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### Air Traffic Demand and COVID-19: Analysis by Web-Based Survey Data in Japan

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## DISCUSSION PAPER SERIES

### Air Traffic Demand and COVID-19 - Analysis by Web-Based Survey Data in Japan -

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RESEARCH INSTITUTE  
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KAETSU UNIVERSITY

## Air Traffic Demand and COVID-19 - Analysis by Web-Based Survey Data in Japan –

OKAZAKI Yurie, USAMI Munekatsu, MIYAKI Miki, KIMURA Shin and MANABE Masashi

### Abstract

The purpose of this study is to capture consumers' current perceptions and future prospects of domestic air demand in order to obtain perspective about the structure of air demand in the new normal society of after COVID-19.

In this study, we conducted a web-based survey for residents in Japan to understand potential air demand; pre-pandemic and post-pandemic air travel trends, pandemic risk perceptions and migration intentions. We collected the sample of 1600 that responded between March 27 and March 29, 2022 when the infectious status was not so serious as the government removed the emergency declaration on March 21, 2022.

The main results of this study are as follows. Domestic air demand after the pandemic has been expected to increase compared to that before the pandemic. The percentage of respondents who intend to relocate from their workplaces where air travel is required, reaches 0.9%. If they were to commute by air twice a month, we can expect that 23 millions' nationwide annual demand is newly created.

This is the first comprehensive summary to present the actual air demand and the blueprint of future demand in Japan. In general, while there is a pessimistic forecast for air demand, this study is the first contribution to show the possibility of recovery or air demand in Japan.

### Keyword

COVID-19, Pandemic Airdemand, Aviation safety, New normal,

# 1. Introduction

Impact on the economic activities by COVID-19 is quite serious. The disease was initially observed around Wuhan, China in December 2019 and then spread all over the world. Restrictive border country measures implemented by many countries have prevented air traffic movement. In particular we have never seen such a serious damage for aviation industry. Passengers might feel the risk of COVID-19 on board.

We experience tremendous changes of social economic structure by various restrictions. For example, new behavioral mode such as “Workation” and “remote-work” are emerging. “Workation” is working while on vacation. It is combining business and leisure. As a result business travel and leisure travel are being forced to change. It is hard to predict traffic demand in “new normal” society. Therefore, it is so important to understand perspective for change of traffic demand in terms of consumers’ current recognition, in particular for demand by type and volume.

According to the paper that researching air travel trends under COVID-19 pandemic threat perception, liking, emotion, and fear with COVID-19 were significant predictors to air travel. (Lamb, Winter, Rice, Ruskin, and Vaughn, 2020) The survey was using 632 participants from the United States and conducted in two parts. Stage 1 was developed the regression equations for the two statistical models, and Stage 2 was conducted to verify the predictive capabilities and validate the model fit of willingness to fly for business and pleasure. This analysis indicates safe flying action such as wearing mask policies and disinfection for airplane is effectiveness to passengers feeling safe.

As regards the literature on air travel behavior, there are studies to identify travelers’ attitude toward air travel during and after a pandemic (Manca, Sivakumar, Pawlak and Brodzinski, 2021). Their study aims to investigate the various factors that influence itinerary choices when traveling by air and utilizes recently collected survey data (April-July 2020) from 388 respondents who traveled from one of six airports in London, UK, and includes both explicit and expressed preferences. The results of the analysis indicate that those who are concerned about contracting COVID-19 at the airport or on the plane, or about meeting uncaring travelers, are less likely to travel under current (pandemic) conditions.

The pandemic has had huge impacts on the aviation market. However, previous researches of impacts are not enough. Therefore, we attempt to discuss the aviation market in the new normal era by examining trends in air travel after the pandemic with particular scopes; changes in risk recognition and life and working style. We conducted a web survey to Japanese residents to find the frequency of air travel by purpose, risk recognition for air travel, and preferences for life and working style before and after the pandemic.

## 2. Online Survey

### 2-1 Questionnaire

In this survey, questions were asked about pre-pandemic and post-pandemic air travel trends, risk perceptions that are expected to have a significant impact on air travel demand, and migration intentions that are important for understanding potential air travel demand. The specific questions are as shown in tab 2-1.

### 2-2 Collection of survey

This survey was conducted in an online format. The survey was conducted in an online format, with respondents answering questions while viewing a web screen. The data was collected using Rakuten Research's service.

The sample size was 1600. The survey was conducted until a predetermined sample target was reached. Among the registered users of Rakuten Research, those who have flown on scheduled airline flights since January 1, 2018 were targeted. The gender, age, and region (six regions) were assigned so that they would be equal to the actual population ratio, and samples were collected until that ratio was reached<sup>1</sup>. Considering generation and gender bias, the data was collected based on proration.

