were obese, smoked, or had hypertension.[10)]

Further analysis using results of MHLS showed that there was no relationship between the incidence of polycythemia and mental health status evaluated by PCL-S or K6, but there was a significant relationship between the incidence of polycythemia and older age, higher education, obesity, hypertension, diabetes, liver dysfunction, and smoking. Therefore, polycythemia was considered to be associated with the incidence of lifestyle-related diseases.[11)]

F) Platelet count
a Results
There was no substantial change in the mean platelet count from FY2011 to FY2018 in any age group (no graph).

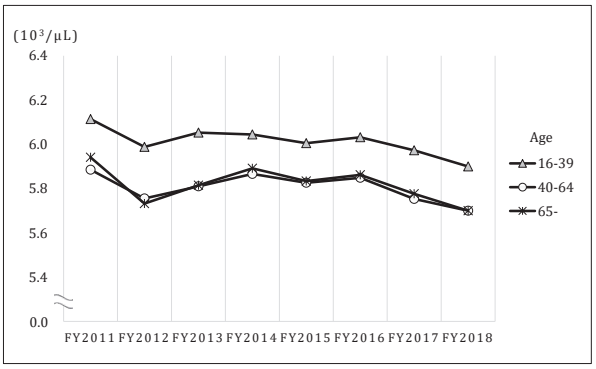
G) White blood cell count, white blood cell fraction
a Results
The mean white blood cell count did not change substantially from FY2011 to FY2018 in any age group (Figure 48).

In the white blood cell differential, there was no substantial change in the mean values of neu-

Table 13. Relationship between evacuation status and polycythemia vera based on the presence of obesity, smoking, and hypertension

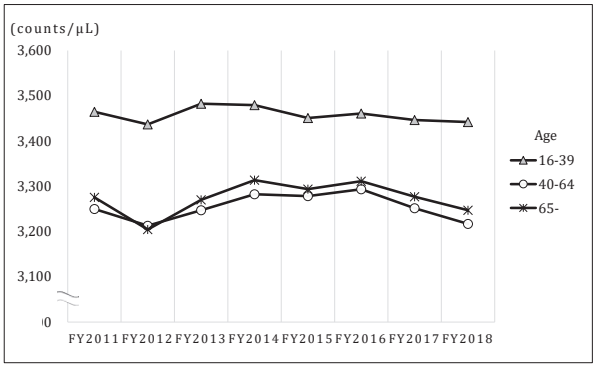
				Prevalence of polycythemia, n (%)				
n				Baseline	2011–2012	p^a	2013–2014	p^a
Total		non-Evacuees	2349	22(0.94)	24 (1.02)	0.86	18 (0.77)	0.56
		Evacuees	5364	47(0.88)	76 (1.42)	<0.0001	90 (1.68)	<0.0001
Overweight/Obesity	(+)	non-Evacuees	666	9(1.35)	11 (1.65)	0.79	6 (0.9)	0.51
	(+)	Evacuees	1704	25(1.47)	38 (2.23)	<0.05	37 (2.17)	0.09
	(−)	non-Evacuees	1683	13(0.77)	13 (0.77)	1	12 (0.71)	1
	(−)	Evacuees	3660	22(0.6)	38 (1.04)	0.01	53 (1.45)	<0.0001
Smoking	(+)	non-Evacuees	233	3(1.29)	3 (1.29)	1	3 (1.29)	1
	(+)	Evacuees	647	12(1.85)	20 (3.09)	0.13	18 (2.78)	0.24
	(−)	non-Evacuees	2116	19(0.9)	21 (0.99)	0.86	15 (0.71)	0.54
	(−)	Evacuees	4717	35(0.74)	56 (1.19)	<0.005	72 (1.53)	<0.0001
Hypertension	(+)	non-Evacuees	1322	15(1.13)	14 (1.06)	1	10 (0.76)	0.3
	(+)	Evacuees	2903	34(1.17)	48 (1.65)	0.06	51 (1.76)	0.03
	(−)	non-Evacuees	1027	7(0.68)	10 (0.97)	0.55	8 (0.78)	1
	(−)	Evacuees	2461	13(0.53)	28 (1.14)	<0.01	39 (1.58)	<0.0001

Sakai A, et al. BMC Public Health, 2014; Sakai A, et al. Pre Med Rep, 2017



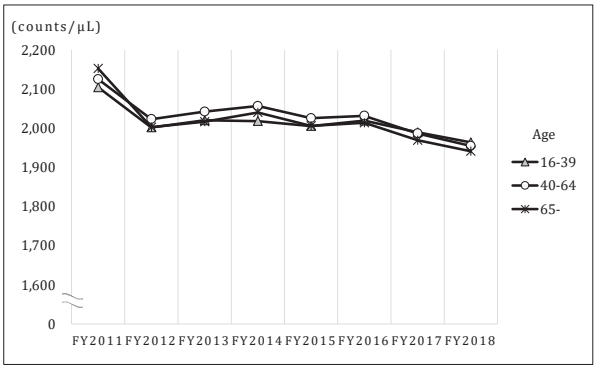
Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	6.1	6.0	6.1	6.0	6.0	6.0	6.0	5.9
40-64	5.9	5.8	5.8	5.9	5.8	5.8	5.8	5.7
65-	5.9	5.7	5.8	5.9	5.8	5.9	5.8	5.7

Figure 48. Changes in the mean white blood cell count (10^3/μL) (overall)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	3,465	3,437	3,482	3,479	3,451	3,461	3,447	3,442
40-64	3,250	3,213	3,247	3,282	3,278	3,293	3,252	3,217
65-	3,275	3,204	3,270	3,314	3,294	3,311	3,277	3,247

Figure 49. Changes in the mean neutrophil count (cells/μL) (overall)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	2,105	2,002	2,020	2,018	2,006	2,019	1,990	1,964
40-64	2,125	2,023	2,042	2,057	2,026	2,032	1,987	1,955
65-	2,153	2,003	2,017	2,040	2,006	2,014	1,969	1,941

Figure 50. Changes in the mean lymphocyte count (cells/μL) (overall)

trophil count, lymphocyte count, monocyte count, and eosinophil count from FY2011 to FY2018 in any age group. The mean basophil count did not change substantially from FY2012 to FY2018 in any age group (Figures 49 and 50; no graphs for monocyte, eosinophil, or basophil counts).

b Analysis: *White blood cell count and white blood cell differential in residents of the evacuation zone after the nuclear accident*

The white blood cell count, including neutrophil and lymphocyte fractions, was analyzed in 45,278 residents of the 13 municipalities (18,953 males and 26,325 females) between the ages of 20 and 99 who received health checks between June 2011 and March 2012.

The mean values of white blood cell, neutrophil, and lymphocyte counts, as well as the proportion of residents with white blood cell and neutrophil counts below the reference intervals, showed significant differences among the 13 municipalities. However, the distribution of residents for every 200-cell/μL increment in lymphocyte count was similar in the 13 municipalities. Furthermore, there was no particular decrease in the number of white blood cells, neutrophils, or lymphocytes in Iitate Village and Namie Town, where there were more residents with an estimated external exposure dose of 5 mSv or more, than in the other 11 municipalities.

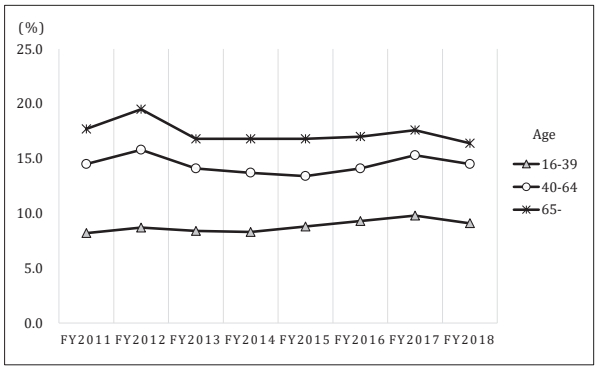
Therefore, no effect of radiation exposure on the distribution of white blood cell counts, including neutrophil and lymphocyte counts, was found in the 13 municipalities in health checks conducted within one year after the earthquake.[12)]

H) Liver function (AST, ALT, γ-GT)

a Results

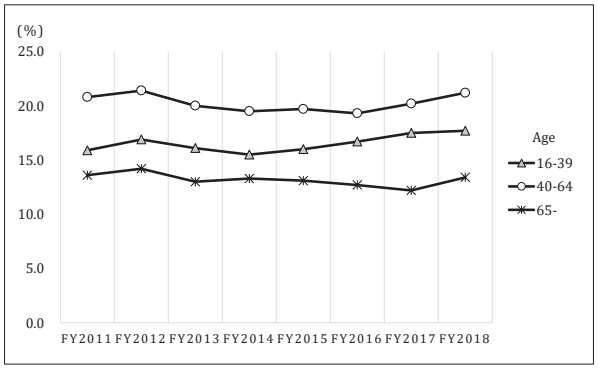
The proportion of those with AST 31U/L or higher, ALT 31U/L or higher, and γ-GT 51U/L or higher did not change substantially in any age group (Figures 51 to 53).

(AST 31U/L or higher, ALT 31U/L or higher, and γ-GT 51U/L or higher are reference values used in group and individual health checks for those aged 16 and above.)



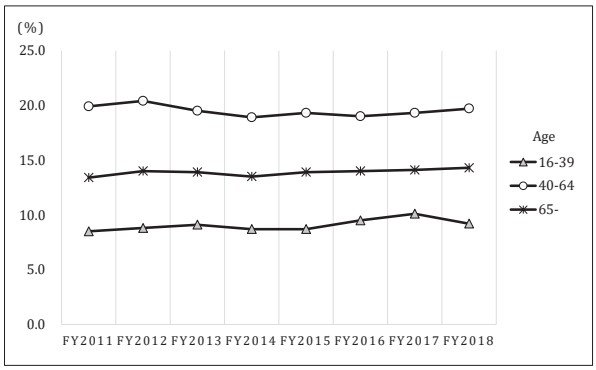
Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	8.2	8.7	8.4	8.3	8.8	9.3	9.8	9.1
40-64	14.5	15.8	14.1	13.7	13.4	14.1	15.3	14.5
65-	17.7	19.5	16.8	16.8	16.8	17.0	17.6	16.4

Figure 51. Changes in the proportion of those with AST 31U/L or higher (overall)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	15.9	16.9	16.1	15.5	16.0	16.7	17.5	17.7
40-64	20.8	21.4	20.0	19.5	19.7	19.3	20.2	21.2
65-	13.6	14.2	13.0	13.3	13.1	12.7	12.2	13.4

Figure 52. Changes in the proportion of those with ALT 31U/L or higher (overall)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	8.5	8.8	9.1	8.7	8.7	9.5	10.1	9.2
40-64	19.9	20.4	19.5	18.9	19.3	19.0	19.3	19.7
65-	13.4	14.0	13.9	13.5	13.9	14.0	14.1	14.3

Figure 53. Changes in the proportion of those with γ-GT 51U/L or higher (overall)

b Analyses

Analysis-1: *Risk factors for the development of liver dysfunction after the earthquake* (Table 14)

Among residents of the 13 municipalities, 27,486 males and females who underwent specific health checks or health checks for citizens aged 75 and above between 2008 and 2010 were selected for follow-up. Of these, those who underwent follow-up health checks after the earthquake between June 2011 and March 2013 were included in the analysis, and the proportions of those with liver dysfunction before and after the earthquake were compared by classifying them according to their drinking status.

