

# Why did Zero COVID-19 Infections continue for so long in Iwate, Japan?

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## Abstract:

This study focuses on the fact that Iwate prefecture confirmed its first infection much later than any other prefecture in Japan and yet the reasons for this are unknown. I conducted a survey of local residents to learn about the extent and nature of their infection prevention behaviors so that the information can be utilized for future infectious disease measures, health promotion, and the revitalization of regional livelihoods from the Great East Japan Earthquake of 2011.

According to the results of resident questionnaire in Iwate and Miyagi (neighbouring prefectures), the most significant factor behind zero infections in Iwate was the thorough infection prevention behaviors of individuals over an extend period of time, backed up by the strong manifestation of the thinking and behavioral tendencies of those living in the coastal areas of Iwate. One infection prevention behavior that was considered particularly important was refraining from going out (direct factor), and this can be best explained by the point made above. Additionally, basic behaviors such as wearing masks on a daily basis had been widely observed since before the spread of infection. Trust in the public sector was also high (indirect factor), which had a considerable impact on the infection prevention behaviors.

**Keywords:** *questionnaire survey, the Great East Japan Earthquake, Miyagi, case control*

## 1. Introduction

Research on the theme of the novel coronavirus infection (hereinafter abbreviated as COVID-19) covers various fields. Needless to say, the top priority policy issue for COVID-19 is to protect the lives and health of the people, that is, not to cause infected people. When we look for areas where the increase in infections has been controlled, there is an interesting fact. In Iwate Prefecture, the first COVID-19 was confirmed on July 29, 2020, the latest date in Japan, and there is a difference of three and a half months compared to Tottori Prefecture, which is the 46th in Japan. Furthermore, the number of infected people in Iwate Prefecture was 33 as of November 10 of the same year, and until this time, it had held the lowest position in Japan. This raises the question, "Why was there no or the

lowest number of infected people in Iwate Prefecture?"

In this study, we focused on the infection prevention behavior of Iwate residents and conducted a questionnaire survey consisting of related questions among Iwate residents. The reason for this is that in the non-infection of COVID-19, prevention of infection at the individual level is fundamental, so there is a strong aspect of leaving it to individual thoughts and actions, and we thought that it was most reasonable to ask the people concerned. However, caution should be exercised in surveys in Iwate Prefecture. Iwate was affected by the Great East Japan Earthquake in 2011, and the coastal area in particular is facing the coronavirus pandemic while it is still in the process of reconstruction. Therefore, it is more important to obtain implications for regional revitalization based on the relationship with the great earthquake.

As the subject of the questionnaire survey, Iwate Prefecture was coastal areas with a strong character of an agricultural and fishing village and an inland city (Morioka City), and like Iwate Prefecture, the coastal areas of Miyagi Prefecture, which was severely damaged by the earthquake, and a large city (Sendai City) were added. In addition, both coastal areas were divided into general housing, disaster public housing, and municipalities, giving the possibility of a second analysis. Based on the assumption that objective evidence from data would be obtained in this way, we decided to adopt a research method called case control <sup>1</sup>.

Based on the above awareness of the problem and research methods, the purpose of this paper are to elucidate the reasons why COVID-19 did not spread (it was difficult to spread) in Iwate Prefecture through a resident questionnaire survey, and to obtain implications for infectious disease countermeasures and health promotion based on the independence and autonomy of Iwate Prefecture residents, as well as for the reconstruction of the disaster-stricken areas <sup>2</sup>.

## **2. Completion of the questionnaire survey**

### **(1) Concept of survey design**

The "Questionnaire Survey on the Factors of Non-Infection of the Novel Coronavirus Infection" conducted by the author consists of 91 questions, and responses were multiple-choice and free-form responses, and were anonymous <sup>3</sup>. The content of the survey consists of original questions that focus

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<sup>1</sup> Case control refers to a research method that retroactively compares the background of a group that produced results and those that did not.

<sup>2</sup> This paper is based on Kuwada, Tamura, Inoue, and Sato (2021) and significantly reduced and revised.

<sup>3</sup> The idea for the questionnaire survey came from the "Nationwide Survey for Novel Coronavirus Countermeasures" conducted multiple times by the Ministry of Health, Labour and Welfare and LINE Corporation. In addition, although many previous studies were referred to for the questions in the survey and the analysis of the answers, in reality, the simplest possible analysis method was adopted so that the citizens of Iwate Prefecture could understand it widely and sufficiently.

on the following three aspects.