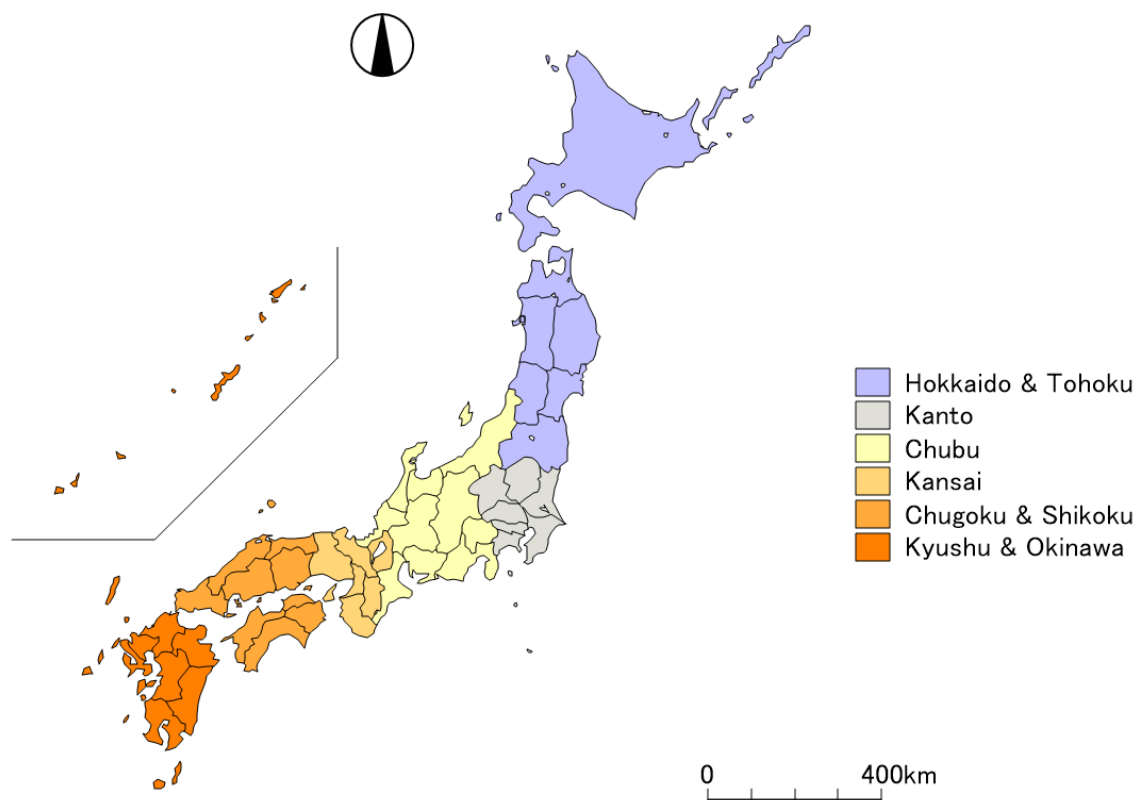
- Hokkaido Tohoku – Hokkaido, Aomori, Iwate, Miyagi, Akita, Yamagata, Fukushima
- Kanto – Ibaraki, Tochigi, Gumma, Saitama, Chiba, Tokyo, Kanagawa
- Chubu – Niigata, Toyama, Ishikawa, Fukui, Yamanashi, Nagano, Gifu, Shizuoka, Aichi, Mie
- Kansai – Shiga, Kyoto, Osaka, Hyogo, Nara, Wakayama
- Chugoku Shikoku – Tottori, Shimane, Okayama, Hiroshima, Yamaguchi, Tokushima, Kagawa, Ehime, Kochi
- Kyushu Okinawa – Fukuoka, Saga, Nagasaki, Kumamoto, Oita, Miyazaki, Kagoshima, Okinawa

The survey was conducted from Saturday, March 27 to Monday, March 29, 2022. During

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<sup>1</sup> Respondents are entitled to receive rewards by answering the survey.

this period, a second state of emergency was declared on January 8, 2021, in response to the spread of COVID-19 infection since the end of 2020, which was later lifted nationwide on March 21 after the infection had subsided.



Questionnaire is Table1-1. Section of screening

### 3. Place of Residence

Hokkaido
Aomori
Iwate
Miyagi
Akita
Yamagata
Fukushima
Ibaraki

Tochigi
Gunma
Saitama
Chiba
Tokyo
Kanagawa
Niigata
Toyama
Ishikawa
Fukui
Yamanashi
Nagano
Gifu
Shizuoka
Aichi
Mie
Shiga
Kyoto
Osaka
Hyogo
Nara
Wakayama
Tottori
Shimane
Okayama
Hiroshima
Yamaguchi
Tokushima
Kagawa



Ehime
Kochi
Fukuoka
Saga
Nagasaki
Kumamoto
Oita
Miyazaki
Kagoshima
Okinawa
Overseas

### 3. Analysis of Survey data

#### 3-1 Risk recognition

First, let's look at the results of the risk perceptions of COVID-19 and the risk perceptions of air travel associated with COVID-19 in order to capture the ideas about people's travel that form the basis for discussing aviation demand in the new normal.

The results of Q42 are shown in Figure 1-1. Since this questionnaire was administered at a time when the vaccination program had just started for health care professionals, it is likely that expectations of the effectiveness of the vaccine were weak. In other words, approximately 25% of the respondents answered that the vaccination rate was about 90%, and these points may have differed between the time of the survey and the time of writing. It is also known that antibodies decrease a few months after the second vaccination, and this may change with the start of the third vaccination. The most common response was "3. Therapeutic drugs and methods comparable to seasonal influenza have been established", followed by "8. No need to wear masks" and "2. Almost no number of infected people".

The results of Q43 are shown in Figure 1-2. The mean value was 2.7, which is lower than 3. This indicates that most of the respondents think that the risk should be avoided as much as possible. This may be a characteristic of Japanese people, but at any rate, many of the respondents to this questionnaire have a risk-averse mindset.

The results of Q44 are shown in Figure 1-3, and the results of Q45 are shown in Figure 1-4. COVID-19 symptoms and fear of infection are felt more strongly by the elderly. Fear of social alienation does not differ significantly between generations.

The results of Q46 to Q48 are shown in Figure 1-5. During the corona epidemic, there was a clear increase in the number of people who were concerned about safety, infection, and social disadvantage compared to before the corona epidemic. However, after the end of the corona epidemic, it is suggested that the situation will return to the pre-corona state. In particular, although the safety of airplanes themselves is not generally linked to corona, people are concerned about safety as corona spreads, indicating that corona is also increasing non-scientific concerns.

#### 3-2 Volume of demand

Next, let's look at how demand for air travel will recover after the end of Corona, by the

purpose of business, leisure, and visiting friends and acquaintances.

The results for Q18-Q25 are shown in Figure 2-1 – 2-5. Figure 2-1 shows the total number of times flown; Figure 2-2 shows the average number of times flown per person; Figure 2-3 shows how many of the 1,600 people have flown before and after the pandemic; Figure 2-4 shows the percentage of the 1,600 people who have flown at least once. Figure 2-5 shows the number of people out of 1600 who said they would increase or decrease the number of times they flew, in which case those who increased the number of times may have increased from zero.

Surprisingly, demand tends to increase, at least from our survey data. In particular, there is an increase in leisure and visiting friends and relatives (VFR). By purpose, business travel is expected to be curtailed due to the spread of online meetings, while demand is expected to recover due to the elimination of stagnation in business activities during the spread of the infection, or to create demand due to new business activities after the end of the infection.

As for leisure activities, demand is expected to be generated by the desire to actually visit the area after the infection is over, as a result of experiencing online tourism during the restricted time due to the infection, or seeing and hearing the local information provided by tourist spots through SNS. In addition, since the survey asked about domestic air travel, it is possible that the survey is capturing alternative demand for domestic leisure activities when overseas leisure activities are not foreseen.

Finally, VFR tended to increase due to the inability to return home due to Corona and the sense of crisis that they might not be able to see each other casually due to the issuance of event risks including Corona.

The results for Q26 are shown in Figure 2-6. Fewer respondents perceive an infection risk in air travel for business purposes and fewer believe that air travel puts their family members at risk of infection, while a larger percentage use other means of communication. The reasons for this may include the reduction of travel costs for the company and the increasing use of online communication such as zoom, which will become more established in the future.