After the earthquake, a total of 26,006 examinees (11,715 males and 14,291 females) were followed up for an average of 1.6 years. The overall proportion of liver dysfunction increased significantly from 16.4% before the earthquake to 19.2% after the earthquake, and a similar increase was observed for both drinkers and non-drinkers. Furthermore, the increasing rate of liver dysfunction was significantly higher in evacuees than in non-evacuees. When the risk of new liver dysfunction after the earthquake was examined, the risk of liver dysfunction emerging in evacuees compared to non-evacuees was 1.38 times higher in non-drinkers, 1.43 times higher in light drinkers, and 1.24 times higher in moderate and heavy drinkers.[13)]

Analysis-2: *Change in the proportion of hepatobi-*

Table 14. Factors correlated with liver dysfunction after the earthquake in people who did not have liver dysfunction before the earthquake

Variable	Non-drinkers		Light drinkers		Moderate/Heavy drinkers	
	Odds ratio (95% CI)	*p*-Value	Odds ratio (95% CI)	*p*-Value	Odds ratio (95% CI)	*p*-Value
Age, per 1-year	0.96 (0.96–0.97)	<0.001	0.97 (0.97–0.98)	<0.001	0.98 (0.97–0.98)	<0.001
Women vs. men	0.45 (0.39–0.53)	<0.001	0.46 (0.41–0.52)	<0.001	0.41 (0.30–0.56)	<0.001
Body mass index, per 1 kg/m^2	1.15 (1.14–1.17)	<0.001	1.13 (1.12–1.15)	<0.001	1.14 (1.11–1.17)	<0.001
Smoking, yes	1.00 (0.78–1.28)	0.981	0.97 (0.83–1.13)	0.654	1.45 (1.26–1.67)	<0.001
Evacuation, yes	1.38 (1.20–1.58)	<0.001	1.43 (1.29–1.59)	<0.001	1.24 (1.09–1.42)	0.001

Odds are the probability (p, between 0 and 1) of an event occurring, divided by the probability of it not occurring, i.e., p/(1-p). An odds ratio is the odds of an event occurring in one group, divided by the odds of it occurring in another group.

Takahashi A, J Epid, 2017

liary enzyme abnormalities—suggesting liver dysfunction—for 3 to 4 years after the earthquake

Among residents in the 13 municipalities, 20,395 males and females aged 40 and above who underwent specific health checks or health checks for citizens aged 75 or above immediately after the disaster (2011 to 2012) and three to four years after the disaster (2013 to 2014) were selected for follow-up. We evaluated the relationship between lifestyle factors and changes in hepatobiliary enzyme abnormalities immediately after the disaster and three to four years later.

The overall proportion of hepatobiliary enzyme abnormalities decreased significantly from 29.9% to 27.1%. When the factors contributing to the improvement in hepatobiliary enzyme abnormalities were examined, it was found that the improvement was associated with improvement in daily physical activities and the frequency of breakfast intake.[14)]

Analysis-3: *Effect of lifestyle factors on hepatobiliary enzyme abnormalities after the earthquake* (Table 15)

Based on the CHC results so far, we reported that the proportion of those with hepatobiliary enzyme abnormalities – suggesting hepatobiliary disease – increased after the earthquake, and that subsequent evacuation was a risk factor for liver dysfunction. Given this, we conducted an analysis of data in the FY2011 CHC and MHLS. Liver dysfunciton were observed in 27.3% (22,246 residents). By evacuation status, the frequency was higher in evacuees (29.5% in evacuees, 25.7% in non-evacuees, P < 0.001). Males, moderate to heavy drinkers, and those with decreased physical activity were also at higher risk for liver dysfunction regardless of evacuation status. In addition, job change was a risk factor among non-evacuees, and unemployment among evacuees. Our analysis showed that various factors affected liver function after the earthquake.[15)]

I) Lipids (LDL cholesterol, triglycerides, HDL cholesterol) (including those on medication)

a Results

The proportions of those with LDL-C of 140 mg/dL or higher and triglycerides of 150 mg/dL or higher showed a slight downward trend from FY2011 to FY2012 in residents aged 65 and above, but no substantial changes were observed after that (Figures 54 and 55).

The proportion of those with HDL-C less than 40 mg/dL in residents aged 40 and above showed a decreasing trend from FY2011 to FY2018 (Figure 56).

(LDL-C of 140 mg/dL or higher is a value of concern in the criteria used in group and individual health checks; triglycerides of 150 mg/dL or higher and HDL-C less than 40 mg/dL are values of concern based on the criteria used in group and individual health checks.)

b Analyses

Analysis-1: *Relationship between post-disaster evacuation and development of hypo-HDL cholesterolemia* (Table 16)

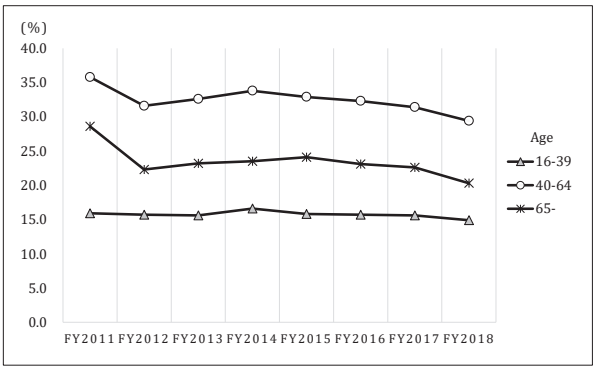
Of the residents registered in the 13 municipalities before the earthquake, 41,633 residents aged 40 and above who received at least one specific health check or health check for citizens aged 75 and above from 2008 to 2010 (18,745 males and 22,888 females, average age: 66.9 years) were selected for baseline data. Follow-up analysis was

Table 15. Multivariate logistic regression analysis of factors affecting hepatobiliary enzyme values after the earthquake

	Non-evacuees (12,705)		Evacuees (9,541)	
	OR (95% CI)	*p*	OR (95% CI)	*p*
Age (+1)	1.01 (1.01–1.01)	<.001	1.01 (1.01–1.02)	<.001
Sex (Male)	3.63 (3.29–4.00)	<.001	3.74 (3.35–4.16)	<.001
Smoking (Yes)	1.06 (0.95–1.18)	0.32	1.06 (0.94–1.19)	0.345
Alcohol comsumption				
Light	0.99 (0.89–1.10)	0.846	1.10 (0.98–1.23)	0.109
Moderate/Heavy	1.83 (1.62–2.06)	<.001	1.80 (1.58–2.05)	<.001
Physical activities				
2-4 times a week	1.21 (1.04–1.41)	0.014	1.20 (1.02–1.42)	0.03
Once a week	1.33 (1.13–1.56)	<.001	1.31 (1.09–1.57)	0.004
None	1.35 (1.18–1.55)	<.001	1.39 (1.19–1.61)	<.001
Changed jobs	1.16 (1.05–1.28)	0.002	1.15 (1.02–1.29)	0.021
Lost jobs	0.98 (0.85–1.13)	0.734	1.18 (1.05–1.32)	0.005
Dissatisfied with sleep (Yes)	1.04 (0.97–1.13)	0.462	1.04 (0.94–1.16)	0.462
K6 ≥13	0.96 (0.81–1.13)	0.591	1.05 (0.90–1.22)	0.569
PCL-S ≥44	1.02 (0.89–1.18)	0.747	0.99 (0.87–1.14)	0.922

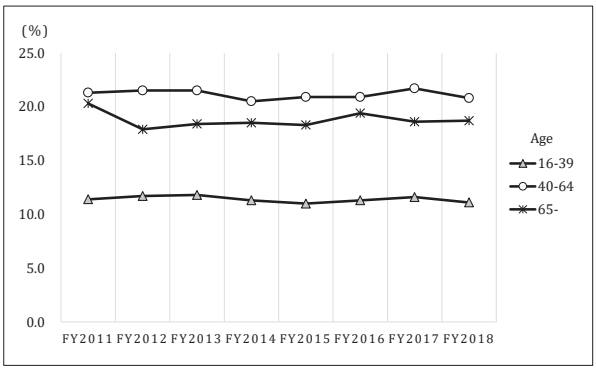
Logistic regression analysis was used (dependent variable: hepatobiliary enzyme abnormalities; related independent variables: presence or absence of each of the lifestyle habits; moderator variables: age, sex, evacuation status, smoking, alcohol intake, physical activities, changing jobs, losing jobs, dissatisfaction with sleep, phychological distress and PTSD) .
CI=Confidence Interval, K6=Kesler 6 Scale, OR=Odds Ratio, PCL-S=PTSD specific-trauma checklist

Takahashi A, et al. Medicine, 2018



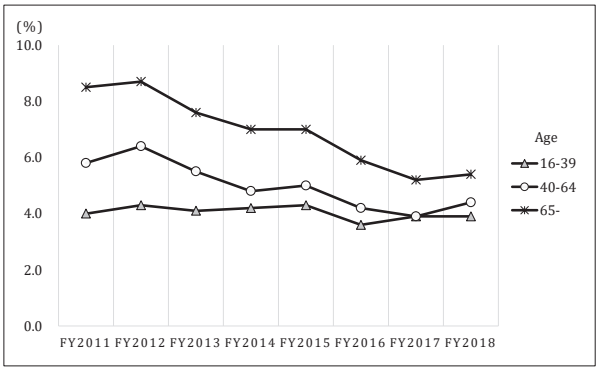
Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	15.9	15.7	15.6	16.6	15.8	15.7	15.6	14.9
40-64	35.8	31.6	32.6	33.8	32.9	32.3	31.4	29.4
65-	28.6	22.3	23.2	23.5	24.1	23.1	22.6	20.3

Figure 54. Changes in the proportion of those with LDL-C 140 mg/dL or higher (overall)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	11.4	11.7	11.8	11.3	11.0	11.3	11.6	11.1
40-64	21.3	21.5	21.5	20.5	20.9	20.9	21.7	20.8
65-	20.3	17.9	18.4	18.5	18.3	19.4	18.6	18.7

Figure 55. Changes in the proportion of those with triglycerides (TG) of 150 mg/dL or higher (overall)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	4.0	4.3	4.1	4.2	4.3	3.6	3.9	3.9
40-64	5.8	6.4	5.5	4.8	5.0	4.2	3.9	4.4
65-	8.5	8.7	7.6	7.0	7.0	5.9	5.2	5.4

Figure 56. Changes in the proportion of those with HDL-C less than 40 mg/dL (overall)

conducted on residents who underwent follow-up health checks in FY2011 or FY2012 to examine changes in HDL cholesterol levels before and after the earthquake.

