Part 2 Survey Results

4. Mental Health and Lifestyle Survey

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4. Mental Health and Lifestyle Survey

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

Many residents of Fukushima Prefecture have been suffering from a variety of anxieties and stress due to their experiences of the Great East Japan Earthquake and TEPCO's Fukushima Daiichi Nuclear Power Plant accident, as well as the evacuation caused by these disasters. The purpose of the Mental Health and Lifestyle Survey is to gain an accurate understanding of the physical and mental health and lifestyle of Fukushima residents affected by these disasters, and to provide appropriate health, medical, and welfare services for each individual.[1)] Specifically, every year since 2011, we have been sending out questionnaires to the residents of the affected areas listed below, and based on the responses, we have been providing support by telephone and other means in cooperation with the relevant municipalities.

Details of the survey and support methods and results are explained below.

2. Survey method and outline of support

1) Eligible persons

Surveys and support are conducted for those who were registered as residents of municipalities nationally designated as the evacuation zone in 2011, as well as those who were registered as residents of the covered municipalities as of April 1 of each survey year. The number of eligible persons changes slightly each year depending on the number of residents who have moved into the covered municipalities.

In the most recent survey (FY2018 survey, for which questionnaires were sent out in February 2019), the following residents were eligible for the survey and support.

a. Residents registered in the covered municipalities between March 11, 2011 and April 1, 2012 (They were eligible even after moving out of their original municipalities).
b. Residents registered in the covered municipalities as of April 1, 2018.
c. Those other than the above who were identified in need of assessment and support as a result of the Basic Survey.

* In the FY2018 survey, the total number of eligible persons was 203,827.

2) Age groups

Eligible persons are divided into five age groups (Ages 0-3, 4-6, elementary school students, junior high school students, and adults), for which different questionnaires and support are provided. The number of eligible persons in each age group, as of October 31, 2019, were as follows:

a. Ages 0-3: 3,396 (those born between April 2, 2015 and April 1, 2018)
b. Ages 4-6: 3,504 (those born between April 2, 2012 and April 1, 2015)
c. Elementary school students: 9,932 (those born between April 2, 2006 and April 1, 2012)
d. Junior high school students: 5,462 (those born between April 2, 2003 and April 1, 2006)
e. Adults aged 16 and above: 181,533 (those born on or before April 1, 2003)

3) Covered municipalities

The survey covers the following 13 municipalities that were designated as the evacuation zone in 2011.

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 part of Date City (specific spots recommended for evacuation)

4) Methods of the survey and support

(1) Content of the questionnaires

All questionnaires are self-administered. Questionnaire content varies depending on the age group, and in principle, for children up to junior high school age, the questionnaire is to be completed by parents/guardians living with them (in the questionnaire for junior high school students, some items are to be completed by the child). While some questions change from year to year, basic information (Table 1, Figure 1) has always been asked to best support people in the aftermath of such an extraordinary accident.[2)]

(2) Schedule for sending questionnaires

In principle, the questionnaires are sent out around February every year.

(3) Response method

The questionnaires are sent by post with a self-addressed return envelope enclosed. From FY2016, online responses became available.

Table 1. Main items in the questionnaires

Ages 0-3	Health condition, height, weight, sleeping habits, exercise habits, eating habits, parent's confidence in child rearing, availability and use of consultation resources, free comments, etc.
Ages 4-6	Health condition, height, weight, sleeping habits, exercise habits, eating habits, SDQ, developmental and/or mental health problems, availability and use of consultation resources, attendance in kindergarten, free comments, etc.
Elementary school students	Health condition, height, weight, sleeping habits, exercise habits, eating habits, SDQ, developmental and/or mental health problems, availability and use of consultation resources, attendance in school, free comments, etc.
Junior high school students	Health condition, height, weight, sleeping habits, exercise habits, eating habits, SDQ, developmental and/or mental health problems, availability and use of consultation resources, attendance in school, free comments, etc.
Adults	Subjective health condition, height, weight, medical history (hypertension, diabetes, etc.), sleeping habits, smoking, alcohol consumption, eating habits, K6, PCL/PCL-4, experience regarding the disaster, current living conditions, employment, financial circumstances, risk perception of radiation health risks, availability and use of consultation resources, free comments, etc.

Figure 1. Questionnaire forms

(4) Support method

In order to ensure smooth implementation of telephone support, we have set detailed selection. For the mental health of children, we use the Strengths and Difficulties Questionnaire (SDQ, Japanese version), to assess emotional and behavioral problems. Other criteria include developmental and mental health problems, the availability of consultation resources, and the status of preschool or school attendance. If the respondent is considered as especially in need of support, we make a phone call to them.

For adults, we use the Kessler-6 Questionnaire (K6) and the PTSD Check List (PCL) to assess general mental health status and posttraumatic stress symptoms. The criteria for lifestyle and physical health include items related to sleep disorders, alcohol consumption and problem drinking (CAGE: Cut down, Annoyed, Guilty, and Eye-opener) scores, and history of hypertension and diabetes. In addition, we read through everything in the free comment section of questionnaires for all ages and provide support to those who have indicated suicide risk, domestic violence, abuse, or other urgent matters (Table 2).

The basic criteria to identify whether a resident needs support remain the same every year, with some year-to-year adjustments to give priority to contacting residents who need more support as soon as possible, with consideration of our team capacity to provide adequate care. The selection criteria range from Criterion I to Criterion III, and different types of support are provided depending on each criterion. Table 3 shows the details of such support.

The criteria to assess the need for support in the FY2018 survey are shown below (Tables 4 and 5).

A) Individual support by telephone

Based on responses to the questionnaire, telephone support is provided to those who are considered to be in need. The telephone support is provided by about 15 experienced professionals appointed by Fukushima Medical University's Radiation Medical Science Center for the Fukushima Health Management Survey (nurses, public health nurses, clinical psychologists, social workers, etc., the number of which varies slightly from year to year). The support staff are making efforts to improve their support skills through regular study sessions and training.

During telephone support, we ask about recent physical and mental health conditions, assess needs, and provide professional advice. In some cases, we may recommend that the recipient see a medical doctor. In cases where there is a threat of suicide, emergency contact may be made with local support organizations. The duration of a call ranges from short to long, with the average being 15 to 20 minutes. In terms of support based on the response to the questionnaires for children (those aged 15 and under), we mostly talk to their parents or guardians.[3), 4)] We provide telephone support to about 3,000 people every year; it takes more than four months to reach all of them.

Specific results of the telephone support will be discussed in detail later.

Table 2. Measures used to assess if respondents may need support

【Children】	【Adults (age 16 and above)】
➢Emotion and behavior (SDQ)	➢Psychological distress (K6)
➢Developmental and/or mental health problems	➢Traumatic responses (PCL)
➢Availability of consultation resources	➢BMI (calculated using height and weight)
➢Attendance in kindergarten/school	➢Medical history, treatment status (hypertension, diabetes, mental disorder)
➢Free comments	➢Sleeping habits
	➢Smoking
	➢Drinking habits
	➢Free comments

Table 3. Types of support provided according to criteria

Criterion I	Our Mental Health Support Team, consisting of clinical psychologists, public health nurses, hospital nurses, etc., make phone calls to the survey respondents who were judged to be in need of support. Support members ask them about their health conditions and problems they might have, and, if judged necessary, recommend that they see a doctor or consult a specialist at medical or health facilities.
Criterion II	A postcard with a reply card attached are sent to the respondents who met this criterion, asking them if they wish to receive telephone support. The Support Team members make phone calls to those who express their wish to receive support in their replies and those who are judged to be in need of support based on the content of their reply, and offer consultation and support.
Criterion III	For those who met this criterion, brochures to encourage improvement of their lifestyle habits are sent.

Table 4. Criteria to assess the need for support regarding issues with children

		Emotion and Behavior (SDQ)	Availability of consultation resources, developmental problems, attendance in kindergarten/school	Free/extra comments
Selection Criteria	Criterion I	1) SDQ (≥ 20 points and ≤ 40 points) OR 2) SDQ (≥ 16 points and ≤ 19 points) AND "have no one to consult with" AND "have been absent from school for 30 days or more"	1) Children who "have developmental problems" and parents who "have no one to consult with" 2) Parents who "have PTSD or depressive tendencies" 3) Children who"have been absent from school for 30 days or more" and parents who "have no one to consult with" OR Children who "have been absent from school for 30 days or more" and parents who "have not consulted with a specialist" 4) Children aged 4-6 years who "have sometimes been absent from nursery school" and parents who "have no one to consult with"	Depending on urgency judged by specialists
	Criterion II	3) SDQ (≥ 16 points and ≤ 19 points)	5) Children who "have developmental problems" and parents who "have not consulted with a specialist" 6) Children who "have been absent for less than 30 days" and parents who "have not consulted with a specialist or anyone else" 7) Children aged 4-6 years who "have sometimes been absent from nursery school" and parents who "have not consulted with a specialist."	

Table 5. Criteria to assess the need for support regarding personal issues

		Mental Health	Physical Health	Sleep Disorder	Mental Disorder	Smoking & Drinking	Free/extra comments
Selection Criteria	Criterion I	1) K6 (≥ 13 points and ≤ 24 points)	1) Having Hypertension or diabetes, but not on treatment, AND (i) BMI of 27.5 or more and (ii) average daily alcohol consumption of 540 mL or more 2) Average daily alcohol consumption of 540 mL or more AND a CAGE score of 4 points				Depending on urgency judged by specialists
	Criterion II	2) K6 (≥ 10 points and ≤ 12 points) 3) PCL-4 (≥ 12 points and ≤ 20 points)	3) Other than (i) or (ii) of 1) 4) Weight increase of 3 km or more/year AND BMI of 27.5 or more	"No mental disorder," "quite dissatisfied with sleep" or "very dissatisfied with sleep" AND "feel depressed during the day" or "physically/ mentally inactive during the day"	"have mental disorders" AND "not on treatment" or no entry	1) Average daily alcohol consumption of 540 mL AND a CAGE score of 2 - 3 points	
	Criterion III		5) Other than 1) or 2) and weight increase of 3 kg or more/year AND BMI of 25.0 or more and less than 27.5			2) Not matching other criteria, and a CAGE score of 2 point or more, or a Brinkman index of 200 or more	

Smoking cessation is recommended during telephone support for those who met Criteria I and II and with a Brinkman index of 200 or more.

B) Feedback on survey results (sending individual result reports)

Since FY2014, we have been sending result reports to individual respondents containing their questionnaire assessment form along with brief advice to help them understand the state of their mental health and lifestyle habits and manage their health, encouraging self-care. Figures 2 and 3 are samples of the result report sent back to those who responded.

〒960-1295
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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

令和元年度 県民健康調査「こころの健康度・生活習慣に関する調査」 結 果 通 知 書

このたびは、「こころの健康度・生活習慣に関する調査」にご回答いただきまして、ありがとうございます。ご回答いただきました内容から結果通知書を作成しました。平成30年度調査にご回答いただいた方には、その結果も表示しています。こころの健康度や生活習慣のおおよその状態を把握していただき、あなたの健康管理にお役立てください。

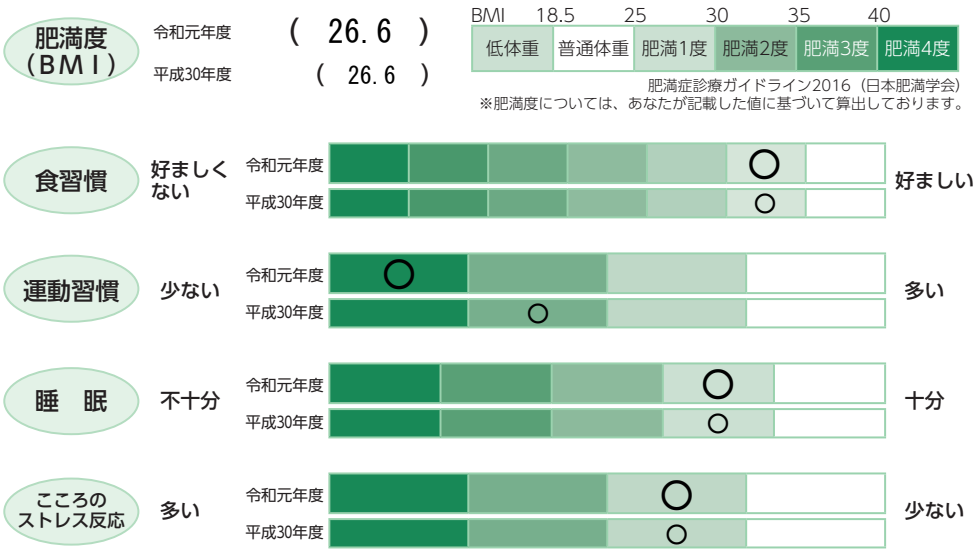
詳しい状況や問題については、この結果のみで判断することはできません。ご心配がある方は、裏面に記載しておりますお問い合わせ先へご相談ください。

あなたのこころの健康度・生活習慣の状況

調査回答記入日 令和2年2月29日

結果の見方について

○印は、あなたがそれぞれの項目について、どの位置にあるかを示しています。
なお、回答がない、あるいは不明瞭であった項目の結果については、空欄となっています。



裏面に、アドバイスを掲載しています。令和元年度に調査票が『中学生用』から『一般用』となった方につきましては、平成30年度の結果は表示しておりませんので、ご了承ください。

Figure 2. Individual result report (Front page)

C) Other support (sending pamphlets, etc.)
As a support to complement the above-mentioned telephone support, pamphlets containing health-related information and contact information of medical facilities and consultation services are sent to respondents when considered necessary. Figure 4 shows the support booklet distributed to help them with self-care. Every year, we also send a summary of overall findings of the survey (Figures 5 and 6) and the summary report on results of the surveys from FY2011 to FY2013 (Figure 7).