- ① Questions that question respondents' own infection prevention behaviors and the thoughts that support them, which can be a direct factor of infection or non-infection (internal indicators)
- ② Questions regarding the impact of the increase (rapid increase) in the number of infected people at the national and regional levels and the policies of the national and local governments that may affect the above (external indicators)
- ③ Questions about the impact of the coronavirus pandemic on the living environment and community activities of residential areas and districts (in particular, since the continuous activities of the community are emphasized in the reconstruction of the disaster-stricken areas, this question asks about the current and future situation)

In the questionnaire survey, questions related to these three aspects are randomly arranged, but this paper focuses on the analysis of the results of the answers to questions 1 to 69. Questions 70 to 91 are questions about values and are not covered in this article because they are set as supplements (for example, Q70 "Do you want to live in a safe and secure place?").

## (2) Outline of the survey

As for how to distribute the questionnaire, I posted the questionnaire directly in the mailbox of the residence. The total number of copies distributed (number of households) was 4,000, of which the breakdown is shown in [Table 1](#). The decision was made by taking into account factors such as the extent of damage caused by the earthquake, the size of the population, and the number of disaster public housing units.

	(unit ; copies)		
	General housing	Disaster public housing	Total
Iwate coastal area (12 municipalities)	1,260	540	1,800
Morioka city	700	—	700
Miyagi coastal area (14 municipalities) excluding Sendai city	700	300	1,000
Sendai city	500	—	500
			4,000

The questionnaire has several questions about the state of community activities during the corona disaster. Therefore, as for the distribution area, the entire coastal municipality was covered in both Iwate and Miyagi prefectures, and the distribution was randomly so that the communities (neighborhood associations called “Chonaikai”) to which they were posted were divided. This is the same for both general housing and disaster public housing. On the other hand, the distribution to Morioka City and Sendai City was for the area with the highest concentration of population. For example, in the case of Morioka City, it is around JR Morioka Station and the Odori area.

The questionnaire distribution period was from January 16 to February 24, 2021. The questionnaire was returned only by mail, and was valid until postmarked by the end of March of the same year. The results of the survey sheet collection (valid responses) are shown in [Table 2](#).

	General housing	Disaster public housing	Total
Iwate coastal area (12 municipalities)	43.8	31.3	40.1
Morioka city	32.9	—	32.9
Miyagi coastal area (14 municipalities) excluding Sendai city	29.0	19.7	26.2
Sendai city	27.0	—	27.0
			33.7

(unit; %)

[note] Number of copies of the questionnaire collected : 1,348 / 4,000

### (3) Findings and their analysis

Here, we organize and analyze the results of the questionnaire survey. Question 1 asked respondents about their place of residence, and Question 2 asked about their occupation and age. When these are regarded as the "main basic attributes of respondents," their characteristics are shown in [Table 3](#). More than 60% of the respondents in the coastal areas of Iwate and Miyagi prefectures are over 60 years old, and more than 40% are unemployed. As a main feature, looking at the frequency of going out, it can be seen that in the coastal area of Iwate Prefecture, there are very few people who go out frequently, and more than half of the people go out less than three times a week. People in the coast of Iwate Prefecture also travel outside the prefecture with the least frequency. If the level (frequency) is so low, the people may strongly refrain from going out.

#### 1) Questions 3 to 7

Questions 3 through 34 were mainly provided to clarify the degree and content of the respondents' infection prevention behavior and their thoughts on regulating them. The main features are as follows. First, we summarized the events that marked turning points in Japan related to COVID-19 in chronological order as follows, and asked the extent of the impact on respondents' infection prevention behavior for each event. There are three options: "did not have an impact," "had a small impact," and "had a large impact."

Question 3: Spread of infection on the large international cruise ship "Diamond Princess" (February 2020)

Question 4: Declaration of a state of emergency in seven prefectures and its subsequent extended application to the whole country (April of the same year)

Question 5: First wave of the spread of infected people (March to May of the same year)

Question 6: Second wave of the spread of infected people (June to August of the same year)

Question 7: First confirmed case in Iwate Prefecture (July 29 of the same year)

Regarding the coast of Iwate Prefecture, the percentage of respondents who answered " had a large impact " increases as the question progresses, and in the last question, Question 7, as shown in Table 4, was 70.3%, which was a larger percentage than others. In addition, 20.1% of respondents answered "had a small impact." From this, it can be seen that 90% of people in the coastal area of Iwate Prefecture felt that seeing the news that "the first infected person in Iwate Prefecture was confirmed" had some impact on their infection prevention behavior.