A total of 27,486 residents were followed up for an average of 1.6 years after the disaster. After the disaster, the prevalence of hypo-HDL cholesterolemia increased from 6.0% to 7.2%. BMI, blood pressure, and LDL cholesterol levels increased significantly in males with hypo-HDL cholesterolemia after the disaster. In the group with normal HDL cholesterol levels, BMI, blood pressure, blood glucose, lipid metabolism and liver function were adversely affected. The decrease in HDL cholesterol levels in the normal group was significantly greater in evacuees than in non-evacuees.[16)]

Analysis-2: *Japanese dietary patterns associated with cardiovascular metabolic risk* (Figure 57)
After the Great East Japan Earthquake, it has been reported that the cardiovascular metabolic risk of Fukushima residents has increased. We examined the relationship between dietary patterns and cardiovascular metabolic risk in residents aged 16 and above in the 13 municipalities. Results of the 2011-2013 dietary frequency survey were used to evaluate dietary patterns by principal component analysis, and the results were compared with the CHC results of those who underwent health checks in 2014 (15,409 residents) and 2015 (14,409 residents).

Dietary patterns were divided into three types: high vegetable intake type, high meat intake type, and high juice/milk intake type. The high vegetable intake type and high juice/milk intake type showed similar health check results to the CHC results in 2014 and 2015. With the low vegetable intake type, many cases of overweight and dyslipidemia were observed, and with the high juice/milk intake type, many cases of high triglyceride and high LDL cholesterol were observed. The high meat intake type showed an association with low HDL cholesterol only in the 2015 CHC. The high vegetable intake type is similar to the dietary patterns found in other cohort surveys in Japan and is similar to the top three categories of habitually consumed foods in Japan (soy and soy-based products, seafood, and vegetables) according to recent statistical findings. Thus, the results of this analysis indicate that traditional Japanese food consumption has a protective effect on cardiovascular metabolic risk.

As described above, it was shown that the dietary pattern with high vegetable intake may be associated with reducing cardiovascular metabolic risks such as being overweight, having hypertension, and having dyslipidemia, while the dietary pattern with high juice/milk intake may be associated with increasing risks of glucose abnormalities and dyslipidemia.[17)]

Table 16. Evacuation status and development of hypo-HDL cholesterolemia, by sex

HDL-C ≥ 40 mg/dL before the Earthquake	Incidence of hypo-HDL cholesterolemia (< 40mg/ dL) after the Earthquake (n)			
	Total	Non-evacuees	Evacuees	p value*
Total (n = 25,835)	3.81% (985)	3.23% (540)	4.89% (445)	< 0.0001
Men (n = 11,248)	5.88% (661)	4.93% (364)	7.67% (297)	< 0.0001
Women (n = 14,587)	2.22% (324)	1.88% (176)	2.83% (148)	0.0002

Satoh H, et al. Intern Med, 2016

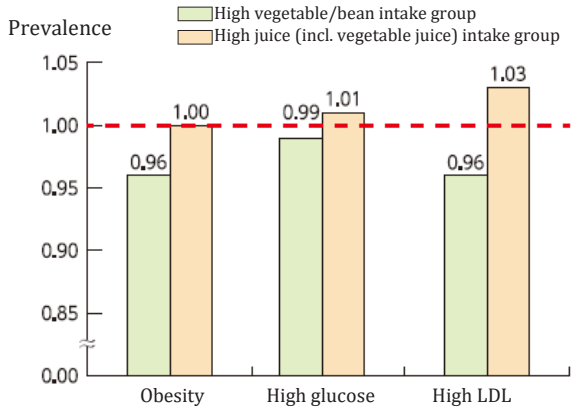


Figure 57. Prevalence of cardiovascular disease metabolic risk factors

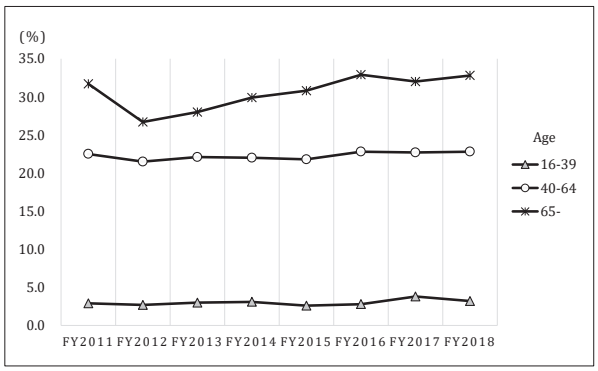
J) Glucose tolerance (fasting plasma glucose, HbA1c) (including those on medication)

a Results

The proportion of those with a fasting plasma glucose level of 110 mg/dL or higher decreased from FY2011 to FY2012 in males and females aged 65 and above, but has not changed substantially since then (Figures 58 and 59).

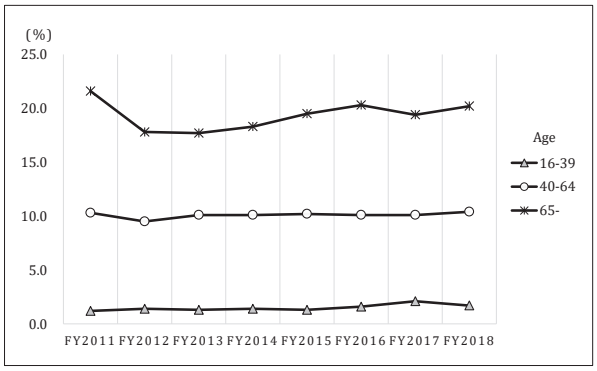
The proportion of those with HbA1c of 5.8% or higher and the proportion of those with HbA1c of 6.5% or higher showed an increasing trend from FY2011 to FY2018 in all age groups (Figures 60 and 61).

(HbA1c of 5.8% or higher and 6.5% or higher are indicators of concern, as described in the "Treatment Guide for Diabetes 2012-2013")



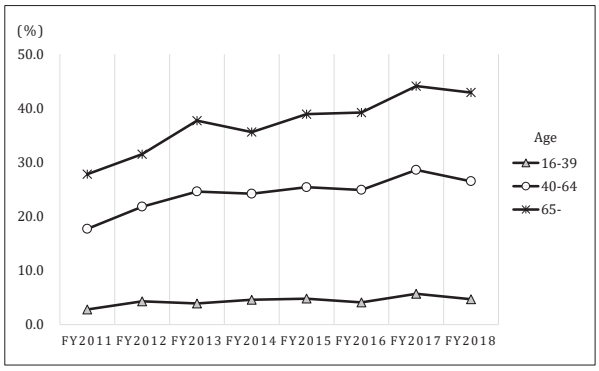
Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	2.9	2.7	3.0	3.1	2.6	2.8	3.8	3.2
40-64	22.5	21.5	22.1	22.0	21.8	22.8	22.7	22.8
65-	31.7	26.7	28.0	29.9	30.8	32.9	32.0	32.8

Figure 58. Changes in the proportion of those with fasting blood glucose of 110 mg/dL or higher (males)



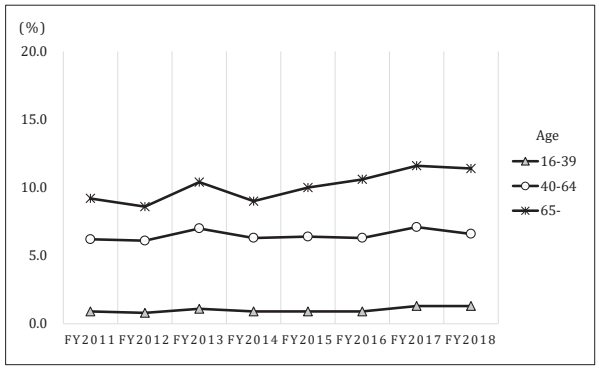
Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	1.2	1.4	1.3	1.4	1.3	1.6	2.1	1.7
40-64	10.3	9.5	10.1	10.1	10.2	10.1	10.1	10.4
65-	21.6	17.8	17.7	18.3	19.5	20.3	19.4	20.2

Figure 59. Changes in the proportion of those with fasting blood glucose of 110 mg/dL or higher (females)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	2.8	4.3	3.9	4.6	4.8	4.1	5.7	4.7
40-64	17.7	21.8	24.6	24.2	25.4	24.9	28.6	26.5
65-	27.8	31.5	37.7	35.6	38.9	39.2	44.1	42.9

Figure 60. Changes in the proportion of those with HbA1c of 5.8% or higher (overall)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	0.9	0.8	1.1	0.9	0.9	0.9	1.3	1.3
40-64	6.2	6.1	7.0	6.3	6.4	6.3	7.1	6.6
65-	9.2	8.6	10.4	9.0	10.0	10.6	11.6	11.4

Figure 61. Changes in the proportion of those with HbA1c of 6.5% or higher (overall)

b Analyses

Analysis-1: *Relationship between post-disaster evacuation and incidence of diabetes* (Table 17)

Of the residents registered in the 13 municipalities (designated evacuation zone) before the earthquake, 41,633 residents aged 40 and above who underwent at least one specific health check or health check for citizens aged 75 and above between 2008 and 2010 (18,745 males and 22,888 females, average age: 66.9 years) were selected for baseline data. We analyzed changes in glucose metabolism before and after the earthquake in residents who underwent follow-up health check in FY2011 or FY2012 for follow-up data. A total of 27,486 residents were followed up for an average of 1.6 years after the disaster.

It was observed that the incidence of diabetes increased significantly after the earthquake and that the incidence of diabetes was significantly higher among evacuees than among non-evacuees.[18)]

Analysis-2: *Relationship between evacuation and incidence of diabetes found in the 4-year follow-up survey after the earthquake* (Figure 62)

Among residents of the 13 municipalities, 13,487 residents aged 40 and above who had received at least one regular health check every year from 2012 to 2014 and who did not have diabetes were followed up based on the annual health check data since immediately after the earthquake in 2011.