あなたへのアドバイス

肥満度について

肥満傾向にあります。食べ過ぎや間食を避けて体重をコントロールしましょう。

食習慣について

食事内容が偏る傾向にあります。魚・野菜などバランスの良い食事を心がけましょう。アレルギー等のある場合は医師などに相談しましょう。

運動習慣について

運動する頻度が少ない傾向にあります。定期的な運動を心がけましょう。

睡眠について

適度な睡眠がとれています。引き続き、生活リズムを整え、必要な睡眠をとりましょう。

こころのストレス反応について

ストレス反応は少ない傾向にあります。今後、こころの健康について、不安などがありましたら、お気軽に当健康管理センターまでご相談ください。

アルコールについて

お酒を飲まれる方は、飲み過ぎに注意して、多くても1日2合までにしましょう。また、お酒を飲まない日を1週間に1～2日作りましょう。

喫煙について

喫煙は健康に悪影響をおよぼすので、喫煙者の方は禁煙をお勧めします。

今後も継続的に「こころの健康度･生活習慣に関する調査」にご回答いただきますようお願い申し上げます。

【お問い合わせ先】
「こころの健康度・生活習慣に関する調査」専用ダイヤル
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 － 5170**
(9：00 ～ 17：00（12/29 ～ 1/3 及び土日祝日を除く))
結果通知書に関するＦＡＱ（よくある質問）はホームページにも掲載しています
URL　http://fukushima-mimamori.jp/qanda/mental-survey/

Figure 3. Individual result report (Back page)

(5) Cooperation with local health and support organizations

The Office of Mental Health and Lifestyle Survey and Care places particular emphasis on cooperation with local support organizations, especially with the municipalities from which respondents evacuated. For example, the content of the questionnaire is prepared in consideration of the requests of municipalities, and the overall results of the survey are communicated to individual municipalities for their overview and to guide countermeasures; valuable information is also

Figure 4. Mental Health and Lifestyle Support Book (Front cover)

received from them.[5] If necessary, information on the health status of individual residents is shared with them, with due consideration for privacy, so that they can make use of the information in their visits and other support. In addition, information on the health status of evacuees is shared with other core support organizations such as the Fukushima Center for Disaster Mental Health through training and other means, as appropriate.[5), 6)]

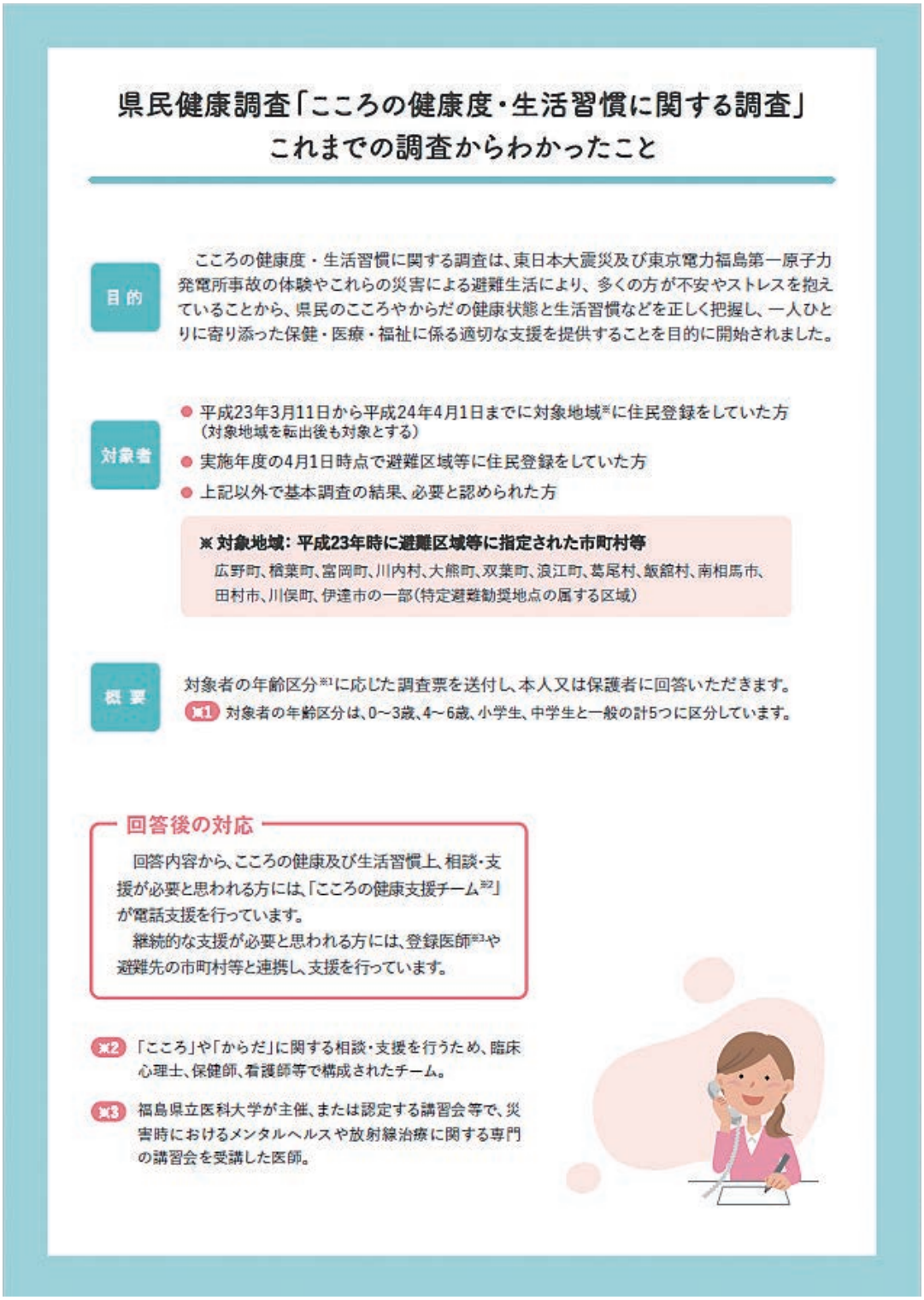


Figure 5. Findings from past surveys enclosed with the 2019 questionnaire (Front page)

(6) Cooperation with medical facilities

Physicians in psychiatry and pediatrics who have attended seminars on mental health and radiation medicine in times of disaster are asked to become registered physicians for mental health care, and in some cases, they may be referred to during telephone support. As of July 2020, there are 125 such registered physicians (Figure 8).

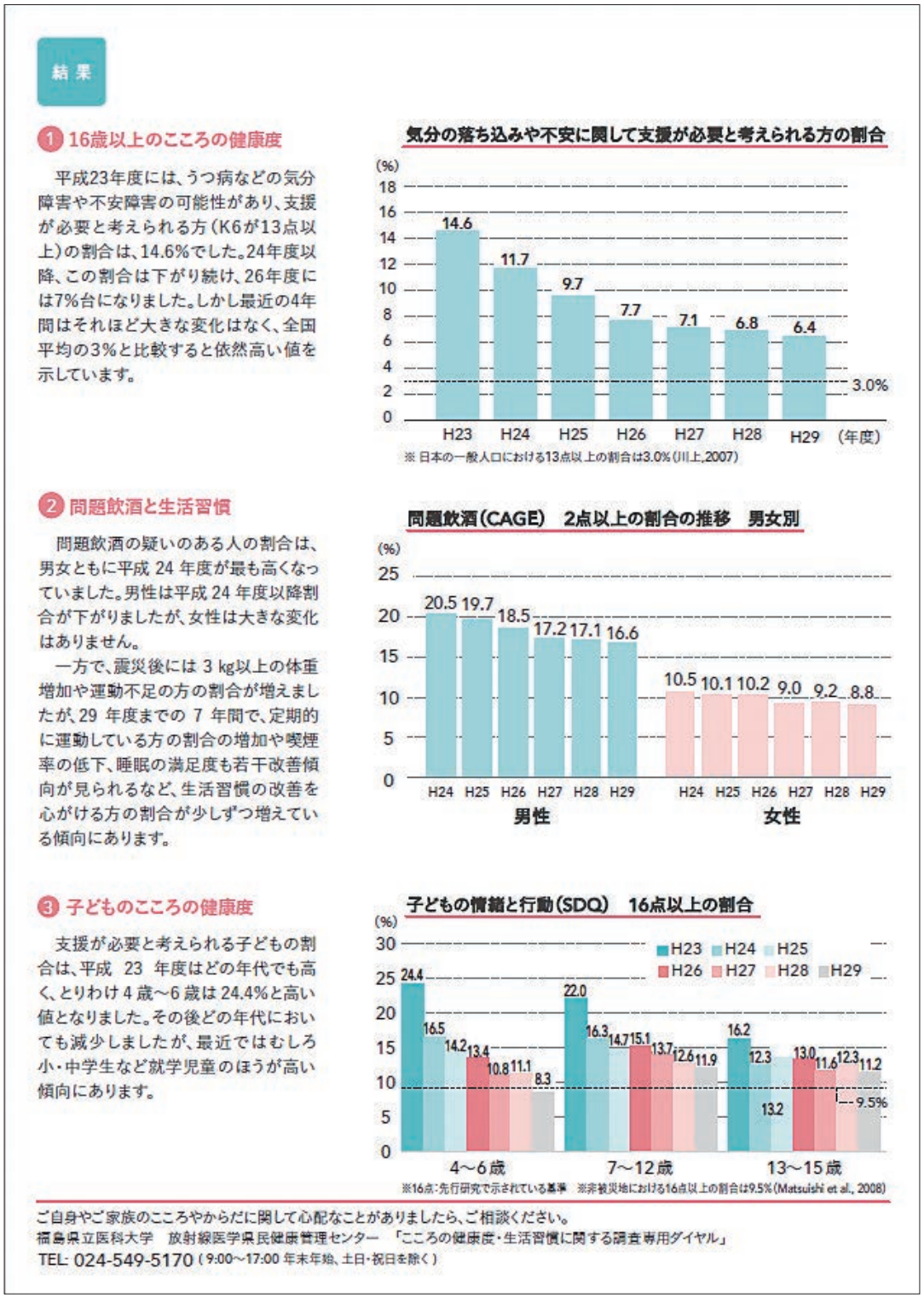


Figure 6. Findings from past surveys enclosed with the 2019 questionnaire (Back page)

Figure 7. Report on the survey results, FY2011-FY2013 (Front cover)

Procedures from submission of survey questionnaire to receipt of support-care in collaboration among relevant organizations and physicians

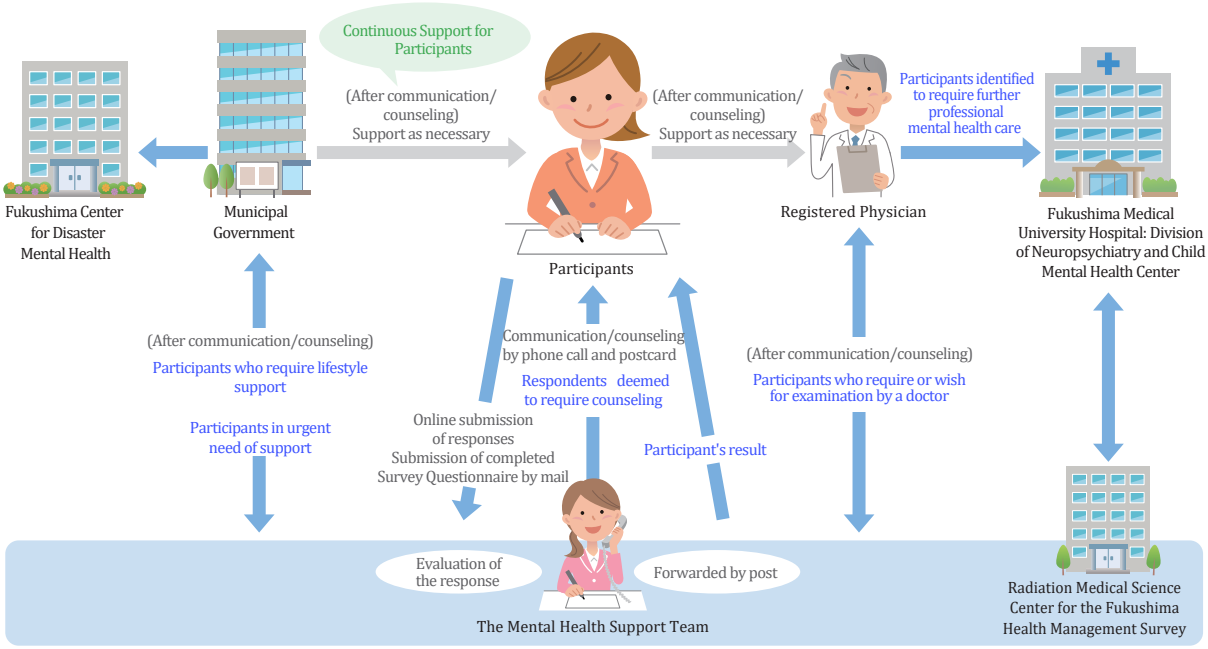


Figure 8. Flow from submitting the questionnaire to receiving support

3. Results of the survey and support

1) Survey results

This section presents an overview of the survey results to date. The most recent data (FY2018 survey results) will be shown first, and the results will be compared over time with the results from the first year onward.