The results for Q27 are shown in Figure 2-7. It can be seen that the percentage of people who are shifting tourism and leisure to online experiences is small. Compared to business, tourism has a higher percentage of those who feel that air travel poses an infection risk and those who believe that it exposes their family to infection risk. The percentage of those who would use other means of

transportation other than air travel for sightseeing and leisure was also small. This indicates that the respondents feel that there is a risk in taking a sightseeing trip to Corona itself.

The results for Q28 are shown in Figure 2-8. The results for the VFR purpose show that a large percentage of respondents are hesitant to visit relatives and friends during the Corona disaster because of the high percentage of respondents who said that air travel would endanger their family. On the other hand, the percentage of respondents who use other means of communication compared to those who use business or leisure purposes is small, suggesting that online communication cannot be an alternative for VFRs because they are more willing to meet their relatives and friends in person. From this, it can be inferred that the potential demand for VFR is solid.

### 3-3 Relocation

Next, as telework becomes popular under the pandemic and work styles that do not necessarily require daily attendance at work take root, there is a trend toward changing one's place of residence. Let's take a look at the results of a survey on the willingness to change the actual place of residence.

The results of Q29 are shown in Figure 3-1, and the results of Q30 (spouse) are shown in Figure 3-2. The pie charts show the percentages by gender. More than half of both Japanese respondents and their spouses are unable to telework or have to go to the office, and women are more likely to be unable to telework than men.

The results of Q31 are shown in Fig. 3-3. As telework becomes more widespread, about 20% of respondents would like to change their place of residence, and about 2% of respondents have already moved.

The results of Q32 are shown in Fig. 3-4. (The results of Q32 are shown in Figure 3-4 (multiple answers possible). In addition, about 2% of the respondents have already moved. The results of Q33 are shown in Figure 3-5 (Family). More than half of the respondents (53%) envisioned other areas with a good living environment as their destination. The results of Q34 are shown in Figure 3-6. More than half (53%) of the respondents answered that they would like to live in the same prefecture as their place of employment, or within 100 km of their place of employment (within a 2-hour commute). The results of Q35 are shown in Figure 3-7. The overwhelmingly most common reason given for wanting to migrate was for work for themselves or their family. The

results of Q36 are shown in Figure 3-8. About 80% of respondents said they would be willing to change their place of residence if there were no restrictions on family work, education/child care, or medical care.

The results of Q37 are shown in Figure 3-9. In terms of the image of their new place of residence, the largest percentage of respondents chose an area where they have a strong attachment or geographical ties, followed by an area with an excellent living environment.

The results of Q38 are shown in Figure 3-10. The largest proportion of respondents chose the point of residence for migration to other areas where the living environment is excellent because there are no restrictions on family work, education/child care, or medical care.

The result of Q39 is shown in Figure 3-11. Even though there are no restrictions, a high percentage of respondents choose areas close to their place of employment.

The result of Q40 is shown in Figure 3-12. The most common reason given in the previous section was attachment to the home. The second most common reason was attachment to the community.

The results for Q41 are shown in Figure 3-13, Figure 3-14, and Figure 3-15. When asked what kind of public support would make them choose to migrate, the largest number of respondents (about 26%) answered a cash benefit of 1,000-1,990,000 yen. On the other hand, 20% of the respondents answered "0 yen". When asked how much public support they would need per month, 18 respondents said 100,000-140,000 yen, followed by 12 who said 0 yen, and 11 who said 50,000-90,000 yen. Furthermore, the most common benefit periods after migration were 7~12 months (between about 1~1.5 years) and 15~36 months (between about 1.5~2 years). However, since people who do not wish to emigrate in the first place also responded, there were many cases where they answered unrealistic amounts, so it is necessary to interpret the results in a wide range.

Now, let's estimate the actual population of migrants using the results of Screening Q1, Questionnaire Q11, Q31 and Q34. The results are shown in Table 2. The ratio of those who wish to emigrate to the total sample is 7.8% in the Kanto region and 5.4% in the Kansai region, indicating

that the ratio is higher in urban areas. However, the ratio of those who wish to migrate to the Tokyo metropolitan area is 9.5%, which is very high. Furthermore, the percentage of those who wish to move to distant places was 1.6% in the Kanto region, 1.2% in the Kansai region, and 2.7% in Tokyo, indicating that the percentage is higher in urban areas than in other regions. Here, those who wish to live far away are defined as those who answered "Yes" or "Already relocated" in Q31.

Since this survey allocates the population to those aged 18 and over, we can estimate the population of immigrants by multiplying the above ratio by the population aged 18 and over. Using the results of the 2020 national census, the total number of people wishing to emigrate to Japan is about 5,260,000, of which about 940,000 are in the distant areas. In particular, there are about 2.91 million people who wish to move to the Kanto region, of which about 610,000 wish to move to distant areas. Even if we focus on the Tokyo metropolitan area, there are 1.15 million people who wish to move and 330,000 who wish to move to distant areas, indicating that there is a considerable amount of latent demand for migration.

## 4. Concluding Remarks

In this study, we conducted a web survey and analyzed consumer perceptions in order to foresee domestic airline demand in Japan after a pandemic. The main results obtained are as follows.

First, risk perception increased during the pandemic, but generally returned to pre-pandemic levels after the pandemic. However, the risk perception of the safety of the use of the void right itself, which is not directly related to infectious diseases, is also changing. The reason for this is thought to be related to the strengthening of airline public relations and security inspections.

Next, it was expected that the number of domestic flight boardings after the pandemic would decrease due to the spread of online means and other factors. However, our survey shows an increasing trend. This trend is the same for business, leisure, and visits to acquaintances.

Finally, with regard to migration, the percentage of respondents wishing to migrate in conjunction with teleworking is not necessarily large. However, the estimated migrant population obtained by multiplying the population is not necessarily small. The estimated population willing to migrate to an area more than 300 kilometers away from their place of work is 940,000. If these people were to fly twice a month, the demand generated would be 50% of the number of ANA domestic passengers before the pandemic.

Finally, we point out some remaining issues. First, this survey was conducted for domestic flights. Countries' immigration policies have changed dramatically, as evidenced by the "water border policy." The outlook for the international airline market is likely to vary widely. It is also believed that risk perception of infectious diseases differs greatly between Japanese and foreigners. Additional analysis on this point will be necessary. Furthermore, we designed the web survey based on the expectation that the number of airline trips would decrease after a pandemic. In the web survey, those who decreased were asked why, but those who increased were not asked why. As a result, the reason for the increase is not clear. This is another remaining issue.