The incidence of diabetes was found to be 1.61 times higher in evacuees than in non-evacuees. Compared to non-evacuees, the proportions of those with obesity, dyslipidemia, weight gain of 10 kg or more since the age of 20, weight change of 3 kg or more within one year, and/or habitual smoking were found to be significantly higher among evacuees.[19)]

Analysis-3: *Impact of post-disaster evacuation on the incidence of obesity, hypertension, dyslipidemia, and diabetes (hazard ratio)* (Figure 63)

The analysis showed that post-disaster evacuation was a risk factor for the incidence of obesity, hypertension, dyslipidemia, and diabetes. [4)]

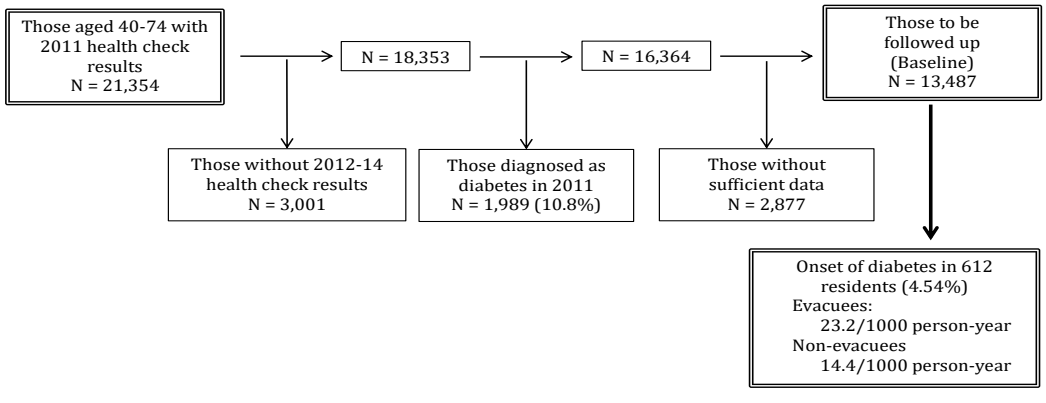
Analysis-4: Relationship between post-disaster evacuation and the development of metabolic syndrome

Analysis of health check items related to metabolic syndrome showed that the incidence of

Table 17. Incidence of diabetes after the earthquake

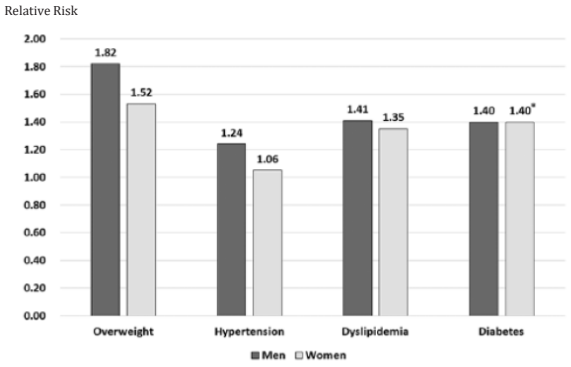
Before the earthquake	Incidence of diabetes after the earthquake (*N*)			*P* value*
	Total	Nonevacuees	Evacuees	
Nondiabetic type (*N* = 24,935)	3.0% (743)	2.6% (430)	3.6% (313)	0.00002
Normal type (*N* = 16,760)	0.5% (85)	0.4% (44)	0.7% (41)	0.004
Normal-high type (*N* = 6,440)	3.5% (223)	3.2% (132)	3.9% (91)	0.15
Borderline type (*N* = 1,735)	25.1% (435)	25.1% (254)	25.0% (181)	0.95

Satoh H, et al. J Diabetes Res, 2015.



Satoh H, et al. Diabetes Metab, 2017.

Figure 62. Incidence of diabetes found in the 4-year follow-up survey after the earthquake



*Analysis for diabetes was conducted with both males and females combined.

Ohira T, et al. Asia Pac J Public Health, 2017

Figure 63. Impact of evacuation on the incidence of obesity, hypertension, dyslipidemia, and diabetes

metabolic syndrome after the earthquake was significantly higher among evacuees than among non-evacuees in both males and females, and that BMI, waist circumference, serum triglycerides, and fasting plasma glucose levels were also higher among evacuees after the earthquake. [5)]

K) Renal function (serum creatinine, eGFR, uric acid)

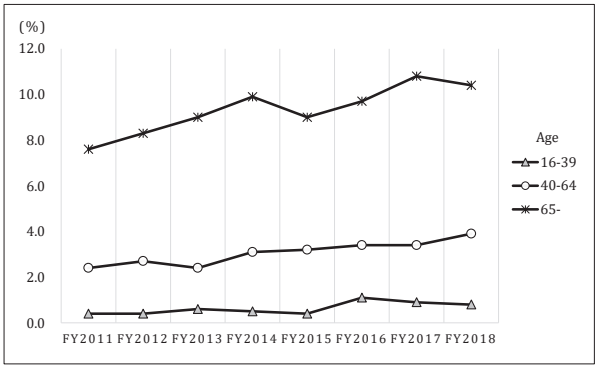
a Results

The proportion of males aged 40 to 64 with serum creatinine of 1.15 mg/dL or higher showed an increasing trend from FY2011 to FY2018. In the age group of 65 and above, the proportion increased in FY2014, decreased in FY2015, and increased again in FY2018 (Figure 64).

The proportion of females aged 65 and above with serum creatinine of 0.95 mg/dL or higher showed an increasing trend from FY2011 to FY2018 (Figure 65).

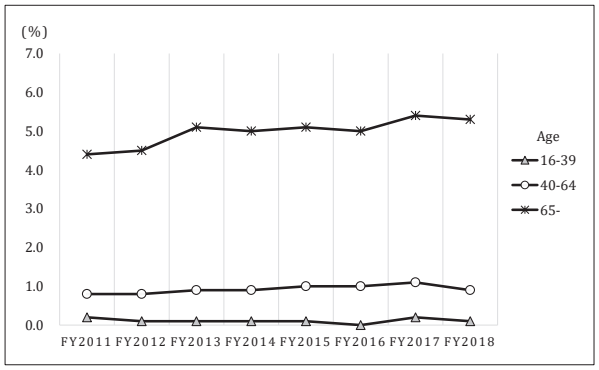
The proportion of those with an estimated glomerular filtration rate (eGFR) of less than 60 mL/min/1.73 m^2 showed an increasing trend in all age groups (Figure 66).

(Serum creatinine of 1.15 mg/dL or higher for males and 0.95 mg/dL or higher for females is a value of concern based on criteria used in group and individual health checks; eGFR of less than 60 mL/min/1.73 m^2 is a value of concern based on criteria used in group and individual health checks.)



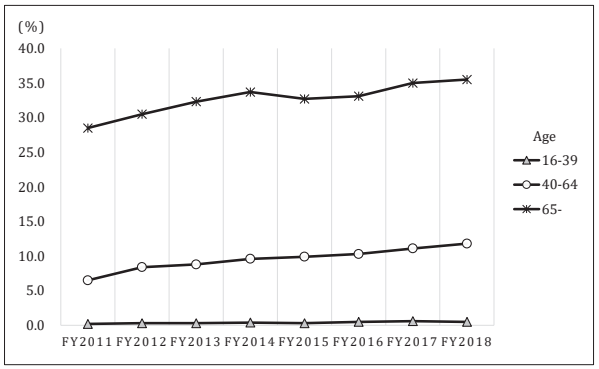
Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	0.4	0.4	0.6	0.5	0.4	1.1	0.9	0.8
40-64	2.4	2.7	2.4	3.1	3.2	3.4	3.4	3.9
65-	7.6	8.3	9.0	9.9	9.0	9.7	10.8	10.4

Figure 64. Changes in the proportion of those with serum creatinine of 1.15 mg/dL or higher (males)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	0.2	0.1	0.1	0.1	0.1	0.0	0.2	0.1
40-64	0.8	0.8	0.9	0.9	1.0	1.0	1.1	0.9
65-	4.4	4.5	5.1	5.0	5.1	5.0	5.4	5.3

Figure 65. Changes in the proportion of those with serum creatinine of 0.95 mg/dL or higher (females)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	0.2	0.3	0.3	0.4	0.3	0.5	0.6	0.5
40-64	6.5	8.4	8.8	9.6	9.9	10.3	11.1	11.8
65-	28.5	30.5	32.3	33.7	32.7	33.1	35.0	35.5

Figure 66. Changes in the proportion of those with eGFR less than 60 mL/min/1.73 m^2 (overall)

b Analyses

Analysis-1: *Prevalence of renal dysfunction among evacuees and non-evacuees after the earthquake*

We analyzed the prevalence of chronic kidney disease (CKD) after the earthquake among evacuees and non-evacuees. A total of 27,088 residents aged 40 and above who lived in the 13 municipalities before the earthquake and who underwent specific health checks were selected for follow-up. Evacuees and non-evacuees were stratified according to estimated eGFR and the degree of proteinuria. The results of this analysis showed that the prevalence of CKD with eGFR less than 60 mL/min/1.73m^2 and CKD with proteinuria was 21.59% and 1.85%, respectively. CKD severity classification showed no significant difference between evacuees and non-evacuees. The prevalence of diabetes, hypertension, and dyslipidemia according to CKD severity was significantly higher in the high-risk group than in the low-risk group. Furthermore, diabetes and dyslipidemia showed a significantly higher prevalence in evacuees than in non-evacuees only in the low-risk group. However, multivariate logistic regression analysis did not show a significant association between evacuation and CKD prevalence.[20)]

Analysis-2: *Risk factors for the development of chronic kidney disease after the earthquake* (Table 18)

CKD was defined as eGFR less than 60 mL/min/1.73 m^2 or proteinuria 1+ or more. Residents aged 40 to 74 who had lived in the 13 municipalities which are close to Fukushima Daiichi since before the nuclear accident and who did not have CKD in general health checks in 2011 (9,780 non-evacuees and 4,712 evacuees) were followed up. The incidence of CKD was investigated using the data of regular health checks conducted annually from 2012 to 2014. The association between evacuation and the incidence of CKD was analyzed using the Cox proportional hazards model.

At the start of the follow-up, the average age of the participants was 65, of whom 46.7% were males; their mean eGFR was 75.7 mL/min/1.73m^2. The incidence of CKD during the follow-up period (2.46 years on average) was higher in evacuees, at 100.2/1,000 person-years compared to 80.8/1,000 person-years in non-evacuees. In addition, Cox proportional hazards analysis showed that evacuation was an independent risk factor for the development of CKD even after adjustment for age, eGFR, sex, obesity, hypertension, diabetes, dyslipidemia, and smoking status at the start of the survey (HR: 1.45; 95% CI: 1.35-1.57). Furthermore, when CKD was analyzed separately for low eGFR and positive urinary protein, evacuation was a significant risk factor for low eGFR (HR: 1.48; 95% CI: 1.37-1.60) but not for positive urinary protein (HR: 1.21; 95% CI: 0.93-1.56).[21)]

HR=hazard ratio CI=confidence interval

Table 18. Hazard ratios of factors associated with low eGFR and positive urinary protein

	eGFR <60 ml/min/1.73 m^2		Proteinuria	
	Age- and sex-adjusted HR	Multivariable-adjusted HR	Age- and sex-adjusted HR	Multivariable-adjusted HR
Evacuee (ref : non-evacuee)	1.45 (1.35–1.57)	1.48 (1.37–1.60)	1.35 (1.05–1.74)	1.21 (0.93–1.56)
Age (continuous)	1.06 (1.05–1.06)	1.04 (1.03–1.04)	1.03 (1.02–1.05)	1.03 (1.02–1.05)
Women (ref: men)	1.28 (1.19–1.38)	1.09 (1.01–1.18)	0.45 (0.35–0.58)	0.58 (0.44–0.75)
eGFR				
≥75	Ref	Ref	Ref	Ref
≥60 to <75	19.78 (16.58–23.59)	19.81 (16.60–23.63)	1.02 (0.80–1.31)	1.00 (0.78–1.29)
BMI[a]				
Underweight	0.84 (0.69–1.014)	1.06 (0.87–1.28)	1.10 (0.58–2.09)	1.28 (0.67–2.45)
Normal weight	Ref	Ref	Ref	Ref
Obese	1.31 (1.21–1.42)	1.14 (1.06–1.24)	1.92 (1.51–2.45)	1.55 (1.20–2.00)
Hypertension (ref : without HT)	1.27 (1.17–1.37)	1.22 (1.13–1.33)	2.13 (1.61–2.82)	1.86 (1.40–2.48)
Diabetes (ref : without DM)	1.13 (1.00–1.26)	1.11 (0.99–1.25)	2.49 (1.88–3.31)	2.09 (1.57–2.78)
Dyslipidemia (ref : without DL)	1.25 (1.14–1.36)	1.09 (1.00–1.19)	1.66 (1.28–2.14)	1.38 (1.06–1.79)
Smoking (ref: no smoking)	0.84 (0.73–0.96)	0.91 (0.79–1.04)	1.93 (1.42–2.62)	1.95 (1.43–2.65)