(1) Results of the questionnaires for children (age 0 to junior high school students)

A) Response rate

The number of respondents (response rate) to the questionnaires for children (ages 0-3, ages 4-6, elementary school students, and junior high school students) in the FY2018 survey is shown in Table 6. Annual trends in the response rate are shown in Figure 9. In the first year of the survey, the response rate was very high, at more than 60%, but has been in a downward trend from then until now.

B) Frequency of exercising

FY2018 survey results showed 4.2% of children aged 2 to 3, 3.4% of children aged 4 to 6, 32.5% of elementary school students, and 30.7% of junior high school students "rarely" exercised. Among pre-school children, 26.7% of those aged 2 to 3 and 15.0% of those aged 4 to 6 showed year-by-year improvement (FY2012, Figures 10 and 11). School-age children (elementary and junior high school students) also showed improvement compared with FY2011 when about a half of elementary and junior high school students "rarely" exercised (Figures 12 and 13).

According to a nationwide survey of school-age children in FY2018 (*1), the proportion of children who exercised less than 60 minutes per week (excluding physical education classes at school) was 7.2% in elementary school boys, 13.3% in elementary school girls, 6.9% in junior high school boys, and 19.8% in junior high school girls. Although the results cannot be simply compared with our survey, exercise habits of Fukushima children may not have yet reached the national level.

Detailed analysis by our center shows that children's exercise habits have a significant relationship with mental health and development. For example, in the analysis using SDQ to assess children's emotional and behavioral problems (discussed in detail later), there is a strong relationship between children's exercise habits and SDQ scores.[7), 8)] In this sense, the improvement in

exercise habits year after year compared to the first year of the survey is considered to be a very positive trend for the healthy development and growth of Fukushima children.

*1 Sports Agency, "Results of FY2018 National Survey on Physical Strength, Athletic Ability, and Exercise Habits, etc. Chapter 1: Summary of Survey Results" http://www.mext.go.jp/prev_sports/comp/b_menu/other/__icsFiles/afieldfi le/2018/12/21/1411922_009-037.pdf

Table 6. Number of responses (response rate) and valid responses (valid response rate) in FY2018

Age group	No. of Responses (%)	No. of valid responses (%)
Ages 0-3	503 (14.8)	503 (14.8)
Ages 4-6	497 (14.2)	497 (14.2)
Elementary school students	1,597 (16.1)	1,587 (16.0)
Junior high school students	756 (13.8)	756 (13.8)
Total	3,353 (15.0)	3,343 (15.0)

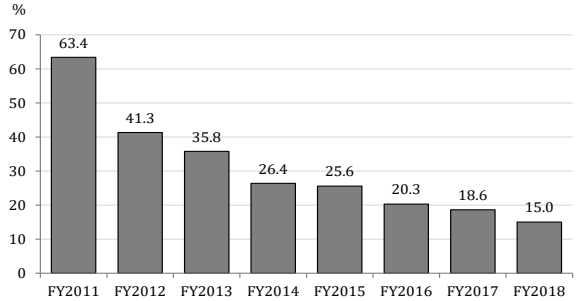


Figure 9. Changes in response rate to the questionnaires for children

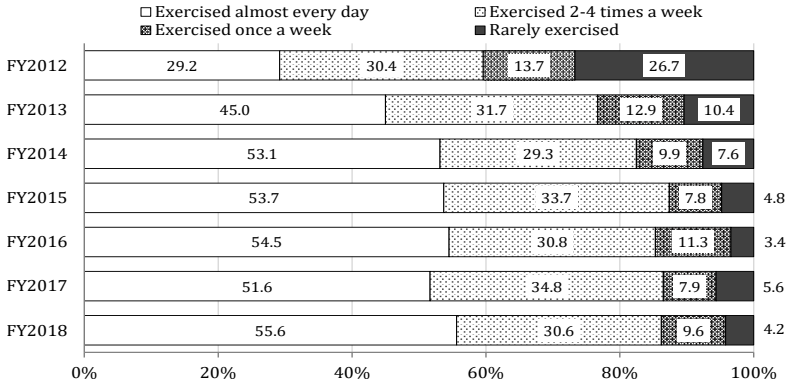


Figure 10. Changes in frequency of exercising among children aged 2 to 3

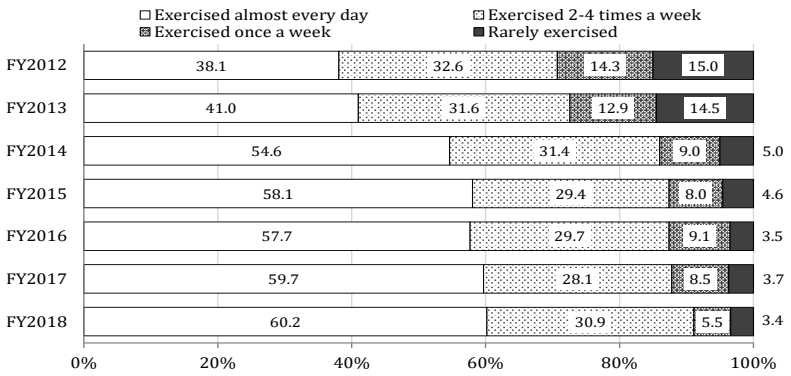


Figure 11. Changes in frequency of exercising among children aged 4 to 6

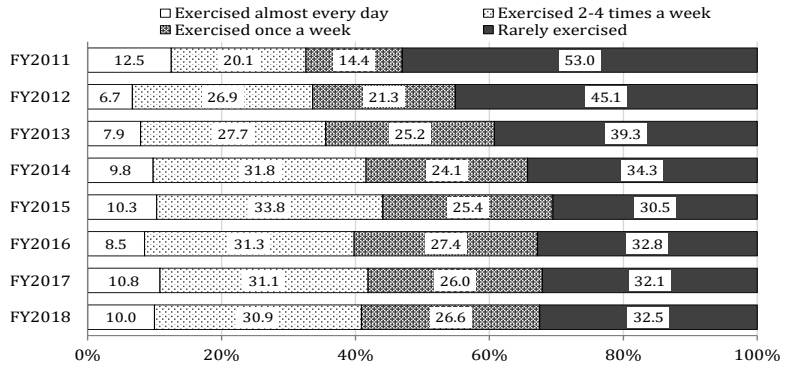


Figure 12. Changes in frequency of exercising among elementary school students

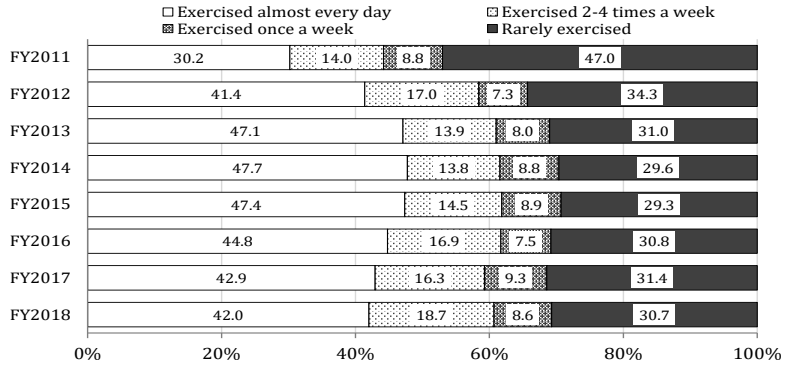


Figure 13. Changes in frequency of exercising among junior high school students

C) Children's emotion and behavior (SDQ)

Among the eligible persons, the emotional and behavioral status of children aged 4 and above is measured using the Japanese version of the Strength and Difficulties Questionnaire (SDQ). Annual changes in the proportion of those whose SDQ score is 16 and more (considered a "high-risk score") are shown in Figures 14 through 18. The SDQ is a questionnaire in which parents/guardians who live with children are asked to answer how much each of the 25 items related to a child's emotional and behavioral needs apply to them in the past six months. If the score is 16 points or more, the child is considered to have some kind of behavior problem that warrants professional support (*2).

In FY2018, the proportion of children with high-risk scores on the SDQ (16 or more) was 9.7% in ages 4 to 6, 9.8% in elementary school students, and 10.8% in junior high school students (Figure 14). In a previous study covering the general population unaffected by any disaster in 2008 (*3), the proportion of children with high-risk scores was 9.5%. Compared with this, the proportion in FY2011 was high in all age groups, with a particularly high proportion of 24.4% in ages 4 to 6. However, the proportion has decreased in all age groups, and in FY2018, the proportion became almost the same as that of the previous study (Figure 14). In addition, when comparing boys and girls, the proportion of high-risk scores tends to be higher for boys than for girls in general, which is almost in line with the above-mentioned study (Figures 15 to 17).

When comparing the proportions of children with high-risk scores by place of residence at the time of FY2018 survey (in or outside the prefecture), the proportion for elementary and junior high school students living outside the prefecture was higher than those living in the prefecture, but there was no difference for ages 4 to 6 compared with the above-mentioned previous study. In fact, children aged 4 to 6 living outside the prefecture showed a lower proportion (Figure 18). Looking at the results of recent surveys, the proportion of those aged 4 to 6 with high-risk scores has generally improved to a point where it is almost the same as that in the above-mentioned previous study both in and outside the prefecture, but among school-age children (elementary and

junior high school students), those living outside the prefecture still tend to show a greater proportion for high risk. As described below, the stress of school life in an area to which they had to relocate may be the cause of this trend. It also may be possible that the improvement in children aged 4 to 6 is attributed to the fact that they were born after the earthquake.

A more detailed analysis of the changes in SDQ results over time revealed that there is a strong correlation between peer relationships and exercise habits.[7] Also, for children aged 4 to

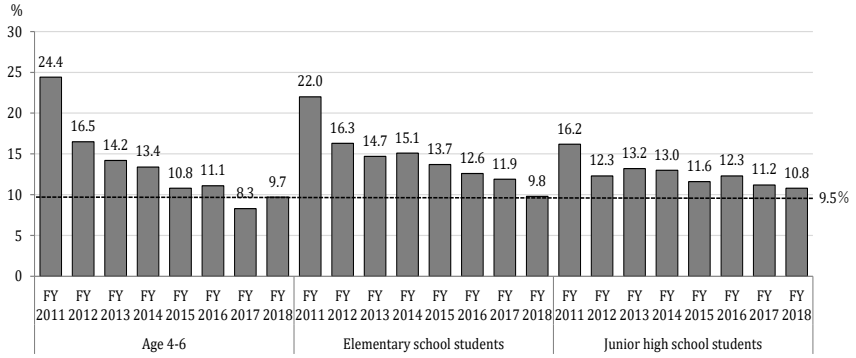


Figure 14. Changes in proportion of children scoring 16 or more on the SDQ (overall)

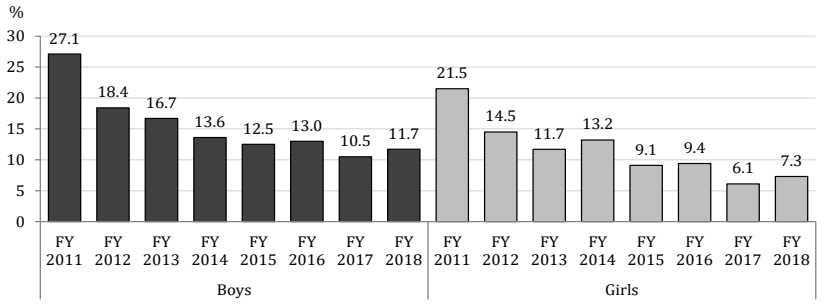


Figure 15. Changes in proportion of children scoring 16 or more on the SDQ (ages 4 to 6)

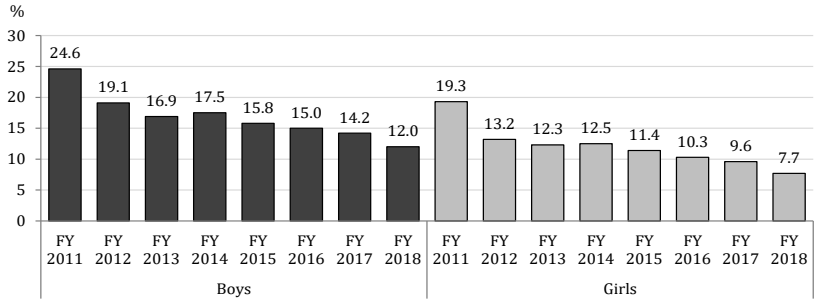


Figure 16. Changes in proportion of children scoring 16 or more on the SDQ (elementary school students)

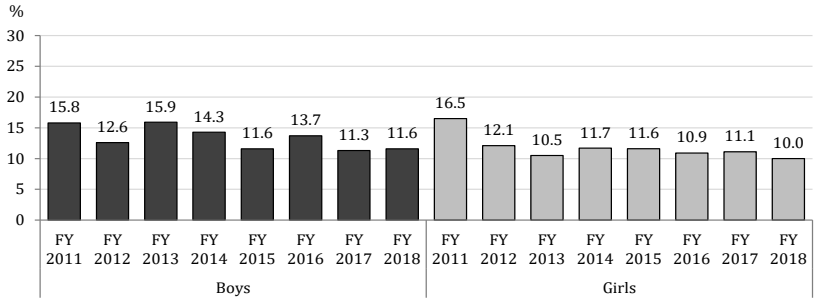


Figure 17. Changes in proportion of children scoring 16 or more on the SDQ (junior high school students)