Table 3. Main basic attributes of respondents

(unit; %)

		Iwate coastal area	Morioka city	Miyagi coastal area	Sendai city
Unemployed among occupations		40.8	22.2	42.2	29.0
Age	Over 70s	44.8	24.0	45.6	27.4
	60s	23.7	21.4	22.4	20.0
Family members	2	36.0	29.9	35.5	26.4
	1	24.4	39.4	23.9	25.6
Annual income	10,000,000 yen or more	2.8	17.0	6.5	12.6
	1,000,000 to 1,990,000 yen	20.2	9.9	18.4	6.3
	Less than 1,000,000 yen	12.2	8.5	8.6	5.5
Experience of damage caused by the Great East Japan Earthquake		69.8	24.4	82.6	66.4
Frequency of going out	At least 6 times a week	28.9	44.3	33.1	36.1
	3 to 5 times a week	25.4	33.0	26.8	33.1
	0	7.2	1.7	6.2	2.3
Frequency of travel outside the prefecture	At least once a week	2.5	3.9	3.6	1.5
	Twice a month	3.2	5.3	3.6	4.6
	0	87.7	79.8	86.7	80.0
Flu shot	Year of 2020	61.8	65.9	59.0	57.0
	Year of 2019	61.7	60.6	59.2	56.6
Car ownership		85.6	63.1	84.3	73.6

Table 4. Percentage of respondents who answered "had a large impact" in Question 7

(unit; %)

Question 7	Iwate coastal area	Morioka city	Miyagi coastal area	Sendai city
Has the occurrence of the first case or the increase in the number of infected people in the prefecture or municipality where you live affected your infection prevention behavior?	70.3	65.9	63.4	50.7

Chronologically, the ratio continued to increase only along in the coastal area of Iwate Prefecture among the four areas. This suggests that people in the coastal area of Iwate Prefecture reacted particularly sharply to the infection situation.

## 2) Question 10

Question 10: From May to July 2020, the national state of emergency was lifted, the request to refrain from traveling between prefectures was lifted, restrictions on holding events were relaxed, and “GoTo Travel” was launched, but how did your infection prevention behavior at that time compare to when you were most committed to preventing infection?

There are three options: "It was quite loose," "It was a little loose," or "It was about the same." As shown in [Table 5](#), more than 60% of respondents in the coastal area of Iwate Prefecture and Morioka City answered “It was about the same.” This suggests that they were continuously thorough in their infection prevention measures and that they were patient.

(unit ; %)				
Question 10	Iwate coastal area	Morioka city	Miyagi coastal area	Sendai city
From May to July 2020, the national state of emergency was lifted, the request to refrain from traveling between prefectures was lifted, restrictions on holding events were relaxed, and "GoTo Travel" was launched, but how did your infection prevention behavior at that time compare to when you were most committed to preventing infection?	64.3	65.5	50.4	56.7

## 3) Question 12

Questions that can be representative of thinking that supports infection prevention behavior were provided as Question 12.

Question 12: I didn't want to be the first infected person in Iwate Prefecture.

There are five options: "I didn't think at all," "I didn't think much," "I can't say either," "I thought a little," and "I thought very much." The percentage of respondents who answered "I thought very much" or "I thought a little" reached 90.7% in the coastal area of Iwate Prefecture and 93.9% in Morioka City. From this, it can be seen that more than 90% of people in Iwate Prefecture did not want to become the first infected person in the prefecture.

## 4) Question 14

Here, we again asked about the degree of infection prevention behavior at different times.

Question 14: The number of infected people in Iwate Prefecture increased sharply in November 2020, but how did your infection prevention behavior around October of the same year compare to when you were most committed to preventing infection?

There are three options: "It was quite loose," "It was a little loose," or "It was about the same."

Regarding this question, the linkage with Question 10 described above is noteworthy. Of the respondents in Iwate Prefecture who answered "It was about the same," 76.7% in the coastal areas and 77.0% in Morioka City answered "about the same." This suggests that a large number of people in Iwate Prefecture continued and thoroughly implemented infection prevention behavior.

## 5) Question 21

The order is slightly different, but I will take up Question 21.

Question 21: When do you think you were most thorough in your infection prevention behavior?

There are five options: "March to April", "May to June", "July to August", "September to October", and "November to December" (all in 2020). Multiple answers were allowed.

When limited to "November to December," the percentage of its response was 30.8% in the coastal area of Iwate Prefecture, 29.2% in Morioka City, 30.3% in the coastal area of Miyagi Prefecture, and 31.6% in Sendai City. There was little difference in the percentage of the response. However, in terms of the number of responses, it is overwhelmingly the first place in other areas except Sendai City. It is suggested that there were quite a few people in Iwate Prefecture who were thoroughly implementing infection prevention behavior even during this period.