Hayashi Y, et al. Clin Exp Nephrol, 2017

L) Hyperuricemia

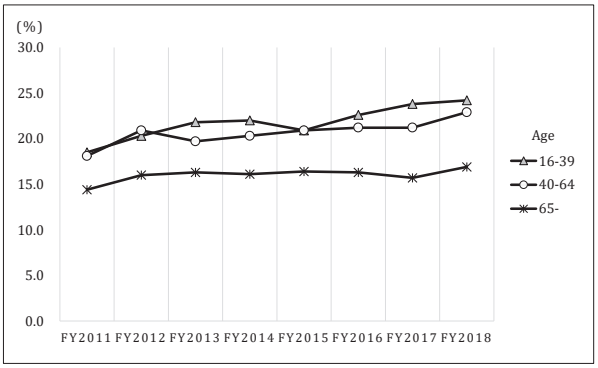
a Results

The proportion of males with uric acid levels of 7.1 mg/dL or higher showed an increasing trend in all age groups from FY2011 to FY2018. There was also a slight increase in the proportion of females with uric acid levels of 7.1 mg/dL or higher among those aged 40 and above from FY2011 to FY2018 (Figures 67 and 68).

The proportion of males with uric acid levels of 7.9 mg/dL or higher showed an increasing trend from FY2011 to FY2018 in the age group of 16 to 64 (Figure 69).

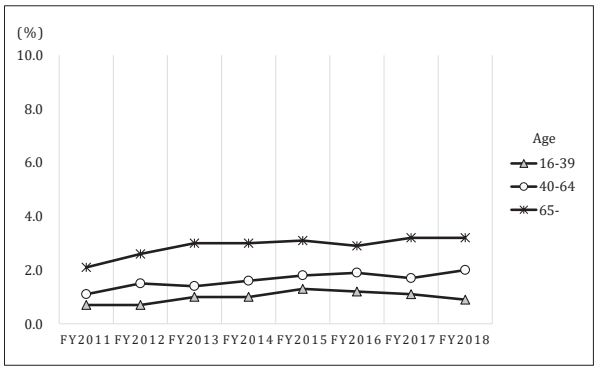
The proportion of females with uric acid levels of 5.6 mg/dL or higher showed an increasing trend from FY2011 to FY2018 in all age groups (Figure 70).

(Uric acid of 7.1 mg/dL is a threshold in the "Guidelines for the management of hyperuricemia and gout" by the Japanese Society of Gout and Uric & Nucleic Acids. Uric acid of 7.9 mg/dL or higher for males and 5.6 mg/dL or higher for females are the upper limits of the reference interval by the Japanese Committee for Clinical Laboratory Standards.)



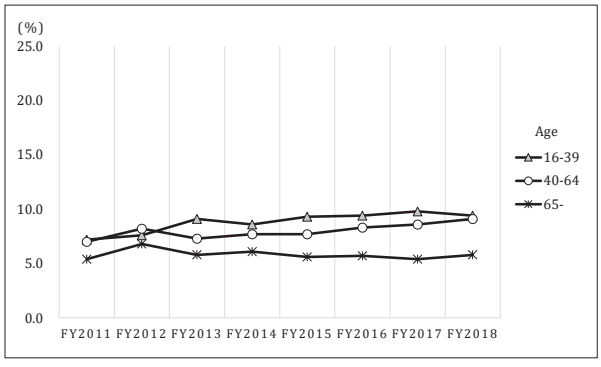
Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	18.5	20.3	21.8	22.0	20.9	22.6	23.8	24.2
40-64	18.1	20.9	19.7	20.3	20.9	21.2	21.2	22.9
65-	14.4	16.0	16.3	16.1	16.4	16.3	15.7	16.9

Figure 67. Changes in the proportion of those with uric acid of 7.1 mg/dL or higher (males)



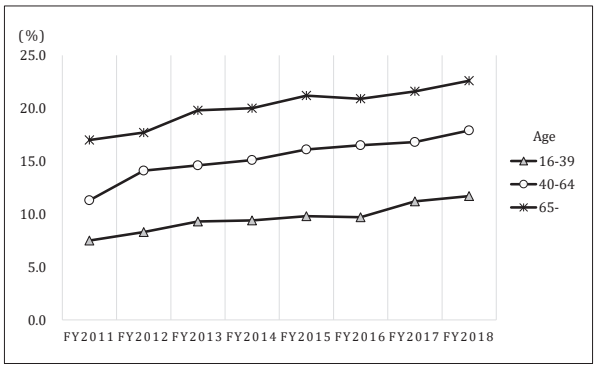
Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	0.7	0.7	1.0	1.0	1.3	1.2	1.1	0.9
40-64	1.1	1.5	1.4	1.6	1.8	1.9	1.7	2.0
65-	2.1	2.6	3.0	3.0	3.1	2.9	3.2	3.2

Figure 68. Changes in the proportion of those with uric acid of 7.1 mg/dL or higher (females)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	7.2	7.6	9.1	8.6	9.3	9.4	9.8	9.4
40-64	7.0	8.2	7.3	7.7	7.7	8.3	8.6	9.1
65-	5.4	6.8	5.8	6.1	5.6	5.7	5.4	5.8

Figure 69. Changse in the proportion of those with uric acid of 7.9 mg/dL or higher (males)



Age	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
16-39	7.5	8.3	9.3	9.4	9.8	9.7	11.2	11.7
40-64	11.3	14.1	14.6	15.1	16.1	16.5	16.8	17.9
65-	17.0	17.7	19.8	20.0	21.2	20.9	21.6	22.6

Figure 70. Changes in the proportion of those with uric acid of 5.6 mg/dL or higher (females)

2) Analyses of CHC results

(1) Prevalence of atrial fibrillation (AF) in the evacuation zone before and after the earthquake, and associated factors (Tables 19 and 20)

Of the 26,163 residents (11,628 males and 14,535 females) aged 40 to 90 who underwent health checks including 12-lead ECG between 2008 and 2010 in the 12 municipalities designated as evacuation zones, 12,410 of them (47%) underwent follow-up health checks between June 2011 and March 2013 (5,704 males and 6,706 females, mean follow-up period of 1.4 years) and were selected for follow-up.

The prevalence of AF increased in the post-disaster period compared to the pre-disaster period (pre-disaster: 1.9%, post-disaster: 2.4%, p<0.001).

The incidence of new AF after the earthquake was 4.5/1,000 person-years. Heavy drinking (alcohol 44 g/day or more) and obesity were associated with AF with multivariate-adjusted hazard ratios of 3.07 (1.55-6.08) and 1.87 (1.19-2.94), respectively.[22)]

(2) Comparison of the 13 municipalities covered by CHC with 3 municipalities in the Aizu Area

A) Purpose and Overview

In the past surveys, it was found that there was a strong tendency for a large increase in lifestyle-related diseases such as obesity, hypertension, dyslipidemia, and diabetic propensity among residents in the evacuation zone from before to after the earthquake. It is necessary to examine how these changes have evolved after the earthquake. It is also necessary to clarify whether the changes are specific to residents in the evacuation zone or whether similar trends are seen in other areas of Fukushima Prefecture. Therefore, we examined the changes in lifestyle-related diseases after the disaster using data from health checks conducted elsewhere in Fukushima Prefecture, namely, the Aizu Area, thought to be less affected by the disaster. The results show that in the evacuation zone, the number of obese residents did not decrease even four years after the earthquake, and the number of residents with diabetic propensity increased. On the other hand, the proportion of residents with liver dysfunction decreased, and blood pressure and LDL cholesterol levels improved as the number of people receiving treatment increased.

Table 19. Change in the prevalence of atrial fibrillation in evacuation zone residents after the earthquake

	Total			Men			Women		
	Before	After	*P*-value	Before	After	*P*-value	Before	After	*P*-value
n	12,410			5704			6706		
Atrial fibrillation	231 (1.9)[a]	293 (2.4)	<.001	166 (2.9)	214 (3.8)	<.001	65 (1.0)	79 (1.2)	<.01
Age									
40–69 years (*n* = 7174)	72 (1.0)	89 (1.2)	<.01	60 (1.9)	74 (2.3)	.01	12 (0.3)	15 (0.4)	.25
70–90 years (*n* = 5236)	159 (3.0)	204 (3.9)	<.001	106 (4.3)	140 (5.7)	<.001	53 (1.9)	64 (2.3)	.02

Suzuki H, et al. Int J Cardiol, 2015

Table 20. Risk factors for the development of atrial fibrillation

Variables	Hazard ratio	95% confidence interval	*P*-value
Age (years)	1.11	1.07–1.14	<.0001
Sex (men)	3.77	2.17–6.53	<.001
Obesity (≥25.0 kg/m^2)	1.87	1.19–2.94	.007
Excess ethanol intake (≥44 g/day)	3.07	1.55–6.08	.001
Currently smoking (yes)	1.12	0.60–2.07	.73
Hypertension (yes)	1.08	0.66–1.77	.76
Diabetes mellitus (yes)	0.92	0.46–1.86	.82

Suzuki H, et al. Int J Cardiol, 2015

B) Covered areas and covered population

- Partially evacuated municipalities: Minamisoma City, Tamura City, Kawamata Town, Date City
- Entirely evacuated municipalities: Hirono Town, Naraha Town, Tomioka Town, Kawauchi Village, Okuma Town, Futaba Town, Namie Town, Katsurao Village, Iitate Village
- Aizu Area: Kitakata City, Minami-Aizu Town, Tadami Town
- Covered population: Residents who had received health checks (i.e., a specific health check, health check for citizens aged 75 and above, or CHC) at least once from FY2011 to FY2012 in the above three areas were selected for analysis. For those who underwent health checks two or more times during the above period, the results of the health check conducted in the fiscal year closest to the earthquake were used as the baseline, and were compared with the data from the health checks conducted from FY2014 to FY2015. For those who underwent health checks more than once from FY2014 to FY2015, the results of the health check conducted in the fiscal year farthest from the earthquake were used for the analysis.

Table 21 shows the number of covered residents, average age, and average follow-up period in the above three areas.

C) Analysis method

- For continuous variables (body mass index, blood pressure, HbA1c, and cholesterol levels), we used the paired t-test, and the McNemar test was used to test for significant differences in proportions (frequencies of obesity, thinness, hypertension, diabetic propensity, dyslipidemia, liver dysfunction, low eGFR, and hyperuricemia, and frequency of medication or other treatment).
- SAS version 9.4 (SAS Institute, Inc., Cary, NC, USA) was used for analysis. Significant difference tests were two-tailed, and significance was determined at a level of less than 5% ($p<0.05$).
- The numbers in the graphs are rounded, so their total may not be exactly 100%.