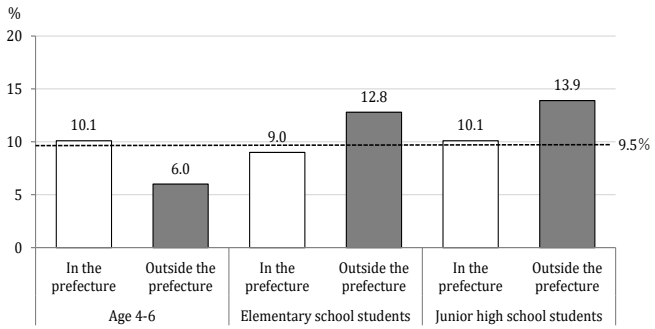


Figure 18. Proportion of children scoring 16 or more on the SDQ in FY2018, by place of residence at the time of the survey

6, short sleep duration was associated with mental health risks based on the SDQ, while for elementary and junior high school students, too much sleep (tendency to oversleep) was associated with higher risk.[9)]

Among the SDQ questions, there is an item that asks the parents/guardians (actual respondents of the questionnaire) about their concerns about their children being bullied or teased. The results showed that about 20% were concerned about these issues, and the fear tended to be particularly high among boys' parents/guardians.[10)] Furthermore, we examined the distribution of high-risk scores of the SDQ by place of children's residence in the first year, and found no relationship between the radiation level in the area of residence and the proportion of those with high risk.[11)]

*2 Goodman R. Psychometric properties of the strengths and difficulties questionnaire. J Am Acad Child Adolesc Psychiatry, 40(11):1337-1345, 2001.
*3 Matsuishi T, Nagano M, Araki Y, Tanaka Y, Iwasaki M, Yamashita Y, et al. Scale properties of the Japanese version of the Strengths and Difficulties Questionnaire (SDQ): A study of infant and school children in community samples. Brain Dev, 30(6):410-415, 2008.

(2) Results of the questionnaire for adults (age 16 and above)

A) Response rate

The response rate to the questionnaire for adults (age 16 and above) in the FY2018 survey was 19.9%. The annual changes are shown in Figure 19, exhibiting a decreasing trend compared to the first year. The response rate by age group is also shown in Figure 20, and is characterized by a particularly low response rate among young people. Furthermore, the results of an interview survey conducted after the questionnaire showed that there were almost no major differences in data between the respondents and non-respondents of the questionnaire survey. In other words, this survey is considered to be a good representation of the general trends of the population affected by the accident. On the other hand, there were some differences, such as the fact that the proportion of those who were employed was slightly higher among non-respondents than among respondents.[12)] The results of this interview survey will be presented in more detail later.

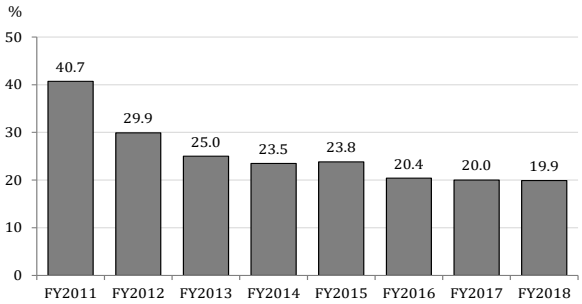


Figure 19. Changes in response rate to the questionnaire for adults

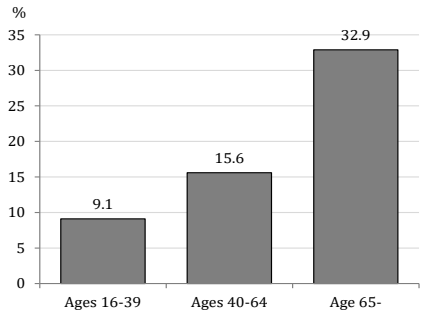


Figure 20. Response rate to the FY2018 survey, by age group

B) Subjective health condition

In the FY2018 survey, 22.9% of the respondents answered "very good" or "good." Annual changes in subjective health conditions are shown in Figure 21. In FY2011, the proportion of respondents who answered "very good" or "good" was 17.8%, which is increasing slightly year by year. The proportion of respondents who answered "poor" or "very poor" was 18.5% in FY2011, and had decreased to 15.2% by FY2018. In FY2018, the proportion of those who answered "poor" or "very poor" increased by age group, and the proportion among those aged 65 and above was 17.9%, higher than the 6.7% among those aged 39 and under (Figure 22). This could be a result of the fact that the older people are more likely to have physical problems. A more detailed analysis showed that while this subjective health condi-

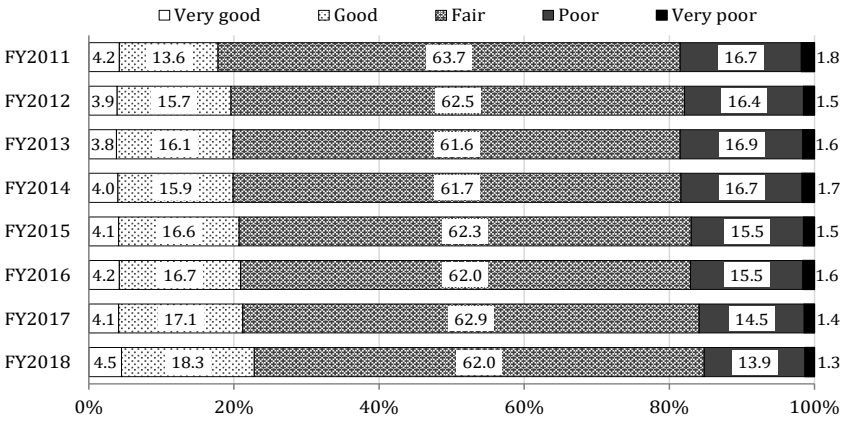


Figure 21. Changes in subjective health status among adults

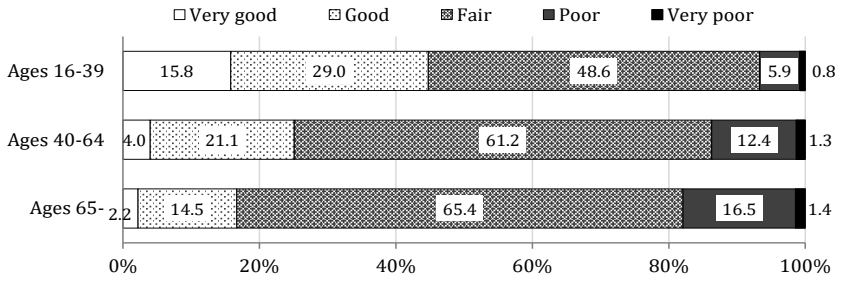


Figure 22. Subjective health condition among adults in FY 2018, by age group

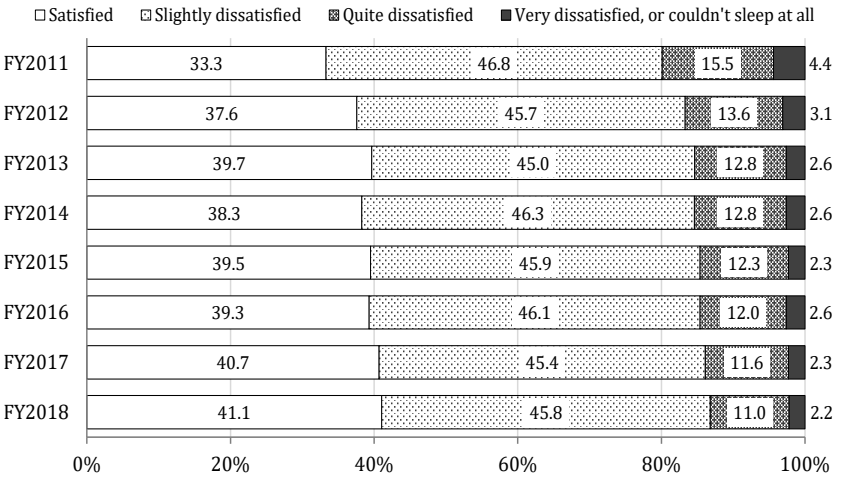


Figure 23. Changes in sleep satisfaction among adults

tion was affected by socioeconomic damage caused by the disaster, it could be improved by participation in community activities.[13)]

C) Sleep satisfaction

In FY2018 survey, 41.1% of respondents were satisfied with their sleep. The annual changes in sleep satisfaction are shown in Figure 23, with a gradual improvement year by year from 33.3% in FY2011. Similarly, the proportion of those who answered "quite dissatisfied" or "greatly dissatisfied or could not sleep at all" decreased from 19.9% in FY2011 to 13.1% in FY2018.

A detailed analysis of the 2011 survey revealed that about 20% of the respondents were dissatisfied with their sleep, and that living in temporary housing and rental housing subsidized by the prefecture, as well as job loss and decreased income, were related to this dissatisfaction.[14)] Furthermore, in a longitudinal analysis, sleep satisfaction was found to be an important factor related to general mental health.[15)] As the sleep status of the residents is an important indicator for physical and mental health and a criterion for support, other questions regarding sleep are also included based on a newly developed assessment scale (the reliability and validity of the scale were also confirmed[16)]). The results showed that general mental health and the intensity of post-traumatic responses were strongly related to sleep status, which also influenced subjective health condition.[16)] The results of these analyses strongly suggest the importance of sleep in the physical and mental health of residents affected by the disaster.

D) Frequency of exercising

In the FY2018 survey, 40.4% of the respondents answered that they "rarely" exercised. The annual changes of exercise frequency are shown in Figure 24, indicating that the frequency of exercise is gradually increasing from FY2011, when about half of the respondents answered that they "rarely" exercised.

The combined proportion of those who answered that they exercised "almost every day" or "2-4 times a week" was 42.5% in FY2018. According to the results of a nationwide survey (*4) conducted in FY2018, the proportion of those who exercised for 30 minutes or more

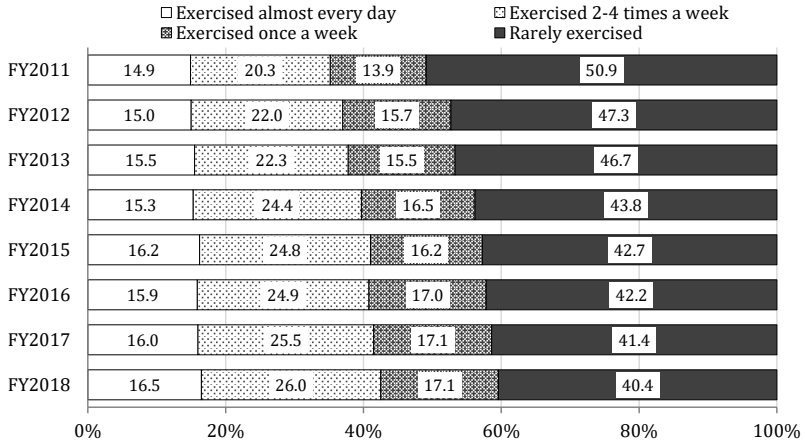


Figure 24. Changes in frequency of exercising among adults

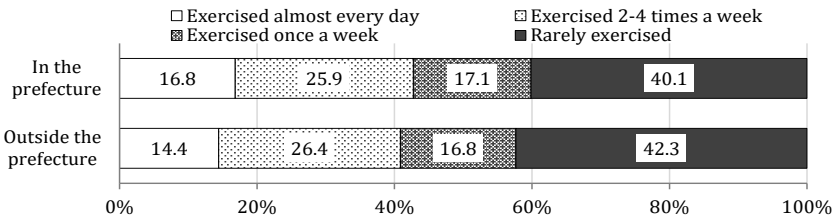


Figure 25. Frequency of exercising among adults in FY2018, by place of residence at the time of the survey

twice a week or more was 28.2%. Compared with this, it can be said that exercise habits among Fukushima residents are at or above the national level, although simple comparisons cannot be made due to differences in age and other attributes. In the comparison by place of residence, those living outside the prefecture tended to exercise less frequently than those living in the prefecture (Figure 25).

According to a more detailed analysis, the presence or absence of exercise habits depends on the evacuation environment. For example, the proportion of those who did not have exercise habits was higher among those living in rental houses or apartments than among those living in evacuation shelters or temporary housing, suggesting that it may be related to the isolation of evacuees.[17)]

*4 Ministry of Health, Labour and Welfare. FY2018 National Health and Nutrition Survey Report. https://www.mhlw.go.jp/bunya/kenkou/kenkou_eiyou_chousa.html

E) Smoking status

In the FY2018 survey, the proportion of smokers was 22.9% among males and 6.0% among females. Figure 26 shows the annual changes in the proportion of smokers by sex, indicating that the proportion of male smokers has decreased year by year from 33.2% in 2011. Similarly, the proportion of female smokers decreased slightly in FY2018 from 10.5% in FY2011.

According to the national survey conducted in FY2018 (*4), the proportion of those with a smoking habit (aged 20 and above) was 29% in males and 8% in females. Compared with this, it is estimated that the proportion of Fukushima residents with a smoking habit is at or below the national level, although simple comparisons cannot be made due to differences in age and other attributes. However, compared to the goal of 12% set in the "Healthy Japan 21 (second term)," the proportion of male smokers still tended to be high.