When comparing the number of options selected per person, the overall average was 2.1 for the coast of Iwate Prefecture and 2.2 for Morioka City, but when limited to the age of teens to 30s, the coastal of Iwate Prefecture was 2.4 and Morioka City was 2.6. This shows that younger people were more aware of thorough infection prevention.

## 6) Question 18

Here are the following questions to ask about the specific methods of the most thorough infection prevention.

Question 18: What are your most thorough infection prevention behaviors?

The following nine options were given, and multiple answers were allowed.

- ① Avoidance of "Three Cs" (confined spaces (closed spaces), close contact settings, crowded places)
- ② Three basics of infection prevention (physical distancing, wearing a mask, hand washing and disinfection)
- ③ Refraining from and control of non-essential outings and travel to areas where infections are endemic
- ④ Health management (body temperature measurement, diet and exercise, etc.) and appropriate lifestyle habits
- ⑤ Shopping ingenuity (use of mail order and electronic payment, time and number of people being at the store, etc.)
- ⑥ Refraining (including take-out, home delivery, and online party) from and thorough manners

(small groups, small plates, and small voices, etc.) for eating together

- ⑦ Review of work styles and devising a means of transportation
- ⑧ Nothing in particular
- ⑨ Other

Of these, the most common responses were ①avoidance of "Three Cs", ②the three basics (wearing a mask, etc.), and ③ refraining from non-essential outings (Table 6). The coast of Iwate Prefecture has the largest proportion in the option ② and ③, and Morioka City has the largest proportion in the option ①.

Table 6. Percentage of choices identified as "the most thorough infection prevention behavior" in Question 18 (top 3 choices)				
(unit ; %)				
choices	Iwate coastal area	Morioka city	Miyagi coastal area	Sendai city
①Avoidance of "Three Cs"	19.0	19.4	19.1	19.1
②Three basics	24.3	23.3	23.3	23.8
③Refraining from non-essential outings	20.7	19.1	19.8	17.4

As a side note, there is a related question 47, in which the question is asked whether respondents are avoiding unnecessary and non-urgent outings (non-essential outings) in the last month or so, based on the time of answering. There were five options: "not at all", "not very applicable", "neutral", "slightly true", and "very true". The percentage of the respondents who answered "slightly true" and "very true" was 89.3% in the coastal area of Iwate Prefecture, 86.2% in Morioka City, 86.7% in the coastal area of Miyagi Prefecture, and 79.9% in Sendai City, and all of which were high, with the highest being the coast of Iwate Prefecture.

## 7) Question 19

Here, we prepared a question asking about the relevance of the experience of the Great East Japan Earthquake. The answer to this question was based on the assumption that it had nothing to do with the presence or absence of damage.

Question 19: Did your experience of the Great East Japan Earthquake help you in your infection prevention behaviors and life under the spread of infection?

There were five options: "not at all", "not very applicable", "neutral", "slightly true", and "very true". Of these, the percentage of the respondents answered "slightly true" and "very true" was 26.2% in the coastal area of Iwate Prefecture, 16.5% in Morioka City, 28.0% in the coastal area of Miyagi Prefecture, and 22.0% in Sendai City. It can be seen that the coastal areas of Iwate and Miyagi Prefectures tend to be higher than those of Morioka City and Sendai City.

On the other hand, the percentage of the respondents answered "not at all" and "not very



applicable" was 32.9% in the coastal area of Iwate Prefecture, 47.3% in Morioka City, 41.2% in the coastal area of Miyagi Prefecture, and 49.2% in Sendai City. Comparing the coasts of Iwate Prefecture and Miyagi Prefecture, it is characteristic that there is a large gap, but in any case, negative evaluations (opinions that do not feel that way) are higher. This suggests that many people think that the great earthquake and the COVID-19 are different things.

## **8) Questions 8 and 17**

The order goes back and forth again, but let's take a look at the answers to questions 8 and 17.

Question 8: There was a call by the prefectural governor on TV for individual infection prevention measures, such as refraining from non-essential outings and traveling between prefectures, and avoidance of "Three Cs" (closed spaces, close contact settings, crowded places), but did this affect your infection prevention behaviors?

Question 17: Do you think that the prefecture and municipality where you live appropriately grasps the actual situation and danger of the spread of infection and are taking reasonable measures?