## Reference

Lamb, Winter, Rice, Ruskin, and Vaughn (2020) “Factors That Passengers Willing to Fly During and After The COVID-19 Pandemic” *Journal of Air Transport Management* Vol.89, pp. Article 101897

Manca, Sivakumar, Pawlak and Brodzinski (2021) “Will We Fly Again? Modelling Air Travel Demand in light of COVID-19 through a London Case Study” *Transportation Research Record* Vol.



Figure

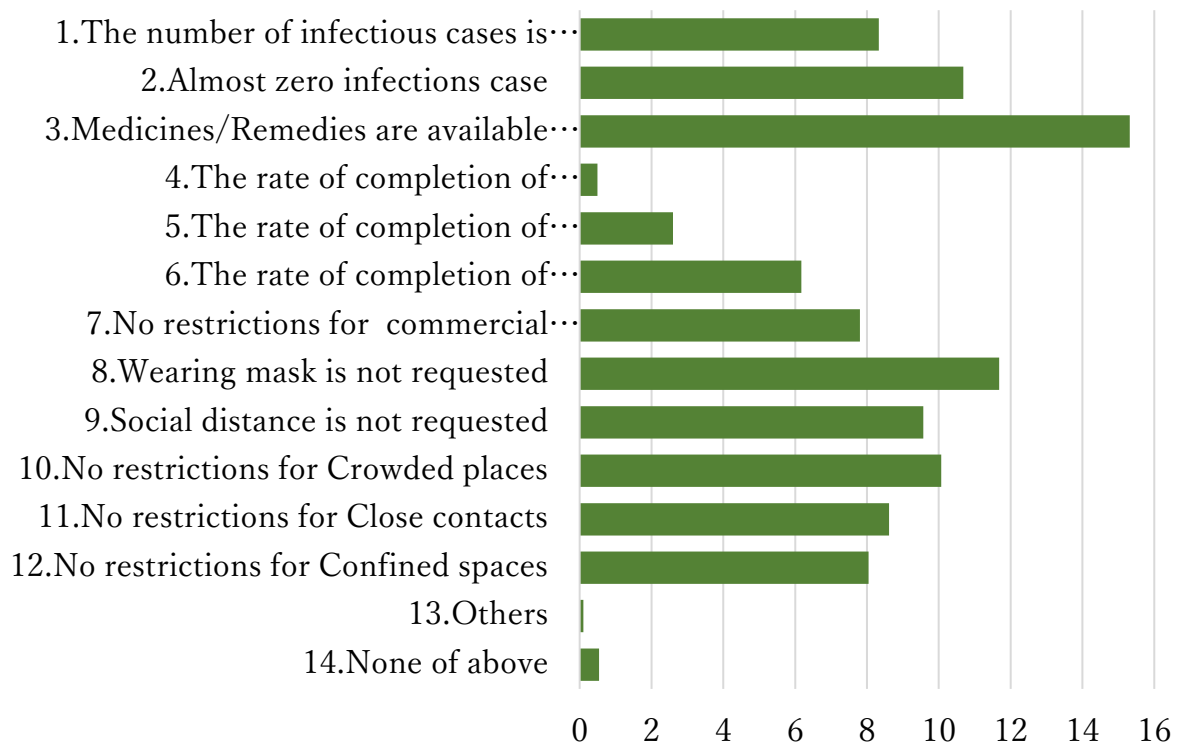


Figure 1-1 Result of Q42 “How do you define "the end of pandemic" ? (Choose all situations to meet the criteria)“

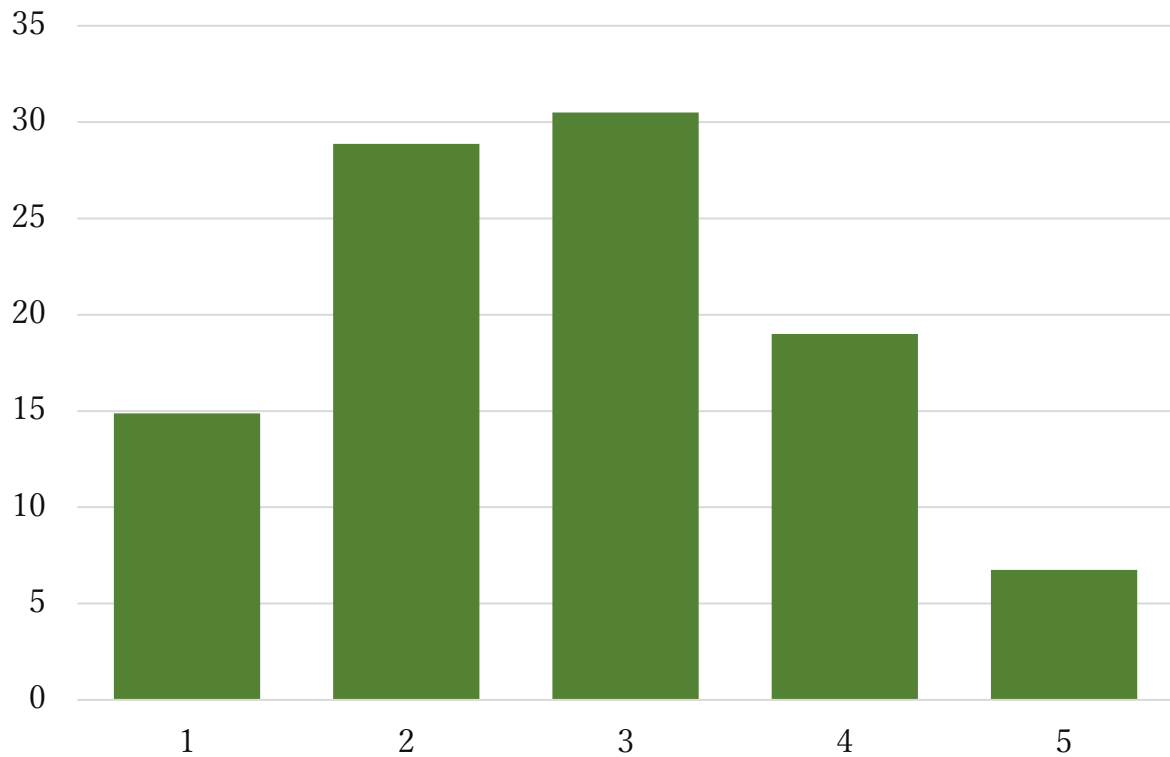


Figure 1-2 Result of Q43 “There are two ways of thinking or behavior for risk as the following proverbs,

(1)“Nothing ventured, nothing gained.” (2)“A wise man keeps away from danger”.