D) BMI (kg/m^2) (Figure 71)

The proportion of residents who are thin (BMI less than 18.5) has significantly increased in all three areas compared to immediately after the earthquake.

Among the three areas, the largest increase was observed in the partially evacuated municipalities.

The proportion of those with obesity (BMI over 25.0) significantly decreased in the Aizu Area and the partially evacuated municipalities compared to immediately after the earthquake, while it significantly increased in the entirely evacuated municipalities.

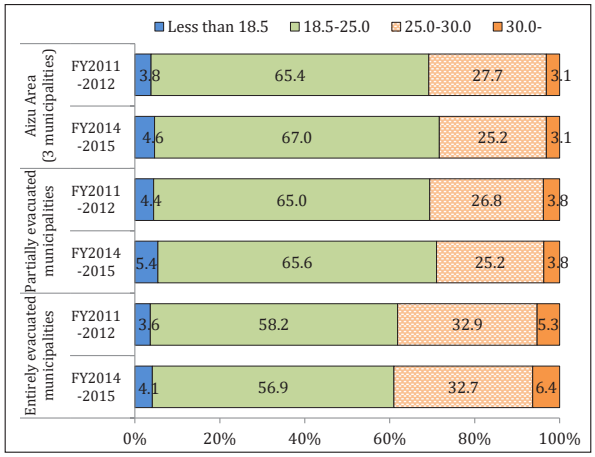


Figure 71. Changse in the proportion of BMI (Body Mass Index: kg/m^2)

Table 21. Number of residents included for tabulation, their average age, and average follow-up period in the three areas

	Total	Males	Females	Follow-up period
	Average age	Average age	Average age	
Aizu Area (3 municipalities)	6,216	2,710	3,506	3.6 years
	67.5	67.6	67.4	
Partially evacuated municipalities	21,744	9,431	12,313	3.4 years
	64.4	65.4	63.5	
Entirely evacuated municipalities	10,768	4,652	6,116	3.5 years
	63.9	64.8	63.2	

Document No. 4-6 for the 37th Oversight Committee meeting

E) Hypertension

The proportion of those with hypertension (systolic blood pressure of 140 mmHg or higher, diastolic blood pressure of 90 mmHg or higher, or taking antihypertensive medication) increased significantly in all three areas compared to immediately after the earthquake.

The proportion of those with untreated hypertension decreased in all three areas, with the smallest decrease in the entirely evacuated municipalities (Figure 72).

The mean systolic blood pressure decreased significantly in all three areas compared to immediately after the earthquake. The largest decrease among the three areas was observed in the partially evacuated municipalities.

The mean diastolic blood pressure also decreased significantly in all three areas, but the largest decrease was observed in the partially evacuated municipalities (Figure 73).

F) Diabetes

The proportion of individuals with diabetic propensity (fasting plasma glucose of 126 mg/dL or more, or blood glucose of 200 mg/dL or more at any time, or HbA1c of 6.5% or more, or under treatment with hypoglycemic agents, etc.) increased significantly in all three areas compared to immediately after the earthquake. Among the three areas, the proportion increased most in the entirely evacuated municipalities.

The proportion of those with untreated diabetes increased in the Aizu Area and the partially evacuated municipalities, but did not change in the entirely evacuated municipalities (Figure 74).

The mean value of HbA1c, an indicator of blood glucose control, increased significantly in all three areas compared to immediately after the earthquake.

The amount of change was about the same in all three areas (Figure 75).

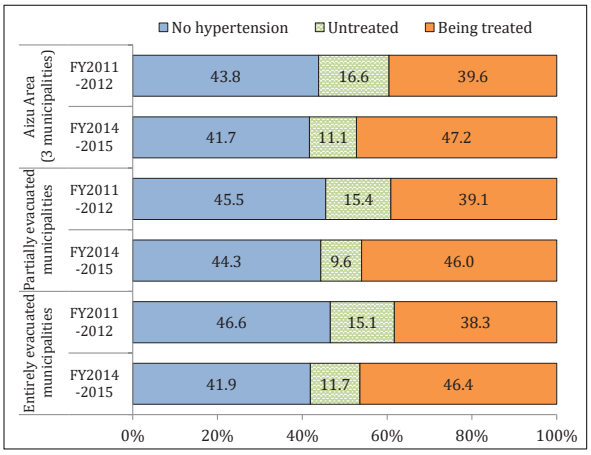


Figure 72. Changes in the proportions of those untreated and being treated for hypertension

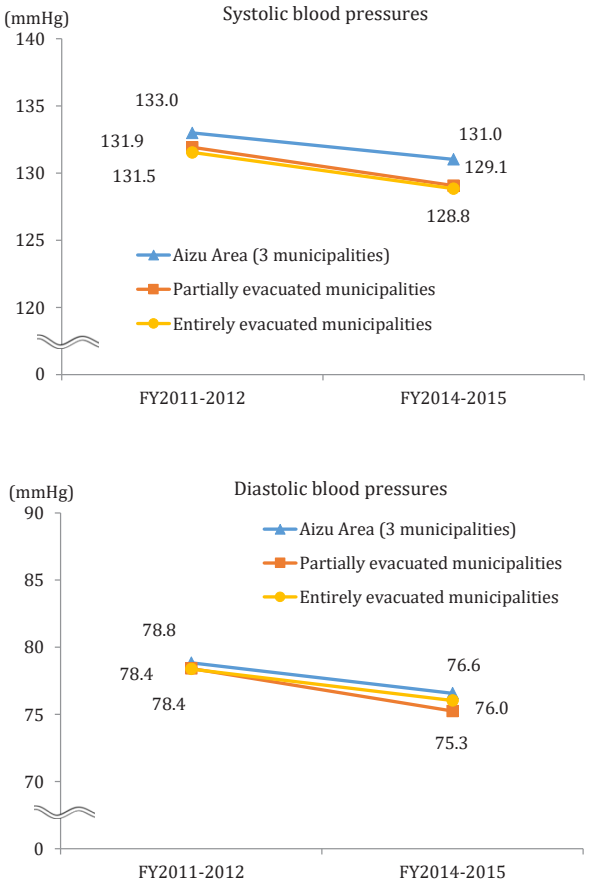


Figure 73. Change in the mean values of systolic and diastolic blood pressures

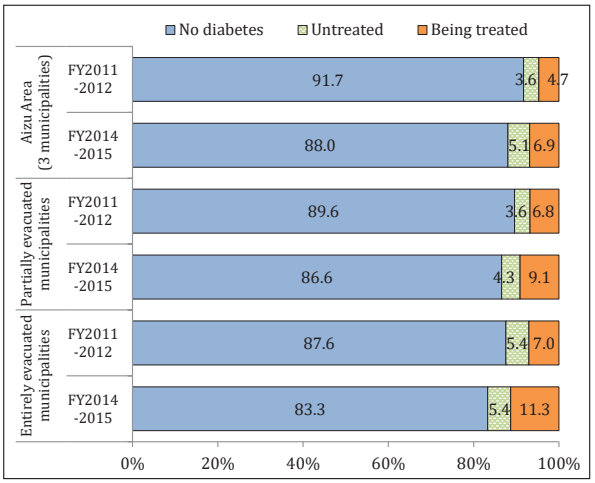


Figure 74. Change in the proportion of those untreated and being treated for diabetes

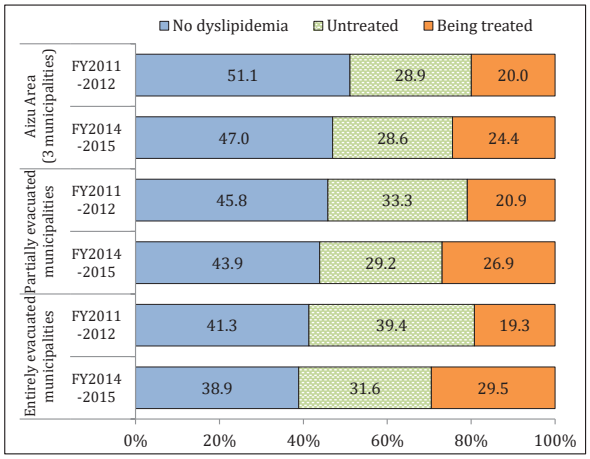


Figure 76. Change in the proportion of those untreated and being treated for dyslipidemia

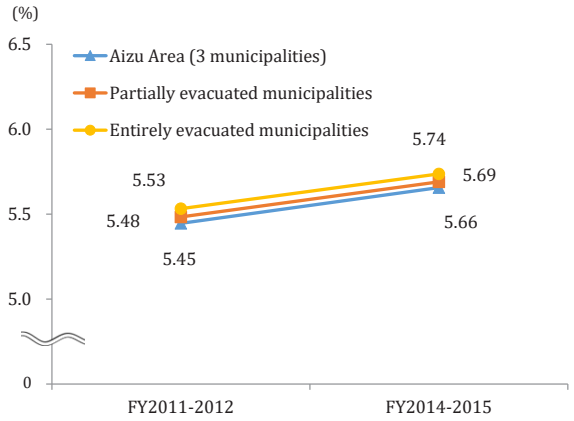
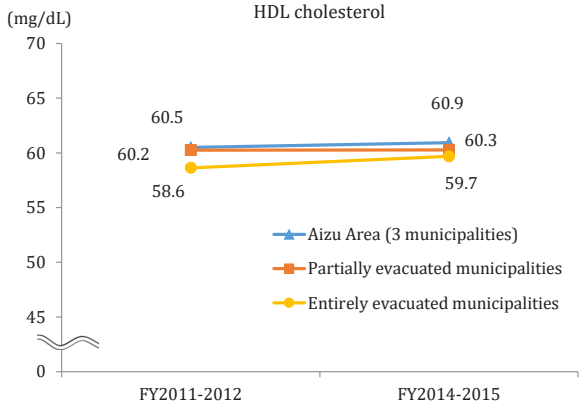


Figure 75. Change in the mean value of HbA1c



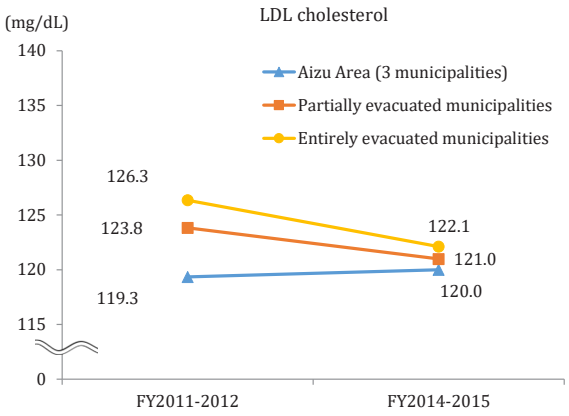


Figure 77. Change in average cholesterol levels

G) Dyslipidemia (Figure 76)

The proportion of those with dyslipidemia (HDL cholesterol less than 40 mg/dL, or LDL cholesterol of 140 mg/dL or more, or fasting triglycerides of 150 mg/dL or more, or under treatment for dyslipidemia) increased significantly in all three areas compared to immediately after the earthquake. Among the three areas, the proportion was largest in the entirely evacuated municipalities, and the rate of increase was greatest in the Aizu Area.