There are three options: "did not have an impact," "had a small impact," and "had a large impact" in Question 8. The percentage of the respondents answered "had a large impact" was 61.9% in the coastal area of Iwate Prefecture, 60.0% in Morioka City, 60.6% in the coastal area of Miyagi Prefecture, and 52.6% in Sendai City.

On the other hand, there are five options: "I don't think at all," "I don't think much," "I can't say either," "I think a little," and "I think very much" in Question 17. The percentage of the respondents answered "I think a little" and "I think very much" was 43.5% in the coastal area of Iwate Prefecture, 42.9% in Morioka City, 41.4% in the coastal area of Miyagi Prefecture, and 35.3% in Sendai City.

In Question 22, which relates to these two questions, we asked what kind of means are used as sources of information for infection prevention behaviors. Looking at the percentage of the respondents who answered "information given by the central government and the local government (prefecture and municipality)," it was 25.2% in the Iwate coastal area, 19.4% in Morioka City, 18.8% in the Miyagi coastal area, and 14.9% in Sendai City. The coast of Iwate Prefecture tends to be high, suggesting that trust in the public sector is high in this area.

Among the questions up to Question 34, the main questions, their answers, and their characteristics were introduced. So far, the questions have mainly been asked to clarify the degree and content of the respondents' infection prevention behaviors, and the thoughts that regulate them. In the following questions 35 to 54, we asked in detail the degree of the respondents' infection prevention behaviors. First, we would like to introduce questions 35 to 40.

## **9) Questions 35 to 40**

Questions 35 to 40 were divided into "before the outbreak of the COVID-19" (around January

2020), "when the state of emergency was declared" (around April and May of the same year), and "in the last one month" (from the time of response), and respondents were asked for responses on infection prevention behaviors in each. Characteristics of the answers are shown in [Table 7](#).

Table 7. The degree of specific infection prevention behaviors: "before the outbreak of the COVID-19," "when the state of emergency was declared," and "in the last one month"

	Question 35 "wearing a mask when going out"			Question 36 "wearing a mask when someone visits"			Question 37 "hand washing when going out"		
	Before the outbreak of the COVID-19	When the state of emergency was declared	In the last one month	Before the outbreak of the COVID-19	When the state of emergency was declared	In the last one month	Before the outbreak of the COVID-19	When the state of emergency was declared	In the last one month
Iwate coastal area	2.56	4.59	4.79	2.35	3.94	4.21	3.18	4.43	4.62
Morioka city	2.35	4.70	4.92	2.06	3.69	4.55	3.07	4.63	4.76
Miyagi coastal area (excluding Sendai city)	2.68	4.63	4.83	2.07	4.05	4.27	3.08	4.50	4.72
Sendai city	2.10	4.70	4.84	1.70	3.93	4.18	2.97	4.47	4.64
	Question 38 "hand washing when returning home"			Question 39 "providing ventilation when someone visits"			Question 40 "gargling when returning home"		
	Before the outbreak of the COVID-19	When the state of emergency was declared	In the last one month	Before the outbreak of the COVID-19	When the state of emergency was declared	In the last one month	Before the outbreak of the COVID-19	When the state of emergency was declared	In the last one month
Iwate coastal area	3.29	4.34	4.52	2.36	3.29	3.45	2.83	3.64	3.83
Morioka city	3.53	4.65	4.76	2.18	3.56	3.72	3.02	3.78	3.90
Miyagi coastal area (excluding Sendai city)	3.24	4.51	4.63	2.31	3.52	3.72	2.84	3.73	3.85
Sendai city	3.31	4.59	4.76	2.08	3.40	3.53	2.93	3.73	3.99

[note] Closer to "5" indicates that a particular action is thorough.

Here, we are processing the answer results in a slightly special way. The number of each option is considered a score. It is a calculation method in which the answer numbers are multiplied and added respectively, and then divided by the number of respondents to calculate the average value. Closer to "5" indicates that a particular action is thorough. The results show the following four features.

- ① In each question, infection prevention behaviors are strengthened as time passes.
- ② The growth of the figures from before the outbreak of the COVID-19 to the time of questionnaire distribution and response (around January to February 2021) varies considerably from area to area.
- ③ In Morioka City, the numerical value of "in the last one month" is the highest (thorough) in five of the six questions.
- ④ The numerical value of "before the outbreak" in the coastal area of Iwate Prefecture is the highest in three of the six questions. This suggests that people of the Iwate coast are strongly aware of infectious disease control measures even in normal times.

## 10) Questions 41 to 48

Questions 41 to 48 were limited to "in the last one month" (from the time of the response) and asked about the degree of specific infection prevention behaviors.