We analyzed the results of the first-year survey, and found that 1.4% of the respondents started smoking after the earthquake, while 11.1% stopped smoking.[18)] In addition, factors such as being male, being young, and having traumatic experiences were associated with starting

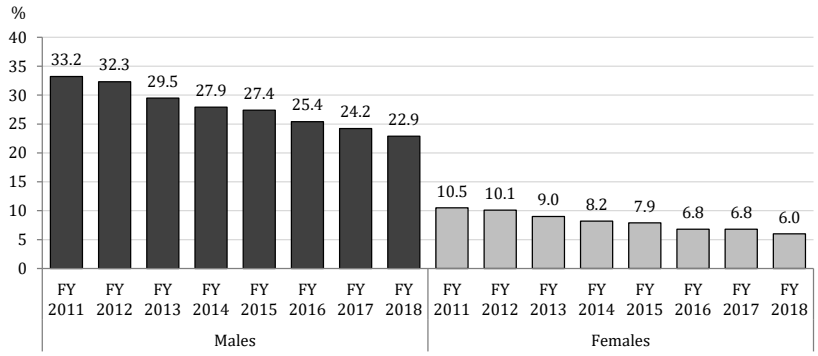


Figure 26. Changes in the proportion of smokers, by sex

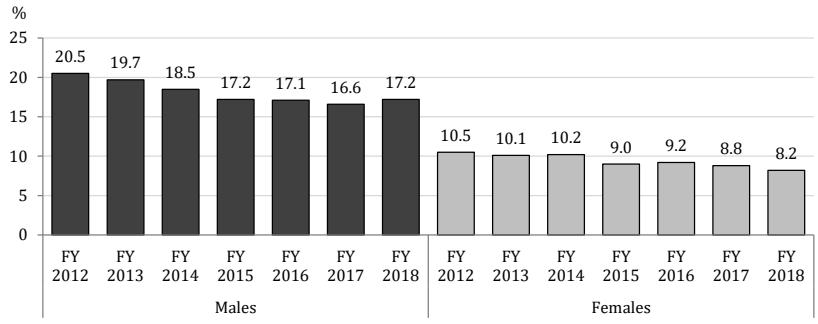


Figure 27. Changes in the proportion of those scoring 2 points or more on CAGE, by sex

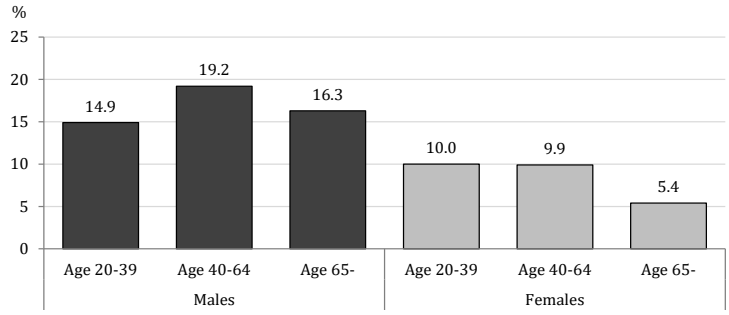


Figure 28. Proportion of those scoring 2 points or more on CAGE in FY2018, by sex and by age group

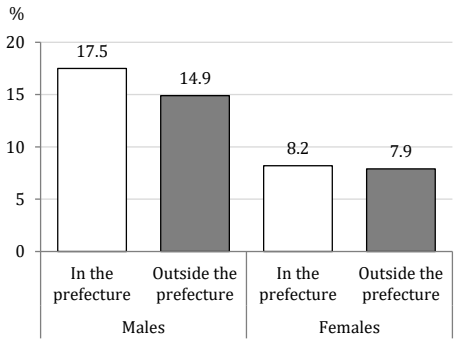


Figure 29. Proportion of those scoring 2 points or more on CAGE in FY2018, by sex and by place of residence at the time of the survey

smoking, while factors such as being female and having a stable income were associated with quitting smoking.[18)]

F) Problem drinking (CAGE)

Figure 27 shows the proportion of those with problematic drinking behavior, as measured by CAGE (a screening test for problem drinkers: abbreviation of "Cut down, Annoyed, Guilty, and Eye-opener"). CAGE is a questionnaire that asks respondents to indicate whether they have or have not experienced any of four items related to drinking habits in the past 30 days. A score of 2 or more is indicative of problem drinking (considered as "high-risk score").

The proportion of those with high-risk scores (2 points or more) in the 2018 survey was 17.2% in males and 8.2% in females. Annual changes are shown in Figure 27. In 2012, the proportion was 20.5% in males and 10.5% in females, indicating a decrease in both sexes. By age group, it was particularly high in males aged 40 to 64 (Figure 28). When compared by place of residence at the time of the survey (in or outside the prefecture), the proportion tended to be higher among residents living in the prefecture, especially among males (Figure 29).

A more detailed analysis of the changes in CAGE scores over time revealed that there were differences in the risk factors that lead to problem drinking between males and females. The most common risk factor was financial problems for males and a history of mental illness for females.[19)] Analysis of the first year's survey results on the amount of alcohol consumed showed that poor mental health was more associated with changes in drinking styles before and after the disaster, rather than changes in the amount of alcohol itself.[20)] A longitudinal analysis of the amount of alcohol consumed for the first two years showed that being male, being under 65, feeling dissatisfied with sleep, and having poor mental health were related to the start of drinking after the earthquake.[21)]

G) General mental health (K6)

General mental health, or the likelihood of having a mood disorder (e.g., depression) or anxiety disorder was measured using K6 (Kessler 6 Scale: a 6-item questionnaire) (*5). Annual changes in

the proportion of those at high risk for deteriorating general mental health (13 points or more on K6, considered as "high-risk scores") is shown in Figure 30. The proportion of those with high-risk scores was very high at 14.6% in FY2011, then improved significantly by FY2014, but the improvement trend has been slowing down since then. The proportion in the FY2018 survey was 5.7% overall, which is still high when compared to 3% shown by a previous study of the general population not affected by any disaster (*6).

*5 Kessler RC, Barker PR, Colpe LJ, Epstein JF, Gfroerer JC, Hiripi E, et al. Screening for serious mental illness in the general population. Arch Gen Psychiatry, 60(2):184-189, 2003.
Furukawa TA, Kawakami N, Saitoh M, Ono Y, Nakane Y, Nakamura Y, et al. The performance of the Japanese version of the K6 and K10 in the World Mental Health Survey Japan. Int J Methods Psychiatr Res, 17(3): 152-158, 2008.

*6 Kawakami N. Distribution of mental health status and related factors by K6 questionnaire in national surveys. A Study on the system for grasping and analyzing the statistical information on the health status of the people from the viewpoint of households. Research Report. 2007.

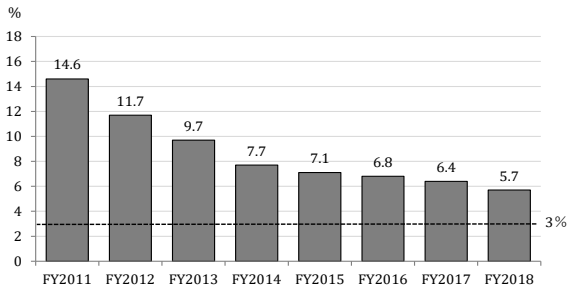


Figure 30. Changes in the proportion of adults scoring 13 or more on the general mental health scale (K6)

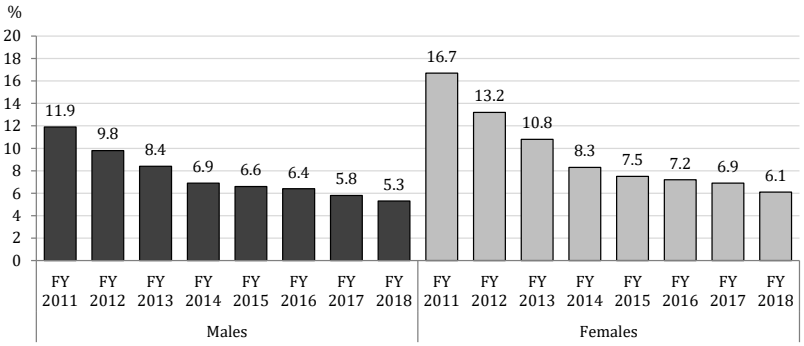


Figure 31. Changes in the proportion of adults scoring 13 or more on the general mental health scale (K6), by sex

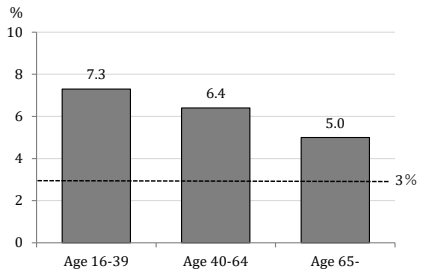


Figure 32. Proportion of adults scoring 13 or more on the general mental health scale (K6) in FY2018, by age group

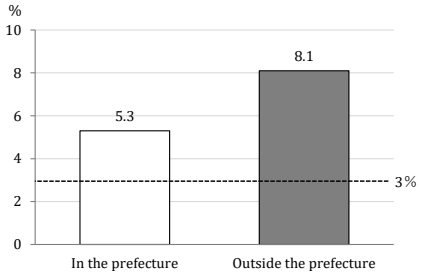


Figure 33. Proportion of adults scoring 13 or more on the general mental health scale (K6) in FY2018, by place of residence at the time of the survey

When looking at the proportion of those with high-risk scores by sex, it was 5.3% in males and 6.1% in females, which is consistent with the results of the above-mentioned previous study (Figure 31). By age group, the proportion is higher among younger respondents than among older respondents, which is not consistent with the previous study or with the levels of post-traumatic responses (Figure 32).

By place of residence at the time of the survey (in or outside the prefecture), 5.3% of the respondents lived in the prefecture, while 8.1% lived outside the prefecture (Figure 33).

K6 is widely used in Japan and abroad, and is one of the most common mental health indicators. For this reason, a wide range of analyses were conducted using this value as the main variable. From the analysis of the first year's survey results, it was found that the level of general mental health was associated with radiation risk perception,[22), 23)] diet and loss of appetite,[24), 25)] self-sufficiency in older people,[26)] and bereavement reactions as well as radiation risk perception in the young.[27)] In a longitudinal analysis using K6 data, factors such as radiation risk perception, sleep dissatisfaction, and support status, which will be discussed later, were found to be deeply related to poor mental health.[15)] In addition, post-traumatic responses and symptoms of mental illness reported in the first year of the survey were found to be related to worsening mental health in later years.[28)]

Taking into account the fact that K6 is closely related to various mental disorders, especially depression, and that suicide has been problematic in Fukushima Prefecture since the earthquake,[29), 30)] it is thought that long-term support and intervention is especially necessary for residents with such high-risk factors.[31)]

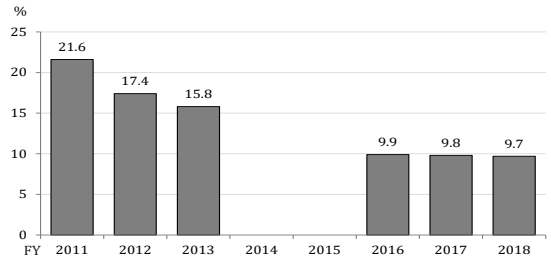


Figure 34. Changes in the proportion of adults with post-traumatic responses and in need of support

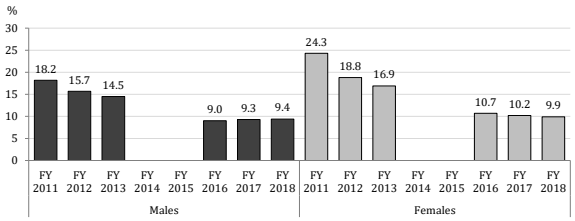


Figure 35. Changes in the proportion of adults with post-traumatic responses and in need of support, by sex

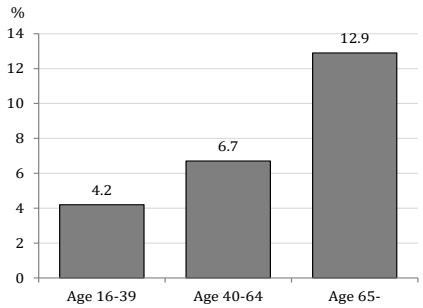


Figure 36. Proportion of adults with post-traumatic responses and in need of support (PCL-4) in FY2018, by age group

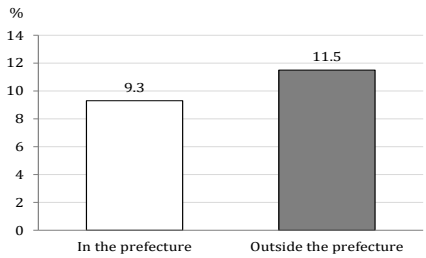


Figure 37. Proportion of adults with post-traumatic responses and in need of support (PCL-4) in FY2018, by place of residence at the time of the survey

H) Post-traumatic responses (PCL)

The proportion of those at high risk for strong post-traumatic stress responses (post-traumatic stress disorder: PTSD) measured with a PCL (PTSD checklist) is shown. The PCL is a scale designed to assess the possibility of PTSD by asking them to indicate the extent of their physical and psychological responses related to the disaster in the past 30 days, such as recalling undesirable memories, avoiding things that may remind them of the disaster, and/or becoming hyperarousal, etc.