How do you evaluate yourself based on the following conditions? : Mark 1 if you completely agree with (1) and mark 5 if you completely agree with (2). ”

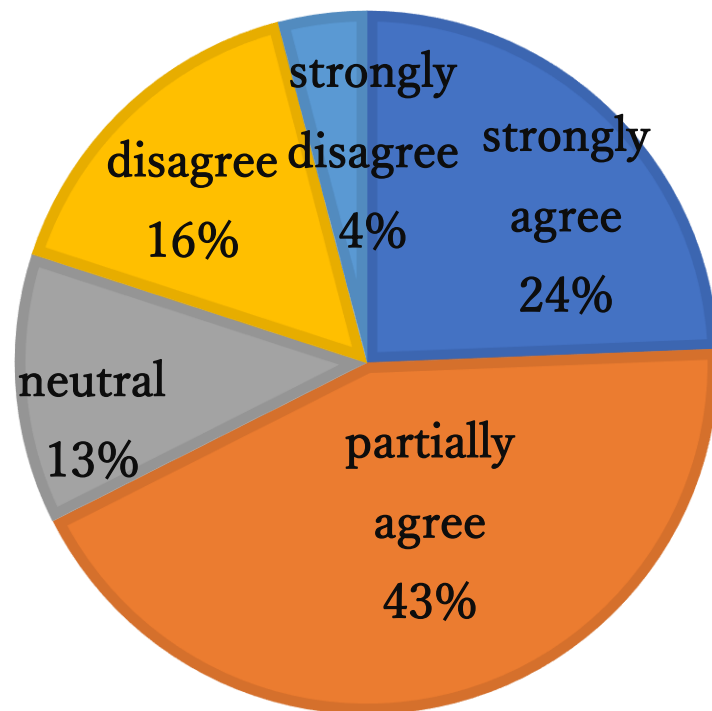


Fig 1-3 Result of Q44 "Are you afraid of the symptoms of COVID-19 (ie. Death, Aftereffects) ?"

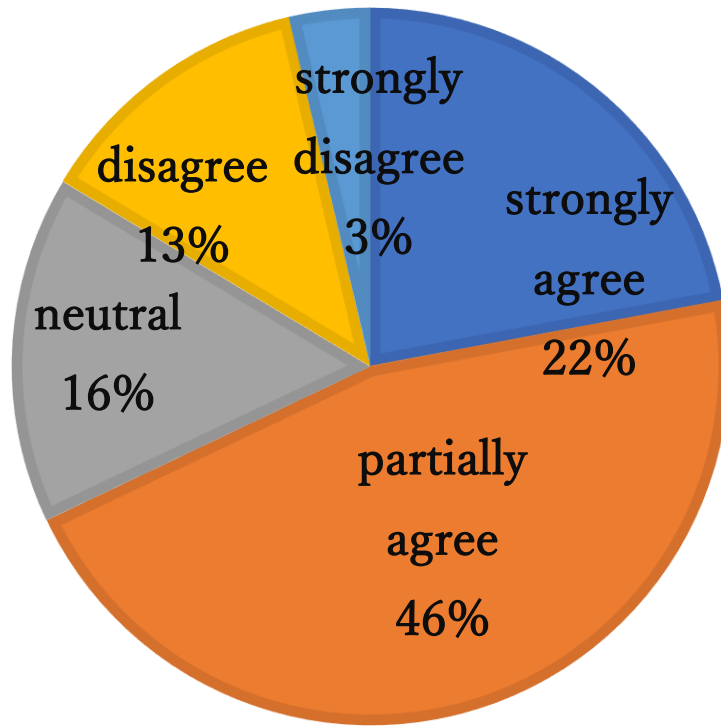


Figure 1-4 Result of Q45 “Are you afraid of the social disadvantages caused by infection of COVID-19 (ie. unemployment, decrease of income, isolation from community) ?”

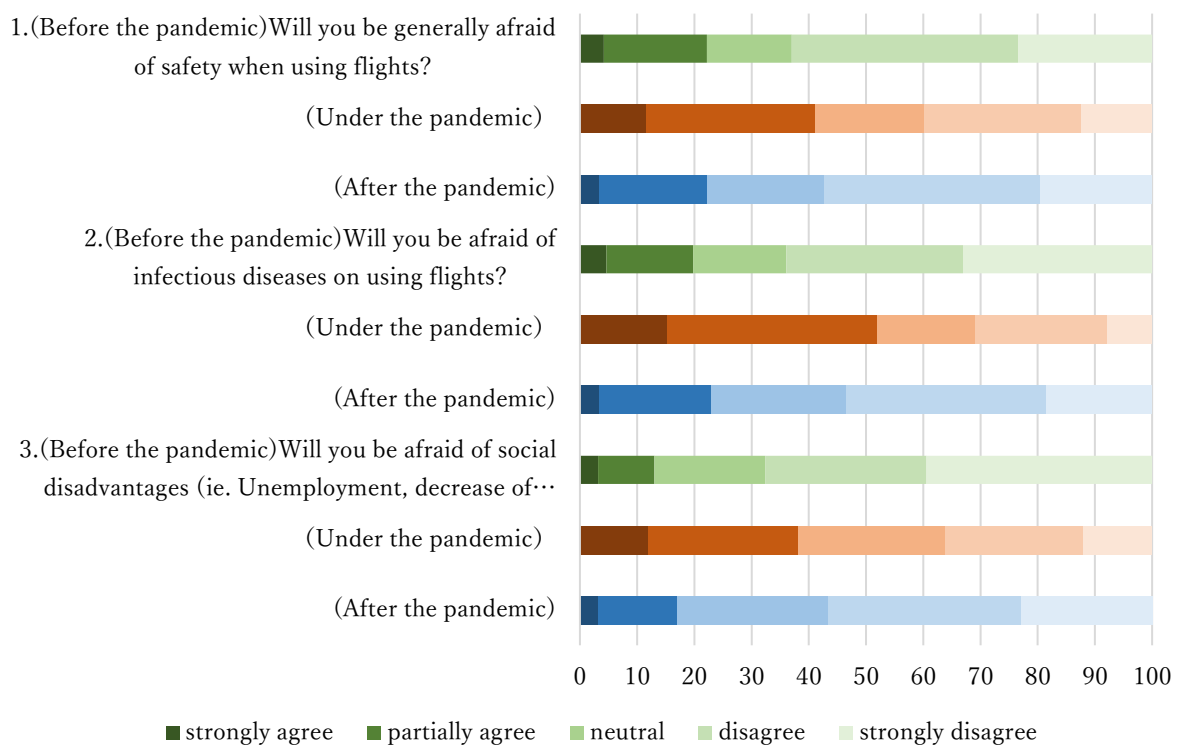


Figure 1-5 Result of Q46-48 “Please choose the closest answer to express your recognition for usage of flight before the pandemic of COVID-19?, Please choose the closest answer to express your recognition for usage of flight under the pandemic of COVID-19?, Please choose the closest answer to express your recognition for usage of flight after the pandemic of COVID-19? "The end of pandemic" means the situation that there would be a certain number of infections, however vaccination is generally available and preventive measures / remedies are established.)”