Questions 41: Do you wash your hands, gargle, or disinfect your hands and fingers with alcohol?

Questions 42: Do you try not to go to poorly ventilated areas?

Questions 43: Do you try not to go to places where a lot of people gather?

Questions 44: Are you trying to avoid talking or speaking to other people at close range?

Questions 45: Do you put a mask or handkerchief to your mouth when coughing or sneezing?

Questions 46: Are you conscious of physical distancing (distance between yourself and others)?

Questions 47: Do you avoid unnecessary and non-urgent outings (non-essential outings)?

Questions 48: Do you work remotely (work from home)?

There were five options: "not at all", "not very applicable", "neutral", "slightly true", and "very true". Here, we focused on the percentage of the responses to "very true" and "slightly true". As a result, Morioka City is the highest in four questions. In particular, Questions 44 to 46 are characterized by a large gap between the first place and the second place (Table 8).

Table. 8 Degree of various infection prevention behaviors in the last one month (from the time of response)				
[Percentage of "very true" and "slightly true"]				
(unit : %)				
	Question 41 "washing hands and gargling"	Question 42 "not going to poorly ventilated areas"	Question 43 "not going to places where a lot of people gather"	Question 44 " not talking to other people at close range"
Iwate coastal area	91.3	71.8	86.4	76.7
Morioka city	96.5	73.7	86.4	<b>80.3</b>
Miyagi coastal area (excluding Sendai city)	94.2	76.3	86.3	73.6
Sendai city	97.7	72.4	84.3	75.4
	Question 45 "use of masks when coughing and sneezing"	Question 46 "consciousness of physical distancing"	Question 47 "avoiding non- essential outings"	Question 48 "working remotely"
Iwate coastal area	89.7	82.1	89.3	6.7
Morioka city	<b>96.9</b>	<b>89.0</b>	86.4	12.8
Miyagi coastal area (excluding Sendai city)	93.0	86.0	86.8	7.9
Sendai city	94.8	83.6	79.9	17.7

[note] Morioka City has a higher proportion of Questions 43 to 46 than other areas, especially Questions 44 to 46.

From the above, focusing on the specific content of infection prevention behaviors and analyzing their thoroughness over a long period of time, it can be explained considerably by the behavioral changes of respondents in Morioka City.

In Questions 49 to 54, we asked about the degree of awareness regarding infection prevention behaviors, but since the answer results were similar to those of Questions 41 to 48, they are omitted here.

## 11) Questions 55 to 61

Questions 55 to 61 asked about changes in community activities and views on community activities from the time when the number of infected people began to surge nationwide to the time when the number of infected people in Iwate Prefecture was the lowest in Japan (March to October 2020).

Only the following question 60 is taken up here.

Question 60: What do you think will happen to community activities in your town after COVID-19 is over?

There are three options: "They will not return to the original community activities", "I cannot say either", and "They will return to the original community activities".

The percentage of the respondents who answered "They will return to the original community activities" was 40.9% in the coastal area of Iwate Prefecture, 36.8% in Morioka City, 41.7% in the coastal area of Miyagi Prefecture, and 41.0% in Sendai City. On the other hand, the percentage of the respondents who answered " They will not return to the original community activities " was almost the same as 10% to 11% in all areas. The proportion of pessimistic responses is negligible.

This question is related to Question 34.

Question 34: After the end of COVID-19, the living environment in residential areas and districts will be better than before the pandemic.

There are five options: "I don't think at all," "I don't think much," "I can't say either," "I think a little," and "I think very much."

The percentage of the responses to " I don't think at all " and " I don't think much " was 37.1% in the Iwate coastal area, 27.6% in the Miyagi coastal area, 36.6% in Morioka City, and 40.7% in Sendai City. In contrast, the percentage of the responses to " I think a little " and " I think very much " was 19.9% in the Iwate coastal area, 24.0% in the Miyagi coastal area, 17.2% in Morioka City, and 11.1% in Sendai City. Respondents in Iwate are quite pessimistic. However, it is not clear how many people who think of it as " the level will return to normal " are included.

From the above, COVID-19 (the corona disaster) may be perceived as only a temporary shock for community activities. Conversely, it is suggested that the sorting out of issues in the living environment of residential areas and districts is being questioned.

Based on the above results, the following correlation was analyzed. That is, what the respondents who selected 4 or 5 items in Question 21 (the period when infection prevention behaviors were most thorough), that is, those who have been thorough in infection prevention behaviors for a long time, answered in Question 34.