Initially, we used a 17-item version of the questionnaire based on the original version, but considering the burden of answering the large number of questions, we started using the 4-item version (PCL-4), which has been confirmed to be reliable, in 2016. The cut-off values for the

17-item and 4-item versions were 44 and 12, respectively, based on previous studies. Thus, it should be noted that the results of the FY2011-FY2013 surveys and of the FY2016 survey and beyond are not simply comparable because they do not use the same scale. In addition, in FY2014 and FY2015, PCL questions were excluded from the questionnaire to reduce the burden on respondents. (The validity and reliability of the Japanese versions of the PCL and PCL-4 have been confirmed based on the results of this survey.)[32), 33)]

In the FY2018 survey, the proportion of those with high-risk scores on the PCL-4 (12 points or more) was 9.7%, with little change over the three years prior (Figure 34). Annual changes by sex show that the proportion of those with high-risk scores is higher in females in each year (Figure 35), which is consistent with many previous studies. While a simple year-on-year comparison cannot be made because of the reason described above, the proportion of those with high-risk scores in the first year of the survey was remarkably high, at 21.6%, and this is also considered to be extremely high compared to the results of other studies using similar survey methods. Although the proportion of those with high-risk scores has decreased in recent years compared to the first year, it has also shown that a certain number of residents still suffer from post-traumatic responses.

A comparison by age group is shown in Figure 36. The proportion of those with high-risk scores increases with age, which is generally consistent with previous studies. Figure 37 shows a comparison by place of residence at the time of the survey (in or outside the prefecture). As with many other results, the proportion of those with high-risk scores was higher among those living outside the prefecture than those living in the prefecture.

In addition, an analysis of changes over time in the proportion of those with post-traumatic responses using the PCL showed that the intensity of post-traumatic responses was closely related to older age and a harsher living environment,[34)] and had a strong influence on radiation risk perception as described later.[35)]

I) Perception of the health effects of radiation

These items asked about the risk perception of individual residents by asking the following two questions on the possibility of health effects of radiation due to the Fukushima accident: "How likely do you think it is that health problems (e.g., onset of cancer) will occur in later years due to current radiation exposure?" and "How likely do you think it is that health effects on the next generation and beyond (your own children and grandchildren born in the future, etc.) will occur due to current radiation exposure?"

In the FY2018 survey, 33.6% of the respondents answered that long-term radiation effects (delayed effects) were likely ("likely" or "very likely."). The proportion was 48.1% in FY2011, but gradually decreased to 31.4% in FY2014. However, there has been little change in the last five years (Figure 38).

Regarding the possibility of radiation effects on the next generation (next-generation effects), 35.9% of the respondents answered "likely" or "very likely" in the FY2018 survey (Figure 39). In FY2011, the proportion was 60.2% and, as with delayed effects, the proportion gradually decreased to 38.0% in FY2014, with little change in the last five years since then. In addition, a comparison of risk perceptions by place of residence at the time of the survey (in and outside the prefecture) for both delayed and next-generation effects showed that the proportion of respondents who consider both types of radiation effects to be likely was higher among those living outside the prefecture (Figures 40 and 41).

As mentioned above, radiation risk perception has been found to be closely related to mental health, in particular, post-traumatic responses.[15), 22), 23), 35), 36)] In addition, changes in radiation risk perception has been found to promote the well-being of affected people through improvements in general mental health and is also associated with the frequency of laughter.[36)] Thus, it is believed that appropriate risk communication and mental health care should not be conducted separately, but need to incorporate a comprehensive perspective of care.[37)] In addition, it is considered necessary to involve the media in providing the public with more accurate information about the effects of radiation exposure on the

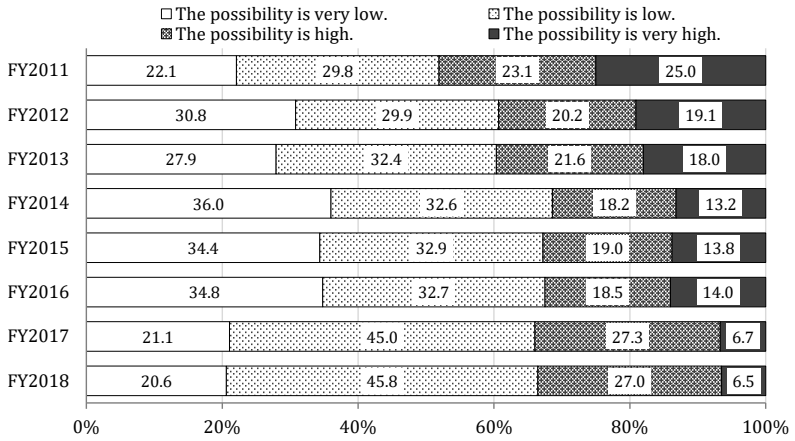


Figure 38. Changes in radiation risk perception (delayed effects) among adults

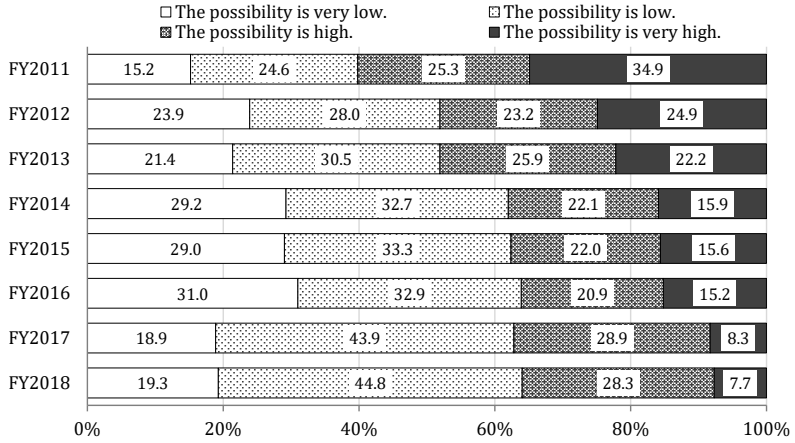


Figure 39. Changes in radiation risk perception (next generation effects) among adults

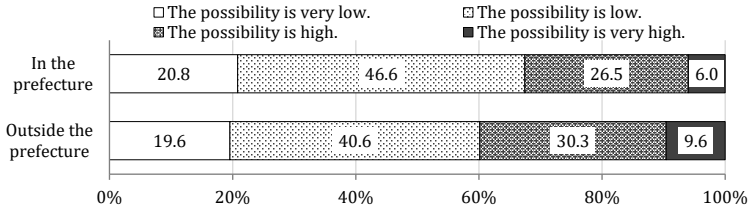


Figure 40. Radiation risk perception (delayed effects) among adults in FY2018, by place of residence at the time of the survey

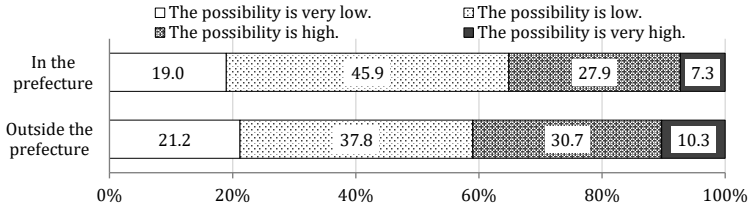


Figure 41. Radiation risk perception (next generation effects) among adults in FY2018, by place of residence at the time of the survey

next generation, as such persistent concerns can easily lead to misunderstanding and prejudice about heredity.[38)]

J) Availability of consultation resources

Figure 42 shows the responses to the question about availability of consultation resources ("Do you have someone or some organization to consult with about physical and mental health problems?"). To this question, 30,893 people (88.9%) answered "Yes," while 3,871 (11.1%) answered "No." Among those who answered "Yes," many said they would consult with family members, friends, or acquaintances and not so many answered that they would consult with government agencies or professional organizations.

K) Others

In addition to the above, there are other questions about various factors related to health that we analyzed. Regarding dietary habits, the detailed analysis revealed that people who live in places other than their own or their relatives' homes tend to have irregular and imbalanced dietary habits.[39)] Evacuees are less likely to follow a regular dietary pattern and more likely to repeat the same menu with meat than non-evacuees,[40)] indicating that evacuation had a significant impact on dietary habits.

As for other physical illnesses, those who lived in places other than their homes after the earthquake had a higher risk of worsening cardiovascular symptoms, and unemployment was also a risk factor for worsening headaches and dizziness.[41)] Furthermore, in an analysis of the first year's survey results related to joint pain in evacuees, daily exercise, economic income, alcohol consumption, and insomnia were associated with worsening of joint pain.[42)]

In some years, respondents were also asked about the frequency of laughter. As mentioned above, the frequency of laughter is related to radiation risk perception,[36)] as well as to age, sex, and lifestyle, suggesting that it is easily influenced by lifestyle changes after a disaster.[43)]

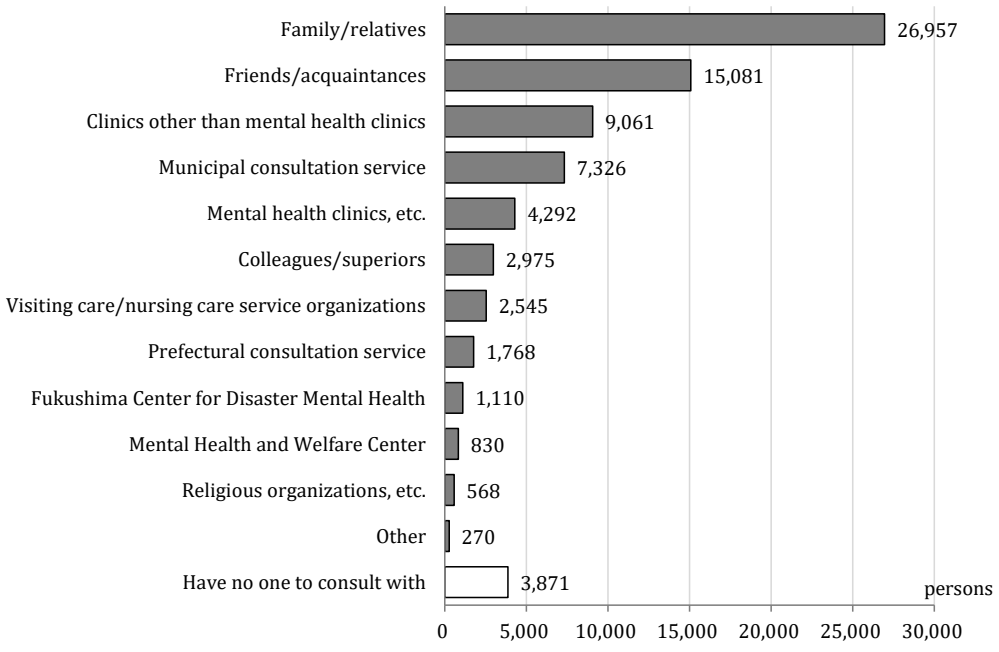


Figure 42. Consultation resources for adult physical and mental health problems in FY2018 (multiple answers)

(3) Free comments in the questionnaire (FY2015)

In order to understand the opinions of the residents regarding the survey, we summarized the number of free and extra comments in the questionnaire and opinions regarding the survey in FY2015. Of the respondents, 15.6% of the respondents to the surveys for children and 30.6% of the respondents to the survey for adults made free comments or extra entries (Table 7).

In terms of opinions about this survey, the most common comments in the surveys for children were about "distress/stress associated with the survey itself and about decline or rejection of support," at 29.3%. The second most common comments were about the "purpose or direction of the survey," at 22.0% and "desire for continued survey," at 22.0%. In the survey for adults, "desire for continued survey" was the most common, at 26.5%, followed by "questions and opinions on question items," at 23.2%, and "distress/stress associated with the survey itself," at 18.1% (Table 8).

The proportion of those who found the survey stressful or thought that they did not need support was higher among respondents to the surveys for children. On the other hand, the number of comments expressing gratitude, such as, "I hope you will continue to conduct the survey and watch over our health," has been increasing year by year (reference: 8.1% in FY2013 and 17.4% in FY2014), and the proportion of respondents who view the survey favorably has increased in the free comments.

While it is not possible to show all of these free comments, they address a wide range of topics, from opinions about the survey to their current situation and personal thoughts. In addition, there were many other things that we did not ask about directly in the questionnaire, such as distress of prejudice from the people around them, anxiety about their future prospects, isolation, concern for their families, and feelings for their home towns.[38] In some cases, they write about the joy of recovery, but it is clear that many of them are still facing various difficulties. In particular, the bewilderment and distress caused by the prejudice of the people around them are considered to be unique to the nuclear power plant accident, which is not seen in natural disasters.[38), 44] The contents of the free comments section are also used as a reference when providing telephone support, and depending on the contents, we arrange to provide urgent support.