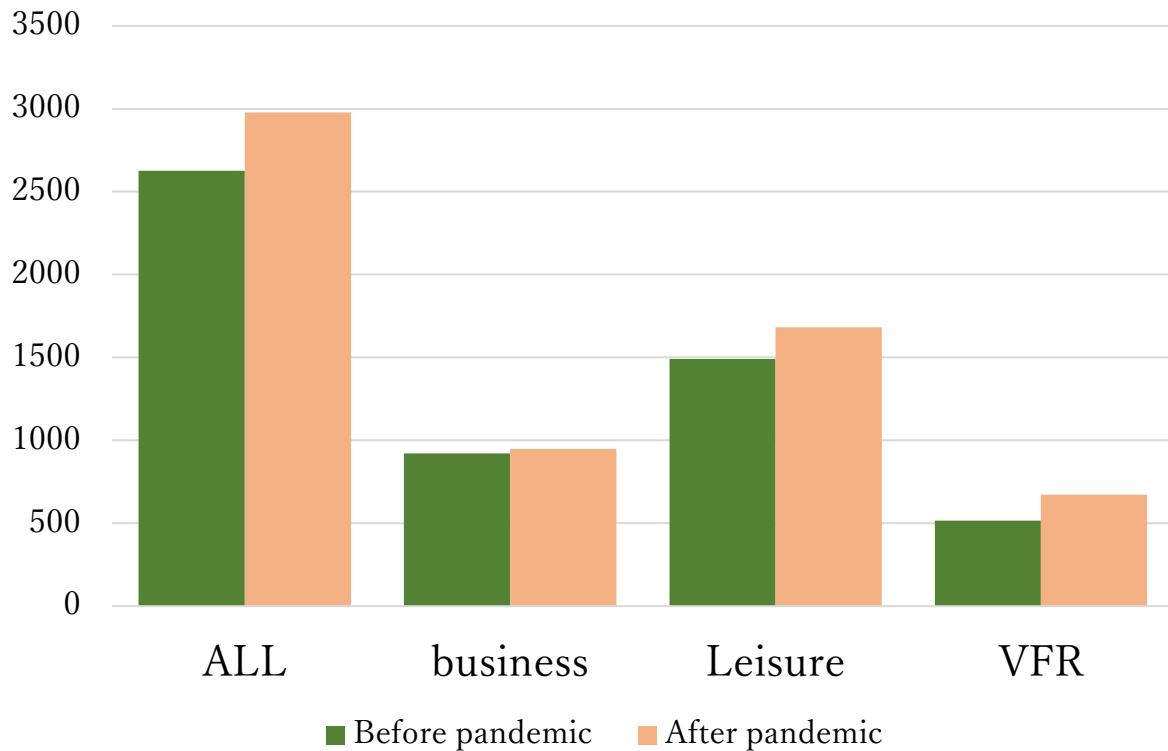


Figure 2-1 The summation for frequency of respondent: Q18-25 “Approximately how many times did you use domestic flights in 2019 ? (Count one time for one round trip), Regarding the above number of usage, approximately how many times did you use domestic flights for business purpose ?, Regarding the above number of usage, approximately how many times did you use domestic flights for leisure purpose ?, Regarding the above number of usage, approximately how many times did you use domestic flights for visiting friends/relatives purpose ?, After the pandemic of COVID-19, approximately how many times will you use domestic flights per one year ? (Count one time for one round trip)

Note: "After the pandemic" indicates the situation which there would be a certain number of patients but vaccination has been almost completed nationwide and medical methodologies are put in place. No subsidy for promoting consumption in the service industry., Regarding the above number of usage, approximately how many times will you use domestic flights for business purpose ?, Regarding the above number of usage, approximately how many times will you use domestic flights for leisure purpose ?, Regarding the above number of usage, approximately how many times will you use domestic flights for visiting friends/relatives purpose ?, For the respondent