The percentage of the respondents who answered "I don't think at all" and "I don't think much" was 29.7% in the Iwate coast and 30.0% in Morioka City, and the percentage of the respondents who answered "I think a little" and "I think very much" was 23.8% in the Iwate coast and 25.0% in Morioka

City. From this, we can glimpse that those who have been thoroughly implementing infection prevention measures for a long time are finding a brighter outlook for the living environment of the residential area and district after the end of COVID-19.

## 12) Questions 62 to 69

Questions 62 through 69 asked about the psychology (feelings, thoughts, and values) of the respondent from around March to October 2020 in detail. Here are the questions:

Question 62: Did you feel the need to protect your community from infection?

Question 63: Were you afraid of becoming infected and exposing you and your family to public scrutiny?

Question 64: Were you afraid that you would be blamed by community members if you became infected?

Question 65: Did you feel that you should put up with inconveniences to prevent infection?

Question 66: Were you afraid that you would be blamed by people at work if you became infected?

Question 67: Did you want to prevent infections in your local community?

Question 68: Did you regard those things that were being advised at that time to prevent infection as rules everyone should observe?

Question 69: Were you afraid of becoming infected and having people gossip about you and your family?

Respondents were asked to answer these questions by selecting one of the five options ("strongly disagree," "disagree," "neutral," "agree," and "strongly agree"). The following is a summary of in-depth analysis of the results, not a description of the responses:

A close look at these questions reveals that Questions 62 and 67 are about "community protection," Questions 63 and 69 "presence of anxiety," Questions 65 and 68 "normative consciousness" and Questions 64 and 66 "fear of blame," while, from another point of view, Questions 63, 64, 66 and 69 are all understood to be asking about the "fear of personal identification and blame."

Responses to these questions were correlated with other questions and were analyzed in further depth from the perspectives shown below <sup>4</sup>. The correlated questions are shown in parentheses, and are described below, except for Questions 3 through 8 and 12, which are mentioned above.

- Events that affected the respondent's infection prevention behavior (Questions 3 through 9)
- How the respondent did not want to be the first to be infected (Question 12)
- Knowledge of the testing procedure, system, etc. (Question 26)
- Voluntary quarantine (Self-restraint) fatigue (Question 27)
- Whether infected people have themselves to blame (Question 31)

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<sup>4</sup> For details of the analysis, please refer to Kuwada, Tamura, Inoue, and Sato (2021) and Tamura, Kuwada, Inoue, and Sato (2023).

- How the respondent did not want people from other prefectures to come to their prefecture (Question 32)

Question 9: Did cancellations of local events, etc. and enhanced infection prevention measures taken by shops, colleagues, friends, and other people affect your infection prevention behavior?

Question 26: Do you know about the COVID-19 testing procedure and system, medical treatment system for infected individuals, etc. of your prefecture?

Question 27: Do you feel fatigue due to voluntary quarantine (cabin fever)?

Question 31: Do you think that infected people have themselves to blame?

Question 32: Did you want people from other prefectures or municipalities to refrain from coming to your prefecture or municipality as the infection spread?

The precondition here is that psychological impacts caused on and by the local communities of respondents in relation to their infection prevention behavior were analyzed in terms of the following two items, from the perspective of their relationship with their own local communities, on which special emphasis was placed in this survey:

- Keeping peace in the community: "I want to keep the peace of the community." (Positive impacts on the community and motivation for taking proactive action to prevent infection in the community)
- Fear of identification and blame: "I do not want to be blamed by community members." (Negative impacts caused by the community and reasons for being passive about taking action to prevent infection in the community)

Analyzing the correlations between questions and responses in the above way revealed the following nine main characteristics:

- ① Community awareness increased more markedly in Iwate Prefecture than in Miyagi Prefecture as their awareness about their own behavior increased.
- ② People in areas other than coastal area of Miyagi Prefecture tended to have the "fear of identification and blame as the result of becoming infected," along with being "affected by the spread of infection."
- ③ The only influence observed in the coastal area of Miyagi Prefecture "affected by the spread of infection" is that people in this area tended to "regard it as a rule to behave to prevent infection" (no other clear correlations were found).
- ④ It can be said that there was a clearer correlation between "lack of voluntary quarantine fatigue" and the psychological items in Iwate Prefecture.
- ⑤ In the coastal areas, the greater the "influence of the spread of infection on their behavior," the more likely the respondents were to "know about the prefecture's measures." Particularly in the coastal area of Iwate Prefecture, the greater the "influence of the spread of infection," the more likely the respondents were to "know about the prefecture's measures" and "want to keep the peace of the community." In Morioka City and Sendai City, however, there was no correlation between whether respondents "know about the prefecture's measures" and the influence of the spread of infection and increase in community awareness.