The proportion of those with untreated dyslipidemia decreased in all three areas, and the largest decrease was seen in the entirely evacuated municipalities.

The mean value of HDL cholesterol increased significantly in the Aizu Area and the entirely evacuated municipalities, but did not change significantly in the partially evacuated municipalities. The lowest mean values were found in the entirely evacuated municipalities.

The mean value of LDL cholesterol increased significantly in the Aizu Area compared to immediately after the earthquake, but decreased significantly in all 13 municipalities (partially and entirely evacuated municipalities). The decrease was the largest in the entirely evacuated municipalities (Figure 77).

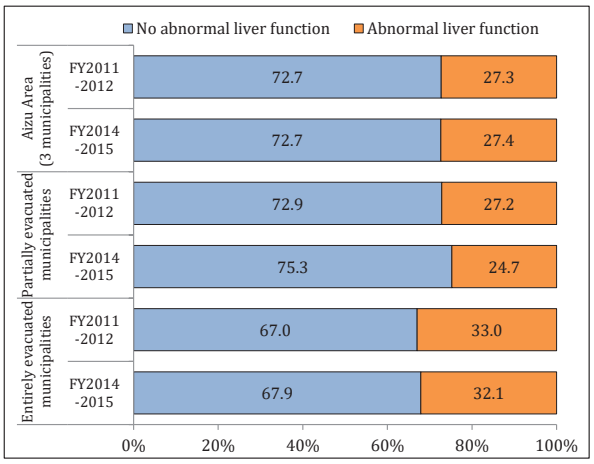


Figure 78. Change in the proportion of those with liver dysfunction

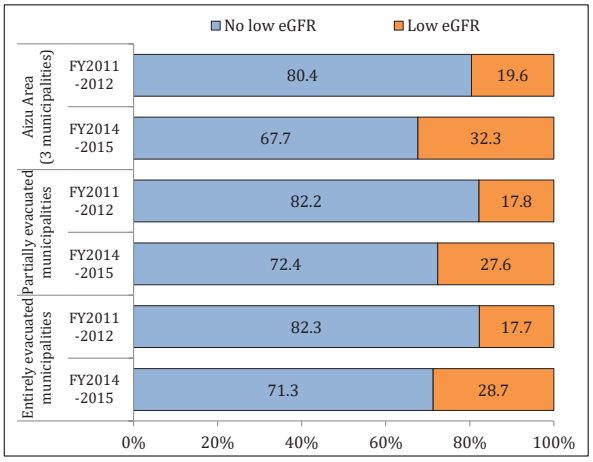


Figure 79. Change in the proportion of those with low eGFR (mL/min/1.73m^2)

H) Liver dysfunction (Figure 78)
The proportion of those with liver dysfunction indicators (AST 31U/L or higher, or ALT 31 U/L or higher, or γ-GT 51U/L or higher) did not change significantly in the Aizu Area compared to immediately after the earthquake, but all 13 municipalities (partially and entirely evacuated municipalities) showed a significant decrease. The proportion of those with liver dysfunction indicators was highest in the entirely evacuated municipalities, but the decrease was the largest in the partially evacuated municipalities.

I) Renal dysfunction (low eGFR) (Figure 79)
The proportion of those with low eGFR (less than 60mL/min/1.73m^2) increased significantly in all three areas compared to immediately after the earthquake. The Aizu Area had the highest proportion of those with low eGFR.

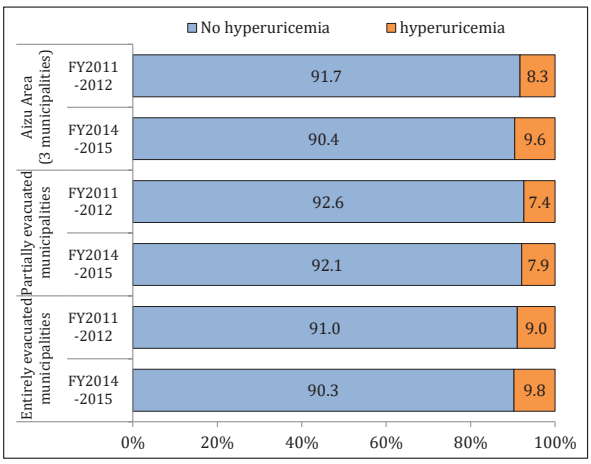


Figure 80. Change in the proportion of those with hyperuricemia

J) Hyperuricemia (Figure 80)
The proportion of those with hyperuricemia (uric acid 7.1 mg/dL or higher) increased significantly in the Aizu Area and the entirely evacuated municipalities compared to immediately after the earthquake, but there was no significant change in the partially evacuated municipalities. The proportion of those with hyperuricemia was highest in the entirely evacuated municipalities, and the rate of increase was greatest in the Aizu Area.

K) Summary of results
As a result of examining the changes of lifestyle-related diseases after the disaster, using as a reference health check data from the Aizu Area (considered to be less affected by the disaster), it was found that the proportion of those with obesity did not decrease even four years after the disaster in the entirely evacuated municipalities, and the increase of diabetic propensity was also greater than in the other two areas.

Although the proportion of those with hypertension increased in all three areas, the proportion of those with treated hypertension also increased, and as a result, the mean values of systolic and diastolic blood pressure tended to decrease in all three areas.

The proportion of those with dyslipidemia also increased in all three areas, but as a result of the increase in the proportion of those treated for dyslipidemia, there was a downward trend in LDL cholesterol levels in both partially and entirely evacuated municipalities.

The proportion of those with liver dysfunction indicators showed a decreasing trend in the partially and entirely evacuated municipalities.

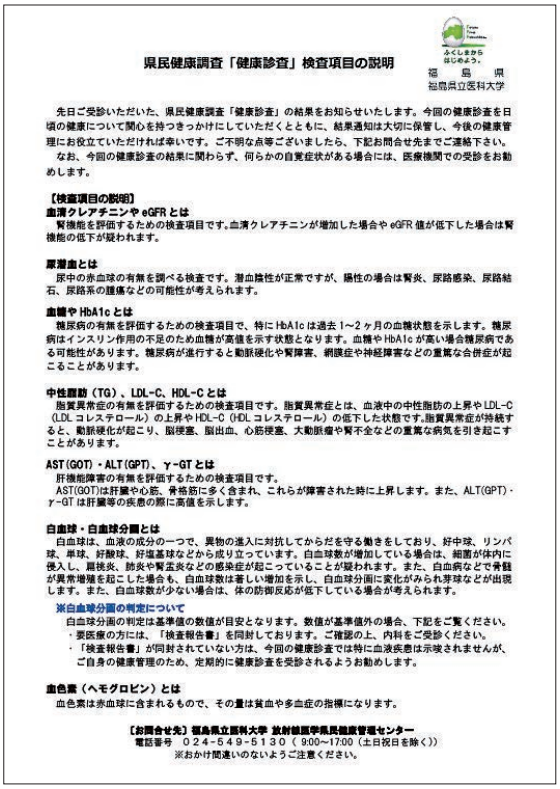
The proportion of those with renal dysfunction (low eGFR) and hyperuricemia showed an increasing trend in all three areas.

From the above results, it can be seen that there is a tendency toward improvement of blood pressure and LDL cholesterol levels in partially and entirely evacuated municipalities due to an increase in those being treated. However, the risk of developing cardiovascular diseases continues to be high, and it is considered necessary to continue disease prevention and health promotion activities such as obesity control.

4. Publication of results and support/feedback

1) Individual result report

The results of the Comprehensive Health Check (CHC) are mailed to each participant. In addition, face-to-face explanation of the results is offered to those aged 15 and under and their parents/guardians at the health check facilities where they received health checks (Figures 81 to 83).



県民健康調査「健康診査」検査項目の説明

福島県
福島県立医科大学

先日ご受診いただいた、県民健康調査「健康診査」の結果をお知らせいたします。今回の健康診査を日頃の健康について関心を持つきっかけにしていただくとともに、結果通知は大切に保管し、今後の健康管理にお役立ていただければ幸いです。ご不明な点等ございましたら、下記お問合せ先までご連絡下さい。
なお、今回の健康診査の結果に関わらず、何らかの自覚症状がある場合には、医療機関での受診をお勧めします。

【検査項目の説明】

血清クレアチニンや eGFR とは
腎機能を評価するための検査項目です。血清クレアチニンが増加した場合や eGFR 値が低下した場合は腎機能の低下が疑われます。

尿潜血とは
尿中の赤血球の有無を調べる検査です。潜血陰性が正常ですが、陽性の場合は腎炎、尿路感染、尿路結石、尿路系の腫瘍などの可能性が考えられます。

血糖や HbA1c とは
糖尿病の有無を評価するための検査項目で、特に HbA1c は過去 1～2 ヶ月の血糖状態を示します。糖尿病はインスリン作用の不足のため血糖が高値を示す状態となります。血糖や HbA1c が高い場合糖尿病である可能性があります。糖尿病が進行すると動脈硬化や腎障害、網膜症や神経障害などの重篤な合併症が起こることがあります。

中性脂肪（TG）、LDL-C、HDL-C とは
脂質異常症の有無を評価するための検査項目です。脂質異常症とは、血液中の中性脂肪の上昇や LDL-C（LDL コレステロール）の上昇や HDL-C（HDL コレステロール）の低下した状態です。脂質異常症が持続すると、動脈硬化が起こり、脳梗塞、脳出血、心筋梗塞、大動脈瘤や腎不全などの重篤な病気を引き起こすことがあります。

AST（GOT）・ALT（GPT）、γ-GT とは
肝機能障害の有無を評価するための検査項目です。
AST(GOT)は肝臓や心筋、骨格筋に多く含まれ、これらが障害された時に上昇します。また、ALT(GPT)・γ-GT は肝臓等の疾患の際に高値を示します。

白血球・白血球分画とは
白血球は、血液の成分の一つで、異物の進入に対抗してからだを守る働きをしており、好中球、リンパ球、単球、好酸球、好塩基球などから成り立っています。白血球数が増加している場合は、細菌が体内に侵入し、扁桃炎、肺炎や腎盂炎などの感染症が起こっていることが疑われます。また、白血病などで骨髄が異常増殖を起こした場合も、白血球数は著しい増加を示し、白血球分画に変化がみられ芽球などが出現します。また、白血球数が少ない場合は、体の防御反応が低下している場合が考えられます。