who is likely to fly less for business purpose, please tell us the reason

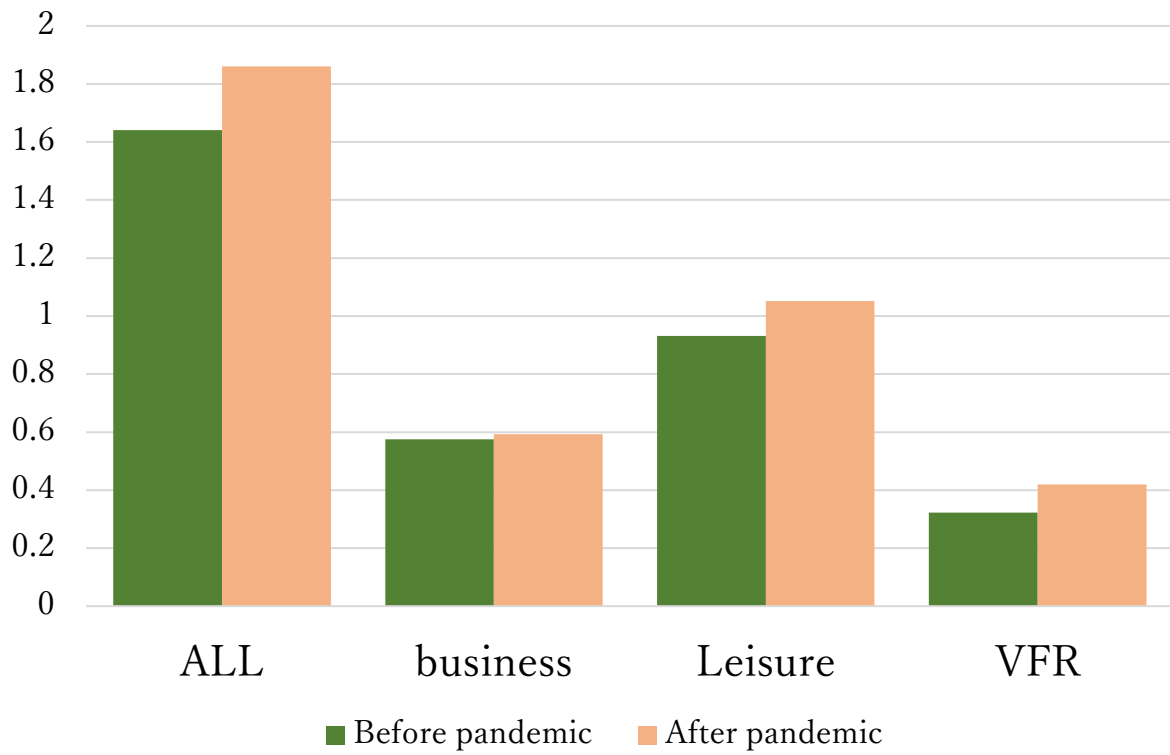


Figure 2-2 The mean for frequency of respondent: Q18-25



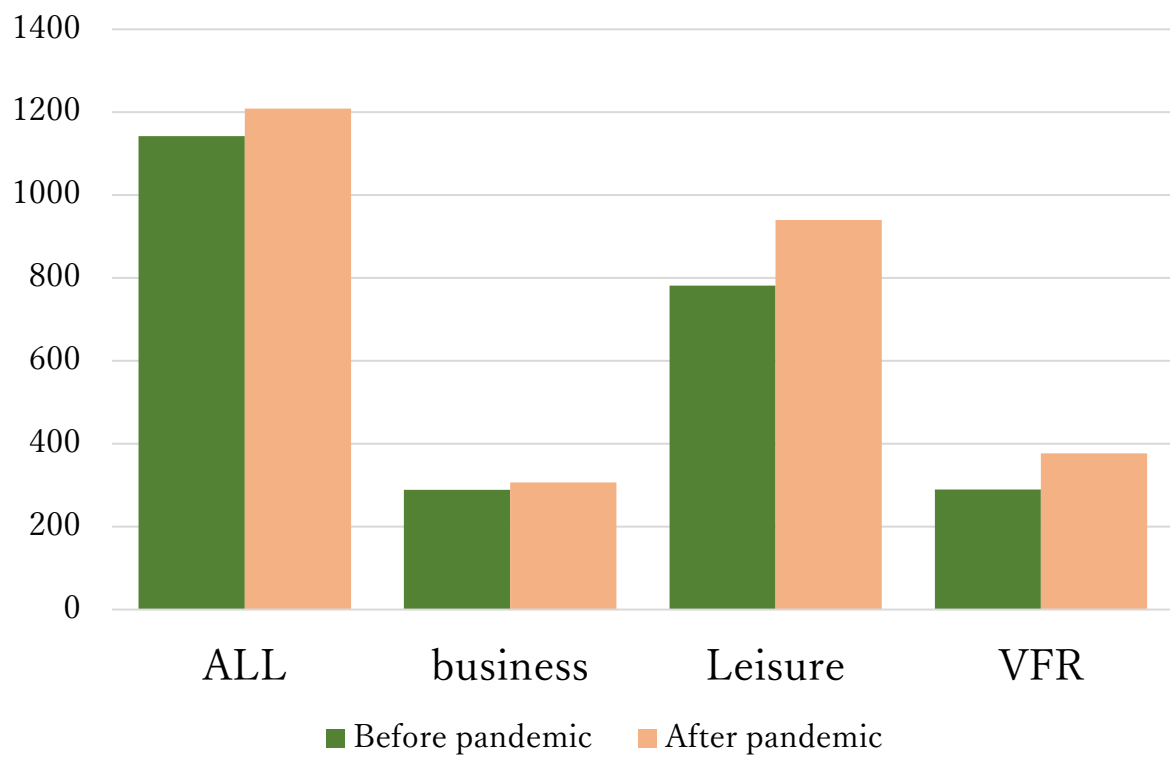


Figure 2-3 The number of respondent to use flight before/after pandemic: Q18-25

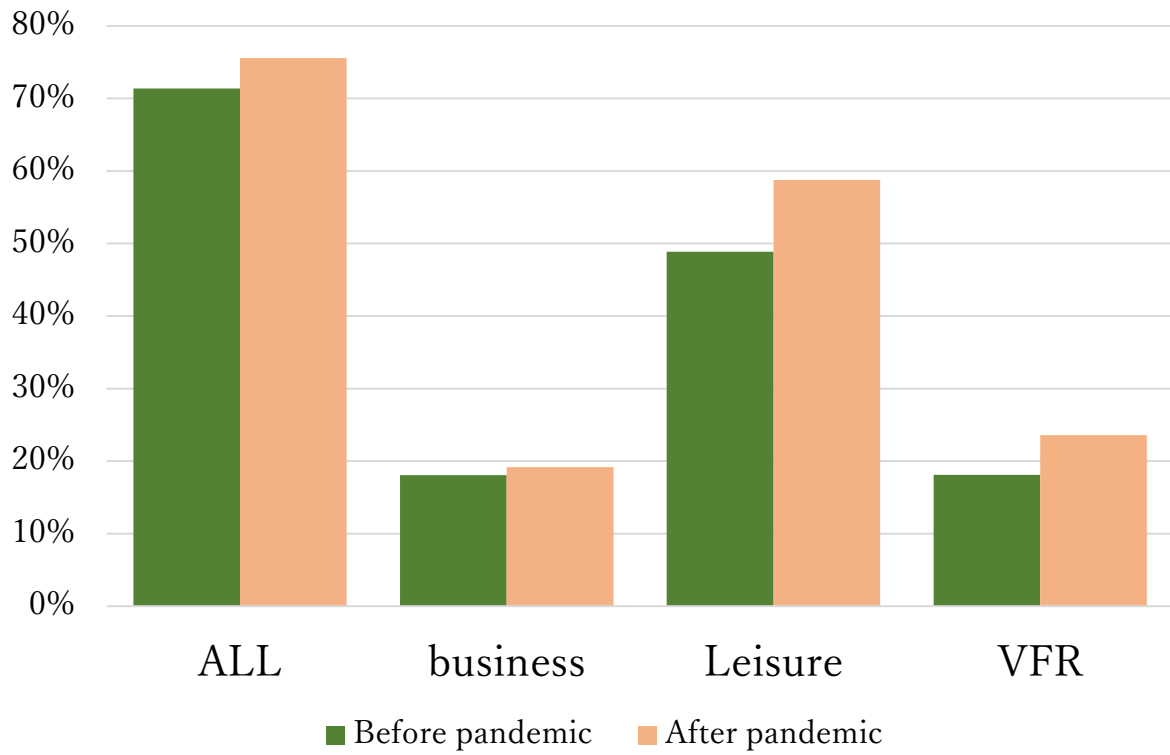