Table 7. Number of free and extra comments in the FY2015 survey

	No. of responses	No. of free comments only	No. of free/extra comments	No. of extra comments only	Total (%)
Ages 0-3	908	77	5	43	125 (13.8)
Ages 4-6	1,317	144	16	58	218 (16.6)
Elementary school students	2,696	260	36	105	401 (14.9)
Junior high school students	1,359	172	24	37	233 (17.1)
Children total	6,280	653	81	243	977 (15.6)
Adults	43,343	6,672	2,553	4,026	13,251 (30.6)
Total	49,623	7,325	2,634	4,269	14,228 (28.7)

Table 8. Content of free comments regarding the Mental Health and Lifestyle Survey in FY2015

	Total n=898	Surveys for Children n=41	Survey for Adults n=857
1 Purpose or direction of the survey	114 (12.7)	9 (22.0)	105 (12.3)
2 Design of the survey			
a) Questions and opinions on question items	204 (22.7)	5 (12.2)	199 (23.2)
b) Coverage (being out of the covered age groups, being a disabled person/child, having dementia, etc.)	37 (4.1)	1 (2.4)	36 (4.2)
c) Inability to understand the numerals and expressions used, rewriting and interpreting the questions	48 (5.3)	0 (0.0)	48 (5.6)
3 Distress/stress associated with the survey itself/decline or rejection of support	167 (18.6)	12 (29.3)	155 (18.1)
4 How support is provided	61 (6.8)	1 (2.4)	60 (7.0)
5 Requests			
a) Survey results (individual results report, dissemination of results)	60 (6.7)	2 (4.9)	58 (6.8)
b) Suggestion for concrete countermeasures	30 (3.3)	5 (12.2)	25 (2.9)
c) Desire for continuation of the survey (support and appreciation for the survey)	236 (26.3)	9 (22.0)	227 (26.5)
d) Method of the survey (in-person interview, web survey)	17 (1.9)	0 (0.0)	17 (2.0)
e) Method and cost of sending questionnaires (using tax revenues)	42 (4.7)	2 (4.9)	40 (4.7)
6 Other	21 (2.3)	1 (2.4)	20 (2.3)

・Numbers excluding comments from those judged to be in need of support and notes in the margins from those who did not answer the questions at all.
・Multple answers are included.

4. Publication of survey results, community support, and feedback

The summary of the survey results described above was reported to the Fukushima Prefectural Oversight Committee for the Fukushima Health Management Survey, and can be found on the website of our Center. In addition, we visit all 13 municipalities covered by this survey one by one to discuss and explain survey results in each municipality, and provide reports and advice on the characteristics of and countermeasures for the residents' health condition of each municipality. Detailed analysis of the results as described above is conducted in accordance with research ethics guidelines and has the approval of the Fukushima Medical University Ethics Committee; results are reported at conferences and in academic papers. An overview of academic papers published in this way can also be found on the website.

1) Results of support

(1) Results of support for issues concerning children (age 0 to junior high school students)

A) Number of support recipients

The numbers and proportions of telephone support recipients from FY2011 to FY2018 are shown in Table 9. The proportion of telephone support recipients has been on a downward trend from FY2011 to FY2015, but since then it has been hovering around 4%.

B) Results of support

We called those identified in need of telephone support and interviewed them about current problems based on their survey responses. Figure 43 shows the consultation topics related to children in telephone support from FY2012 to FY2018. In FY2012, the most frequent content of consultations was "anxiety due to the disaster and radiation exposure," but since then,

Table 9. Number and proportion of telephone support recipients for issues related to their children, by year

	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Number	1,180	623	473	327	250	181	162	138
Proportion	6.3%	5.6%	5.0%	4.8%	3.9%	3.7%	3.7%	4.1%

Persons (Proportion)

FY2012 No. of support recipients: 623	FY2013 No. of support recipients: 473	FY2014 No. of support recipients: 327	FY2015 No. of support recipients: 250	FY2016 No. of support recipients: 181	FY2017 No. of support recipients: 162	FY2018 No. of support recipients: 138
Anxiety from disaster/ radiation 147 (23.6%)	School life-related issues 70 (14.8%)	School life-related issues 49 (15.0%)	School life-related issues 54 (21.6%)	School life-related issues 23 (12.7%)	School life-related issues 29 (17.9%)	School life-related issues 35 (25.4%)
School life-related issues 136 (21.8%)	Anger, frustration, violence 52 (11.0%)	Physical problems 29 (8.9%)	Physical problems 15 (6.0%)	Anger, frustration, violence 10 (5.5%)	Physical problems 13 (8.0%)	Physical problems 15 (10.9%)
Physical problems 102 (16.4%)	Physical problems 32 (6.8%)	Anger, frustration, violence 27 (8.3%)	Sleep problems 9 (3.6%)	Physical problems 9 (5.0%)	Anger, frustration, violence 11 (6.8%)	Dietary problems 12 (8.7%)
Anger, frustration, violence 90 (14.4%)	Anxiety from disaster/ radiation 25 (5.3%)	Anxiety from disaster/ radiation 19 (5.8%)	Anger, frustration, violence 8 (3.2%)	Sleep problems 4 (2.2%)	Sleep problems 9 (5.6%)	Sleep problems 11 (8.0%)
Depression 83 (13.3%)	Depression 23 (4.9%)	Sleep problems 11 (3.4%)	Dietary problems 4 (1.6%)	Dietary problems 4 (2.2%)	Dietary problems 6 (3.7%)	Anger, frustration, violence 10 (7.2%)

* FY2011 is not included because the tabulation method was different from that for other years.

Figure 43. Content of consultations related to children in telephone support

Table 10. Examples of contents related to children in FY2018 telephone support

School-related issues	"My child seems to have difficulty understanding and is behind his classmates. He says he doesn't want to go to school because he doesn't like studying." "My child is being bullied. I have consulted with her teacher, but the situation isn't improving." "My child cries, saying that he doesn't want to go to kindergarten. It's been 1 year and 1 month since he started attending and recently all the teachers he liked have quit the kindergarten." "I (mother) take my child to school and she spends an hour in school while I wait in a parking lot and we come home." "My child proceeded to the next grade, but has been unable to go to school much. He complains of head pain or stomach pain and says he doesn't want to go to school."
Physical problems	"My child's migraine gets worse because of the weather." "My child has had an eye problem and after concentrates in something, she gets a headache and when she has a headache, she often throws up." "My child sometimes complains of stomach ache. He may have a lot of stress." "Symptoms similar to panic attack occured at school such as hyperventilation and dizziness."
Dietary problems	"I'm worrying about my child's overweight. She is not a picky eater, but eats a lot, including between-meal snacks." "My child has many likes and dislikes in food. He sometimes cannot finish his lunch at school, but since students have to ask the teacher for permission to leave food unfinished, he has been reluctant about eating what he doesn't like." "My child wants to lose weight and skips meals. She sometimes even refuses to drink water."
Sleep problems	"My child goes to bed and wakes up around 3 a.m. He is not getting enough sleep." "My child's daily routine sometimes gets disturbed." "My child stays up till late and cannot get up in the morning."
Anger, frustration, violence	"My child is a bit rebellious and sometimes won't listen to me." "My child often throws a tantrum and gets angry." "My child has difficulty in holding back or controling her feelings." "He gets frustrated and takes it out on someone, disturbing people around him."

"school-related issues" has been the most frequent content of consultations. Telephone support interactions are held mostly with parents/guardians (usually mothers). The survey and telephone support results, especially those of the first year, showed that many mothers felt anxiety and difficulties, which seemed to affect their childcare.[4)]

Below are examples of the content of consultations in FY2018 telephone support (Table 10).

(2) Results of support for adults (age 16 and above)

A) Number of support recipients

The numbers and proportions of telephone support recipients from FY2011 to FY2018 are shown in Table 11. The proportion of telephone support recipients was about 10% in FY2012, but has since decreased and has been around 6% since FY2015.

B) Results of support

Based on the survey responses, we called those identified in need of telephone support and interviewed them about current problems. Figure 44 shows the content of consultations related to themselves in telephone support from FY2012 to FY2018.

Over this period, "physical health problems," "sleep problems," and "depression" accounted for the highest proportions, in that order, and this order has not changed. Looking at the other topics, worries about "living conditions" were often mentioned at first, reflecting the evacuation life, but "anxiety for the future" has replaced it since FY2014.

Below are examples of the content of consultations in FY2018 telephone support (Table 12).

Table 11. Number and proportion of telephone support recipients for issues related to themselves, by year

	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Number	7,642	5,991	3,913	3,053	2,567	2,382	2,202	2,206
Proportion	10.4%	10.9%	8.4%	7.0%	5.8%	6.3%	6.0%	6.1%

Persons (Proportion)

FY2012 No. of support recipients: 5,991	FY2013 No. of support recipients: 3,913	FY2014 No. of support recipients: 3,053	FY2015 No. of support recipients: 2,567	FY2016 No. of support recipients: 2,382	FY2017 No. of support recipients: 2,202	FY2018 No. of support recipients: 2,206
Physical problems	Physical problems	Physical problems	Physical problems	Physical problems	Physical problems	Physical problems
2,761 (46.1%)	1,913 (48.9%)	1,279 (41.9%)	1,145 (44.6%)	1,090 (45.8%)	986 (44.8%)	961 (43.6%)
Sleep problems	Sleep problems	Sleep problems	Sleep problems	Sleep problems	Sleep problems	Sleep problems
2,349 (39.2%)	1,593 (40.7%)	865 (28.3%)	798 (31.1%)	699 (29.3%)	613 (27.8%)	603 (27.3%)
Depression	Depression	Depression	Depression	Depression	Depression	Depression
1,417 (23.7%)	765 (19.6%)	485 (15.9%)	342 (13.3%)	231 (9.7%)	240 (10.9%)	312 (14.1%)
Family relationship	Living conditions	Anxieties about the future	Dietary habits	Dietary habits	Anxieties about the future	Anxieties about the future
1,058 (17.7%)	751 (19.2%)	342 (11.2%)	236 (9.2%)	227 (9.5%)	226 (10.3%)	191 (8.7%)
Living conditions	Family relationship	Family relationship	Anxieties about the future	Family relationship	Family relationship	Exercising
1,049 (17.5%)	726 (18.6%)	302 (9.9%)	235 (9.2%)	192 (8.1%)	179 (8.1%)	172 (7.8%)

* FY2011 is not included because the tabulation method was different from that for other years.

Figure 44. Content of consultations related to themselves in telephone support

Table 12. Examples of contents in FY2018 telephone support

Physical problems	"I was diagnosed with cancer after the earthquake, and now I might have a brain tumor. Worries about my health are endless." "I am seeing an internist for my hypertension, diabetes, and dyslipidemia and I have worries about my health." "I have diabetes and recently, I often feel dull and don't want to move, so I'm staying at home." "I feel wobbly and cannot keep standing. It's inconvenient and uncomfortable."
Sleep problems	"I wake up three or four times during the night." "My doctor prescribed me sleeping pills but I can sleep only three hours or so." "I am taking sleeping pills prescribed by a psychosomatic medicine doctor, but I cannot get deep sleep because I get up three times or so during the night to go to the bathroom." "I cannot help thinking about my job while in bed and have difficulty in falling asleep." "Probably due to an influence of the earthquake, I get highly nervous before I go to sleep and have hard time falling asleep."
Depression	"Since my husband had an onset of dementia, I have been mentally disturbed." "I am mentally unstable for no particular reason and I get depressed more often than I used to." "I feel down and restless." "I have lost interest in what I used to enjoy." "There is almost no interaction with neighbors. I sometimes spend a whole day without speaking to anybody and that makes me feel depressed."
Anxieties about the future	"I have started to feel anxious about my future health and I feel gloomy when I think about it." "I lost my job because of the earthquake. I have been unable to find a permanent job, which makes me feel insecure for the future." "I run a business. I placed a want ad, but there have been no applicants. I worry if I can continue my business." "I have been unable to decide on whether I should demolish my house in the evacuation zone." "After I evacuated, I have had less opportunity to meet my friends and as I get older, there are endless worries about health."
Exercise	"My doctor told me that I should start light exercise, but I don't feel like it." "I started walking to lose weight, but it's hard to continue." " I have a pain and even wearing support clothes, I can't stand firm. So, I cannot do exercise." "I used to walk about 20-30 minutes every morning, but I stopped because of the cold weather." "I have osteoporosis and it's hard to do exercise now."

(3) Contents of support

Telephone support was basically provided on weekdays from 9:00 to 17:00. In the first year of the survey, the average support time was about 10 to 15 minutes per person, with about 60% of calls lasting less than 10 minutes and about 5% of calls lasting more than 30 minutes.

The support staff ask support recipients structured questions about their physical and mental health conditions and availability of social support, etc., while listening to the recipients' worries and feelings to assess psychological and physical symptoms. In cases considered to be less urgent (e.g., improvement in physical and/or environmental conditions confirmed; medical intervention already being received; social support being maintained, etc.), professional advice is offered as necessary. When support from medical professionals or local social resources is deemed necessary, the support staff recommend seeking medical attention or refer the support recipients to counseling services in the municipalities to which they have evacuated.

The support staff have received training on how to properly assess suicide risks. During actual telephone support, situations judged to be very urgent, for example, someone not receiving appropriate treatment or care despite having suicide risk or evidence of serious depression, would lead to information sharing with public health nurses in the municipality from which the person has evacuated, generally with the person's consent. Such information is shared in writing, to convey as clearly as possible what kind of support is being sought. In such cases, outreach services have been offered by public health nurses of the relevant municipality and support staff of the Fukushima Center for Disaster Mental Health as necessary, and the results of these visits have been shared with involved entities as much as possible.

Some of the contents of consultation have included questions about radiation, and in cases where it was judged necessary to have a radiolo-

Figure 45. Staff member providing telephone support

Figure 46. Case meeting

gist or other specialist respond to the question, referrals were made to the "Radiation Health Consultation Team," consisting of Fukushima Medical University faculty members. In cases where we were unable to provide assistance due to the inability to reach the support recipients by telephone, we have sent postcards asking if they wish to receive telephone support, as well as information on our dedicated telephone number and informational pamphlets. When a consultation call was made to the dedicated number, a team from the Office of the Mental Health and Lifestyle Survey and Care responded and provided telephone consultation (Figures 45 and 46).