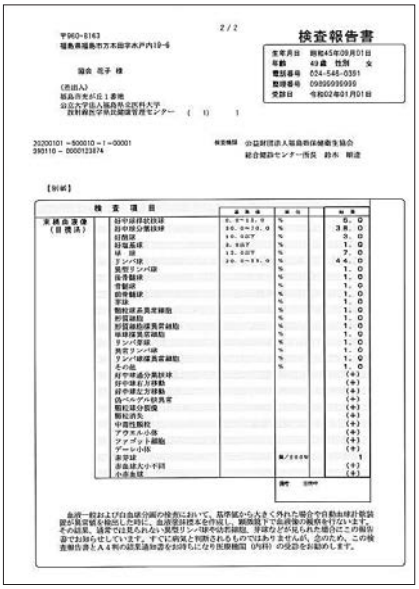
※白血球分画の判定について
白血球分画の判定は基準値の数値が目安となります。数値が基準値外の場合、下記をご覧ください。
・要医療の方には、「検査報告書」を同封しております。ご確認の上、内科をご受診ください。
・「検査報告書」が同封されていない方は、今回の健康診査では特に血液疾患は示唆されませんが、ご自身の健康管理のため、定期的に健康診査を受診されるようお勧めします。

血色素（ヘモグロビン）とは
血色素は赤血球に含まれるもので、その量は貧血や多血症の指標になります。

【お問合せ先】福島県立医科大学 放射線医学県民健康管理センター
電話番号 024-549-5130（9:00～17:00（土日祝日を除く））
※おかけ間違いのないようご注意ください。

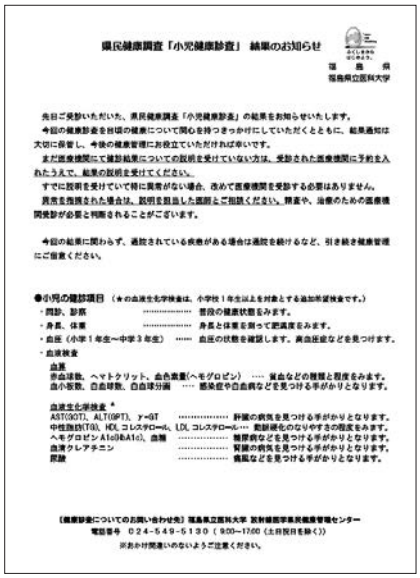
Figure 81. Report of the results of group and individual health check results
(Explanation of health check items, FY2019)

結果通知書



検査報告書

Figure 82.
Report of the results of group and individual health checks (results report, examination data, 2019)



県民健康調査「小児健康診査」結果のお知らせ

●主な小児健診項目についてのご説明

白血球・白血球分画

血色素(ヘモグロビン)

HDL コレステロール、LDL コレステロール、中性脂肪

血清クレアチニン

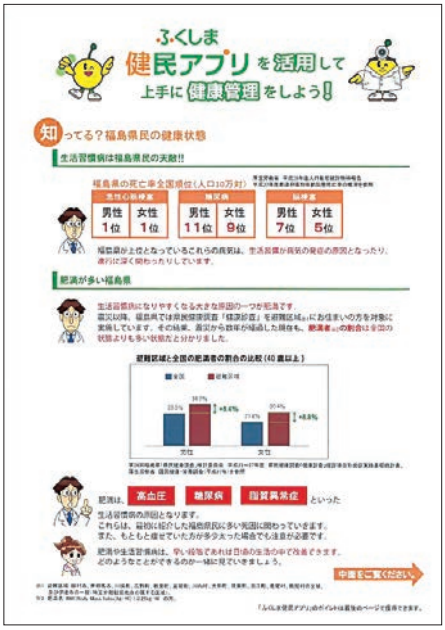
AST(GOT)、ALT(GPT)、γ-GT

血糖、ヘモグロビン A1c (HbA1c)

Figure 83.
Report of pediatric health check results (results report, 2019)

2) Leaflet on the overall results of CHC

Since FY2017, a leaflet summarizing the findings from the CHC has been prepared and enclosed in the health check invitations for those aged 16 and above (Figures 84 to 86).



ふくしま健民アプリを活用して上手に健康管理をしよう!

知ってる?福島県民の健康状態

生活習慣病は福島県民の天敵!!

肥満が多い福島県

高血圧 糖尿病 脂質異常症

Figure 84. Leaflet (Lifestyle-Related Diseases, FY2017)

Figure 85. Leaflet (Diabetes, FY2018)

In the FY2019 leaflet, we introduced the current status of metabolic syndrome in Fukushima Prefecture, what we learned from the Fukushima Health Management Survey, what the problems are, and what we should pay attention to in our daily lives, citing specific examples, intending to help people understand the importance of having regular health checks.

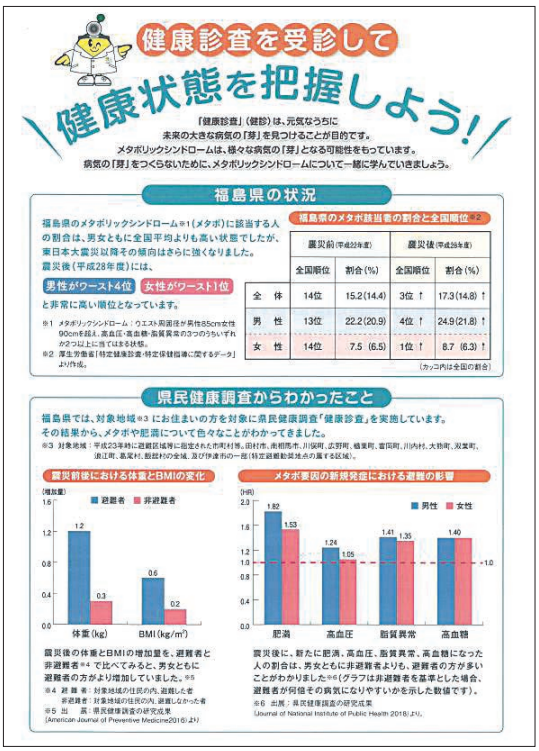


Figure 86. Leaflet (Metabolic Syndrome, FY2019) pp.1 - 3

3) Analysis reports on CHC results

We prepare analysis reports on the results of the CHC in accordance with requests from participating municipalities, and share information with those municipalities.

We also explain the content of these reports at periodic briefing sessions with the 13 municipalities, and opinions are exchanged with health service personnel of each municipality.

In addition, the results of the CHC are disseminated directly to the residents of participating municipalities as health seminars by medical doctors and other experts at events held by the municipalities (Figure 87).

Figure 87. Health seminar (Health lecture by a doctor)

4) Health seminars

(1) Purpose

In order to deepen residents' understanding of the importance of receiving health checks every year and to support them to continue receiving health checks, seminars are held at events such as health check results reporting meetings and health classes organized by municipalities.

(2) Number of health seminars implemented

- FY2016: 11 times
- FY2017: 42 times
- FY2018: 26 times
- FY2019: 38 times

(3) Contents

In health seminars, medical doctors give health lectures to residents of the participating municipalities, presenting results of the CHC and analyses, and specialists offer individual consultations and blood pressure and blood glucose measurements (Figures 88 to 90).

- Examples of events organized by municipalities
  Health check results reporting meetings
  Health promotion lectures for citizens
  Health improvement classes
- Contents
  Health lecture by medical doctors
  Face-to-face explanation and consultation on health check results by experts (nurses, public health nurses, nutritionists, etc.)
  Health exercises by physical therapists
  Blood pressure and blood glucose measurement
  Matters related to mental health
  Display of panels summarizing the results of the CHC, etc.
- Examples of themes for health lectures
  Tips for extending one's healthy life span
  What can be seen from health check results
  Hypertension and diabetes
  Diabetes prevention

Figure 88. Health seminar (Individual consultation by experts)

Figure 89. Health seminar (Blood glucose measurement)

Figure 90. Health seminar (Health exercises)

Figure 91. Poster for the pediatric health checks (FY2019)

5) Efforts to improve participation rates

(1) Publicity

We request that municipal and prefectural governments run notices of health checks in their public relations magazines.

In addition, posters and flyers are prepared and displayed at medical and other health check facilities to encourage people to undergo health checks (Figure 91).

(2) Preparation of pamphlets

We prepared a pamphlet entitled "Health Check is Your Body's Report Card," which summarizes how to read health check results, explains diseases and preventive methods, and emphasizes the necessity of health checks (Figure 92).

The pamphlet is also posted on the website of the Radiation Medical Science Center for the Fukushima Health Management Survey.

Figure 92. Comprehensive Health Check pamphlet (cover)

Figure 92. Comprehensive Health Check pamphlet (Table of contents)

Figure 92. Comprehensive Health Check pamphlet (pp. 6-7 "How to read the health check results")

(3) Use of the Fukushima Kenmin App

Leaflets and flyers are enclosed with the health check invitations, and points for the Fukushima Kenmin App are awarded (100 points with an invitation, 200 points with a result report) (Figure 93).

Figure 93. Leaflet on Fukushima Kenmin App (p. 4, FY2019)

(4) Securing venues for group health checks

Efforts were made to secure convenient venues for health check eligible residents.

(5) Sending reminders

During the period of health checks, we sent out reminders to those who had not yet participated.

5. Summary

1) Summary of CHC results

(1) Summary of pediatric health check results (for residents aged 15 and under)

Analysis of the health check results suggested that there were children with obesity, dyslipidemia, hyperuricemia, liver dysfunction, hypertension, and glucose intolerance among residents aged 15 and under in the designated evacuation zone.[1)]

In addition, obesity and dyslipidemia were detected in pediatric health checks immediately after the earthquake. Although obesity improved during follow-ups, the improvement of dyslipidemia was delayed, suggesting the need for continued health checks.

(2) Summary of CHC results (for residents aged 16 and above)

It was suggested that the number of residents aged 16 and above in the designated evacuation zone with obesity, dyslipidemia, hyperuricemia, liver dysfunction, hypertension, glucose intolerance, and renal dysfunction increased with increasing age.[4), 23)]

2) The significance of CHC

(1) Expanding opportunities for health checks

The CHC has provided opportunities for health checks in the aftermath of the disaster, which enables us to contribute to the monitoring of health status in the face of major changes in the living environment.

It has also provided opportunities for young people aged 16 to 39, who have few opportunities to receive health checks under existing systems.

(2) Close cooperation with municipalities

If the results of group or individual health checks showed values that correspond to the "urgent contact required" category, we promptly con-

Figure 94. Health seminar (Lecture by a medical doctor)

tacted these residents directly, advising them to see a doctor. In addition, we also shared information regarding these residents with the public health nurses of their municipalities.

In addition, we cooperated with health check result reporting meetings and health events by holding health seminars in conjunction with health-related events held by municipalities (Figure 94).

(3) Effects of post-disaster evacuation on the body were examined

By monitoring the health status of residents in the designated evacuation zone, the CHC has correlated decreases in physical activity and changes in dietary habits due to evacuation with increases in weight and obesity, and has shown that some medical conditions are related to evacuation life.

(4) Feedback on CHC results had positive effects

By proactively feeding back the CHC results to the community, the treatment rate increased, leading to improvements in blood pressure and LDL cholesterol levels (Figure 95).

Figure 95. Follow-up session on health check results (Mini lecture by a medical doctor)

(5) Proposals for improvement based on the CHC results, etc.

We have analyzed relationships between lifestyle habits, mental health conditions and lifestyle-related diseases, identified disease associations, and made concrete proposals to municipalities and local residents for improvement, emphasizing the importance of physical exercise, nutritional management, mental health care, and promotion of social engagement (Figure 96).

Figure 96. Health seminar (Exercise guidance, step test)

Notes and sources

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