- ⑥ In Iwate Prefecture (both the coastal area and Morioka City), the more the respondents "did not want people from other prefectures to come to their prefecture," the more likely they were to be "affected by the spread of infection," "want to keep the peace of the community" and have the "fear of identification and blame as the result of becoming infected."
- ⑦ In Miyagi Prefecture (both the coastal area and Sendai City), the more the respondents "did not want people from other prefectures to come to their prefecture," the more likely they were to "want to keep the peace of the community." In the coastal area, however, they were also more likely to have the "fear of blame as the result of becoming infected."
- ⑧ In Iwate Prefecture (both the coastal area and Morioka City) and Sendai City, the more the respondents thought that "infected people had themselves to blame," the more likely they were to "regard it as a rule to behave to prevent the spread of infection" and "want to keep the peace of the community." In the coastal area of Miyagi Prefecture, however, the more the respondents thought that "infected people had themselves to blame," the more likely they were to have the "fear of identification and blame as the result of becoming infected."
- ⑨ In all of Iwate Prefecture, the more the respondents "did not want to become the first to be infected in Iwate Prefecture," the more likely they were to "not want people from other prefectures to come to their prefecture," "want to keep the peace of the community" and have the "fear of identification and blame as the result of becoming infected." While the more the respondents "did not want to become the first to be infected in Iwate Prefecture," the more likely they were to think that "infected people had themselves to blame" in Morioka City, those in the coastal area were divided about this point.

### **3. Implications of the survey results for regional revitalization**

Here, we will first briefly organize the results of the questionnaire responses. Next, we will examine what knowledge the results of the responses can bring to infectious disease control, health promotion, and regional revitalization (reconstruction of disaster-stricken areas).

The most significant factor behind zero infections in Iwate Prefecture was the thorough infection prevention behaviors of individuals over an extend period of time, backed by the strong manifestation of the tendency of thinking and acting that seems to be characteristic of people in the coastal area of Iwate Prefecture. One infection prevention behavior that was considered particularly important was refraining from going out (direct factor), and this can be best explained by the point made above. Additionally, basic behaviors such as wearing masks on a daily basis had been widely observed since before the spread of infection. Trust in the public sector was also high (indirect factor), which had a considerable impact on the infection prevention behaviors. There was an increased awareness of one's own behaviors as well as the community at large, and people who acted with high awareness were more likely to have a brighter outlook for the local living environment.

Although there was a strong recognition that the Great East Japan Earthquake and COVID-19 were separate, it should be noted that the percentage of respondents who said that the experience of the earthquake was useful was close to 30% in the coastal area of Iwate Prefecture. Conversely, nearly 40% of people in Iwate Prefecture say they do not believe that the living conditions in their areas and districts are better than they were before the spread of COVID-19 after the end of COVID-19. From this, the sorting out of issues in the living environment is strongly questioned.

As mentioned above, we need to consider post-COVID-19 infectious disease measures and health promotion as well as the revitalization of local livelihoods from the perspective of good public health. In light of this, measures are needed to instill a suitable degree of fear of infectious diseases based on the information provided by national and local governments as regional and local residents enforce basic infection prevention behaviors—all while reducing the stress that comes with this. Efforts must be made to promote the autonomy and uniqueness of individuals and regions while partnering with local governments to improve people (manpower) and the community in terms of safety and security, make more effective use of mainly indoor space, and steadily tackle the big challenges associated with regional revitalization. At the same time, the most important policy challenge will be building a system for sustainable activities, that emphasize the recovery from the earthquake as well, based on equal and collaborative relationships with entities (individuals, enterprises, and local governments, etc.) both inside and outside the region.

As mentioned at the beginning of this paper, the fundamental policy challenge for COVID-19 is to prevent the number of infected people. Therefore, clarifying the factors behind the zero infections in Iwate Prefecture will provide more important implications for post-COVID-19 infectious disease countermeasures, not to mention the prolonged spread of COVID-19 in Japan and around the world. Regarding the factors of zero infections in Iwate Prefecture, it would be a serious problem to get away with "working out in the end" (because the results were good, so there is no need to discuss in detail the methods and objectives of various measures) or to share short-term factors. That is to say, as policy issues become more complex, diverse, and protracted, combined with reconstruction from the Great East Japan Earthquake and revitalization from the COVID-19 pandemic, there is a high possibility that important issues for regional sustainability will be missed. This study attempted to overcome those deficiencies.

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