(4) Evaluation of telephone support

In order to examine the effectiveness of our telephone support, we conducted a door-to-door interview survey of its recipients. The survey was conducted in FY2016, covering those identified in need of telephone support and living in the municipalities covered in the FY2015 survey, mainly living in Fukushima Prefecture (Fukushima City, Koriyama City, Iwaki City, and Minamisoma City) and outside the prefecture (Tokyo, Saitama, Kanagawa, and Miyagi Prefectures). Of these, we interviewed 715 people, including those whom we had been unable to reach and provide telephone support; 646 support recipients responded about their evaluation and expectations of telephone support.

As a result, about 80% of respondents rated their telephone support positively for each question in the interview, including "Are you satisfied that you received telephone support?" (Figure 47). On the other hand, "I can't say either way" was the most common answer (46.2%) to the question "Was the telephone support helpful?" (Figure 48). In addition, many respondents expected their telephone support to include not only listening, but also concrete solutions to their problems, such as "information and advice on how to cope with stress" (Figure 49).

Many of telephone support recipients positively evaluated the responses they received from telephone support staff. In particular, the fact that more than 70% of the respondents were satisfied with the telephone support they received suggests the usefulness of this method of telephone support, which has no precedent in Japan.[45] On the other hand, since there were strong expectations for information on stress coping methods, social resources, and this survey, as well as advice on lifestyle, we believe that the results of this interview survey should be used to guide future telephone support.

This telephone support has been particularly effective for people who have evacuated to distant places, such as outside the prefecture, and is considered to be a method of support expected to be useful in situations where direct support is difficult to provide, such as large-scale natural disasters and new coronavirus outbreaks.[46)-48)] Furthermore, the usefulness of the survey has been confirmed not only for mental health problems, but also for physical problems related to lifestyle, and it may also contribute to improving the response rate.[49)]

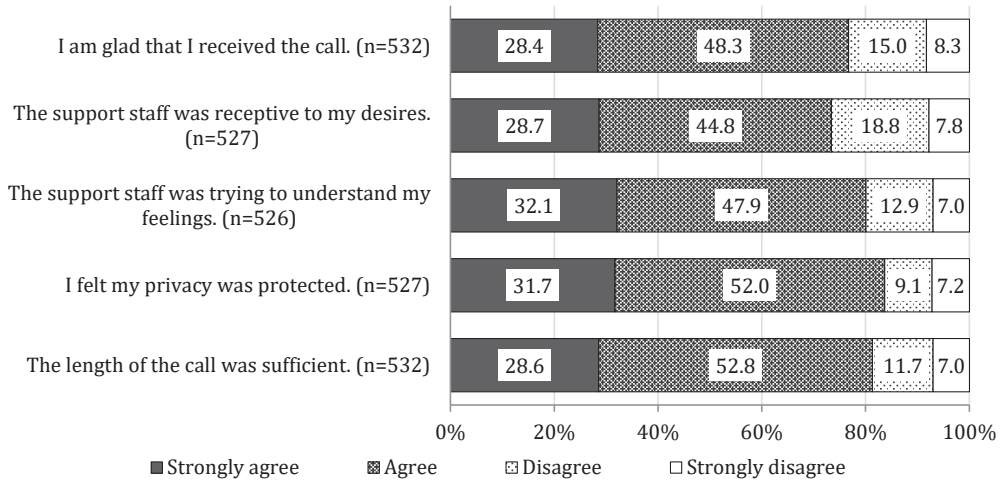


Figure 47. Evaluation on support staff by support recipients

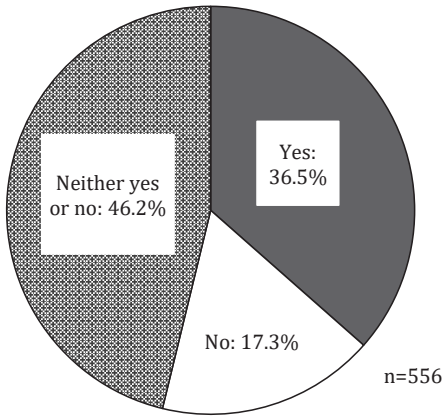


Figure 48. Proportion of support recipients who regarded telephone support as helpful.

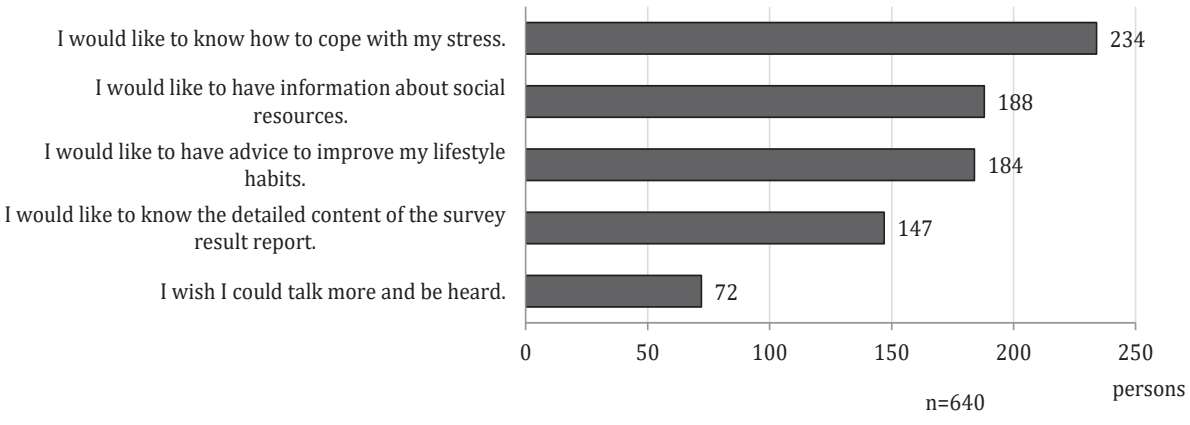


Figure 49. Expectations for telephone support (multiple answers)

2) Efforts to improve response rates

The response rate has been declining since the first year, which has been a major issue for this survey and support. Judging from the content of survey responses, there are still many people whose condition is of concern; in the hope that persons eligible for the survey will take as much interest as possible in their own physical and mental health, we are proceeding with various efforts to improve the response rate, as described below, although the survey remains voluntary.

(1) Survey on motivation to respond

We first needed to understand the reasons for responding or not responding to the survey questionnaire. In order to understand the reasons behind responses and non-responses, as well as the needs the respondents might have felt related to the survey, we conducted door-to-door interviews with those who had responded or not responded to the FY2011 to FY2013 surveys.[12)] Of approximately 210,000 residents eligible for the survey, we selected 967 people using a random sampling method from among residents (aged 20 and above) from Namie Town and Minamisoma City, living in or outside the prefec-

Table 13. Reasons for responding to the questionnaire and suggestions for improvement, by response status[12)]

	Total	Respondent	Non-respondent
		Those who responded at least once. n=169	
I responded because:			
・I wanted my response to be useful/wanted to contribute	-	82 (48.5)	-
・I wanted to tell about my situation and my thoughts	-	77 (45.6)	-
・The questionnaire was from the prefecture/FMU	-	68 (40.2)	-
・I usually answer the questionnaires.	-	33 (19.5)	-
・I had time.	-	23 (13.6)	-
・I saw the survey results.	-	7 (4.1)	-
・My family told me to respond the questionnaire.	-	4 (2.4)	-
・Other	-	13 (7.7)	-
	Excluding those who responded every year		
	n=257	n=113	n=144
I didn't respond because:			
・I didn't have time.	120 (46.7)	61 (54.0)	59 (41.0)
・I thought I wouldn't need it.	69 (26.8)	31 (27.4)	38 (26.4)
・There were too many questions.	41 (16.0)	21 (18.6)	20 (13.9)
・Responding the to the questionnaire itself was a source of stress.	41 (16.0)	10 (8.8)	31 (21.5)
・The purpose of the survey wasn't clear.	23 (8.9)	6 (5.3)	17 (11.8)
・I didn't want to respond to questionnaires from the prefecture or FMU.	9 (3.5)	0 (0.0)	9 (6.3)
・I didn't receive the result report.	3 (1.2)	2 (1.8)	1 (0.7)
・Other	59 (23.0)	15 (13.3)	44 (30.6)
	Excluding those who responded every year		
	n=257	n=113	n=144
Suggestions for improvement			
・Reduce the number of questions	118 (45.9)	74 (65.5)	44 (30.6)
・Reduce the frequency of the survey to once in several years	48 (18.7)	26 (23.0)	22 (15.3)
・Distribute and collect questionnaires at health check venues	41 (16.0)	12 (10.6)	29 (20.1)
・Return survey results to respondents	27 (10.5)	10 (8.8)	17 (11.8)
・Improve questions	5 (1.9)	1 (0.9)	4 (2.8)
・Offer rewards to those who respond to the questionnaire	3 (1.2)	0 (0.0)	3 (2.1)
・Other	53 (20.6)	6 (5.3)	47 (32.6)

n (%)

ture, of whom we interviewed 313 who consented.[12)]

As a result, the most common reasons for responding to the questionnaire were "social contribution" and "I wanted to convey my thoughts," while the most common reasons for not responding were "lack of time" and "too much volume or too many items" (Table 13). From these results, it was deemed necessary to reduce the number of questions as much as possible, in order to improve the response rate. So, we carefully examined questions one by one. In addition, since there were many respondents who did not know that telephone support was available, we thought that more publicity was necessary.[12)]

(2) Careful selection of question items in the questionnaire

Based on evidence, described above, that the large number of questions in the questionnaire was burdensome to respondents, the number of question items has been considerably reduced compared to the first year, and carefully selected to focus on what is necessary for support. However, we believe that such consideration and improvement will be even more necessary in the future.

(3) Sending reminders

Starting in FY2013, we began sending reminder postcards to those who had not yet responded to their questionnaire, at an early stage after the questionnaires were sent out.

(4) Online response

From FY2016, online response was made available as an alternative to postal response.

(5) Cooperation with municipalities

In order to fully incorporate the ideas and opinions of municipalities where the residents lived, we visited all the municipalities and held discussions on the question items. As a result, some of the questions were added or deleted based on the intention of the municipalities.

(6) Other activities (publicity, etc.)

We have conducted activities to promote the survey by creating posters and exhibition booths at local events for residents in the Soso District (Soma and Futaba Counties), such as "Futaba World." We have also provided information through printed materials issued by municipalities and newspapers (Figures 50 and 51).

Figure 50. Futaba World: a booth to explain survey results and offer stress checks.

Figure 51. Futaba World: residents and evacuees participating in a local event.

5. Summary

1) Significance of the survey

The following is a summary of the significance of the survey and what has been learned from it.

- As for the general mental health status (K6) of adults (aged 16 and above), the proportion of those with high-risk scores improved significantly in the first three years, decreasing to about half of that in the first year. After that, the recovery slowed down and the proportion is hovering at a higher level than that of general population in Japan.
- When assessed with the SDQ, the proportion of children with high-risk scores also improved

significantly compared to the first year, but the proportion of school-age children (elementary and junior high school students) with high-risk scores tended to be slightly high.
- There was a trend of gradual improvement in lifestyle habits such as exercise, smoking, and problem drinking compared to the first year of the survey.
- When looking at scores on some important indicators such as K6 and SDQ, it was found that the proportion of those with high-risk scores is greater among residents living outside the prefecture than those living in the prefecture.
- In the first three years of the survey, the perception of radiation effects on health (delayed effects and next-generation effects) declined, but has been hovering around the same level since then. Related studies have consistently shown a strong relationship between general mental health and radiation risk perception.
- By analyzing and communicating the results of the survey in detail, it was possible for us to build connections for information sharing at the prefectural and national levels as well as at the municipal level. In addition, the results were also sent to international organizations such as the World Health Organization (WHO) and the International Atomic Energy Agency (IAEA), leading to information sharing at the international level.
- In order to reduce the burden on respondents, it is necessary to carefully select the question items, which will also contribute to improving the response rate.

2) Significance of support

The following is a summary of the achievements and challenges of our support, mainly regarding telephone support.
- We have continued to provide various types of support based on the results of the questionnaire; in particular, we have provided telephone support to a total of more than 30,000 people through approximately 3,000 telephone calls per year.
- As a result of an interview survey conducted in FY2016, we found that the level of satisfaction with telephone support was high. A nuclear power plant accident may result in evacuation of many residents to distant places, and it is difficult to provide direct support and intervention such as outreach services, so this telephone support is considered to have had a certain degree of usefulness.
- However, depending on the condition of the residents, it may be difficult to provide support only by telephone, and it may be necessary to seek the cooperation of external support organizations. In order for the telephone support to function smoothly, it is essential to collaborate with municipalities and other related organizations on a regular basis; we have actually been building such a network.
- The telephone support in which staff contact recipients requires expertise. As the number of residents identified in need of support is large, a certain number of staff should also be made available (currently, there are about 15). The main issue is to ensure the quality and quantity of support team members so that consistent care can be provided.
- It is also necessary to improve the overall health of the residents of the covered municipalities, including those who have not responded to the questionnaire. In addition to the above-mentioned telephone support for residents identified in need of support (high-risk approach), an alternative population approach to provide intervention for the entire affected population is also very important and needs to be further enhanced from now on.

Notes & Sources

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