Figure 2-4 The Ratio of respondent to use flight before/after pandemic: Q18-25

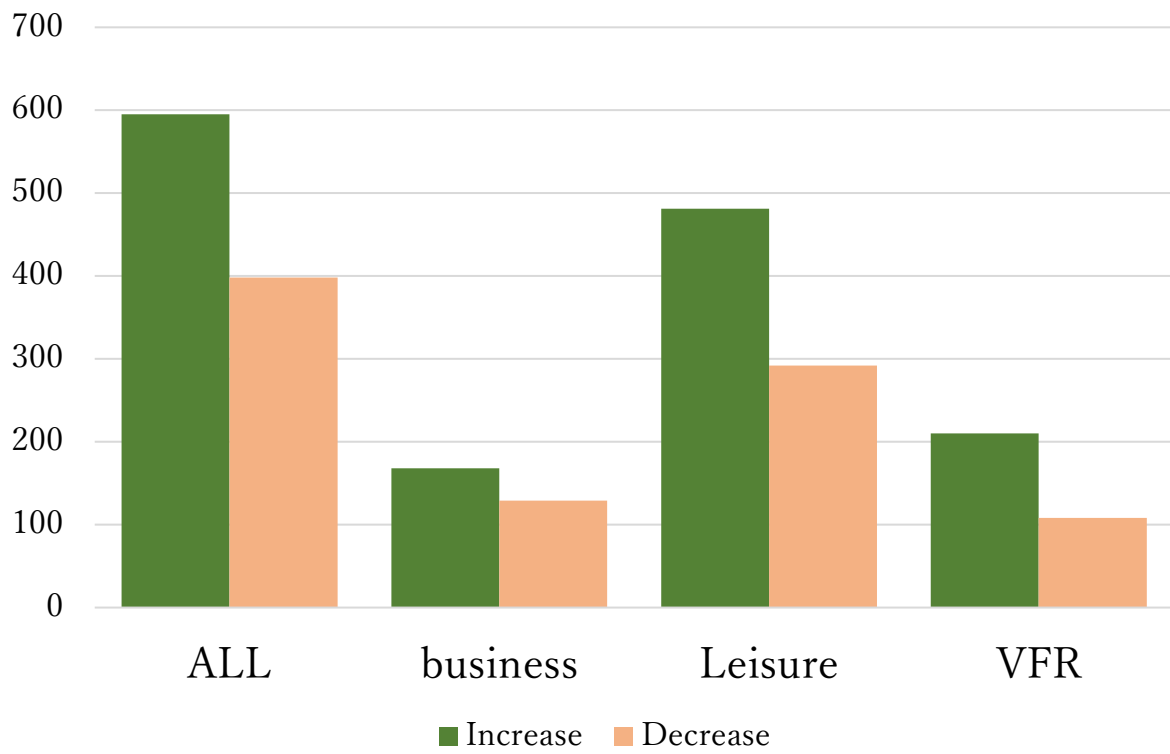


Figure 2-5 The number of respondent to increase/decrease frequency: Q18-25

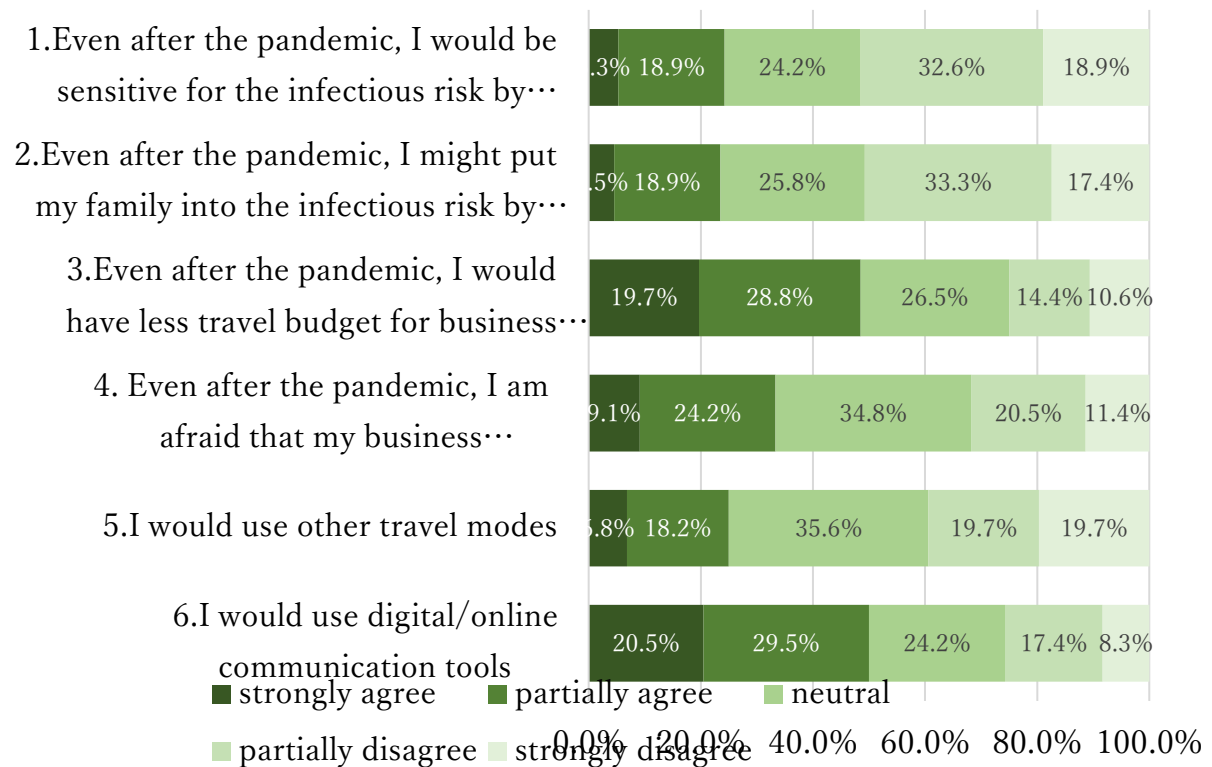


Figure 2-6 Result of Q26 “For the respondent who is likely to fly less for business purpose, please tell us the reason “

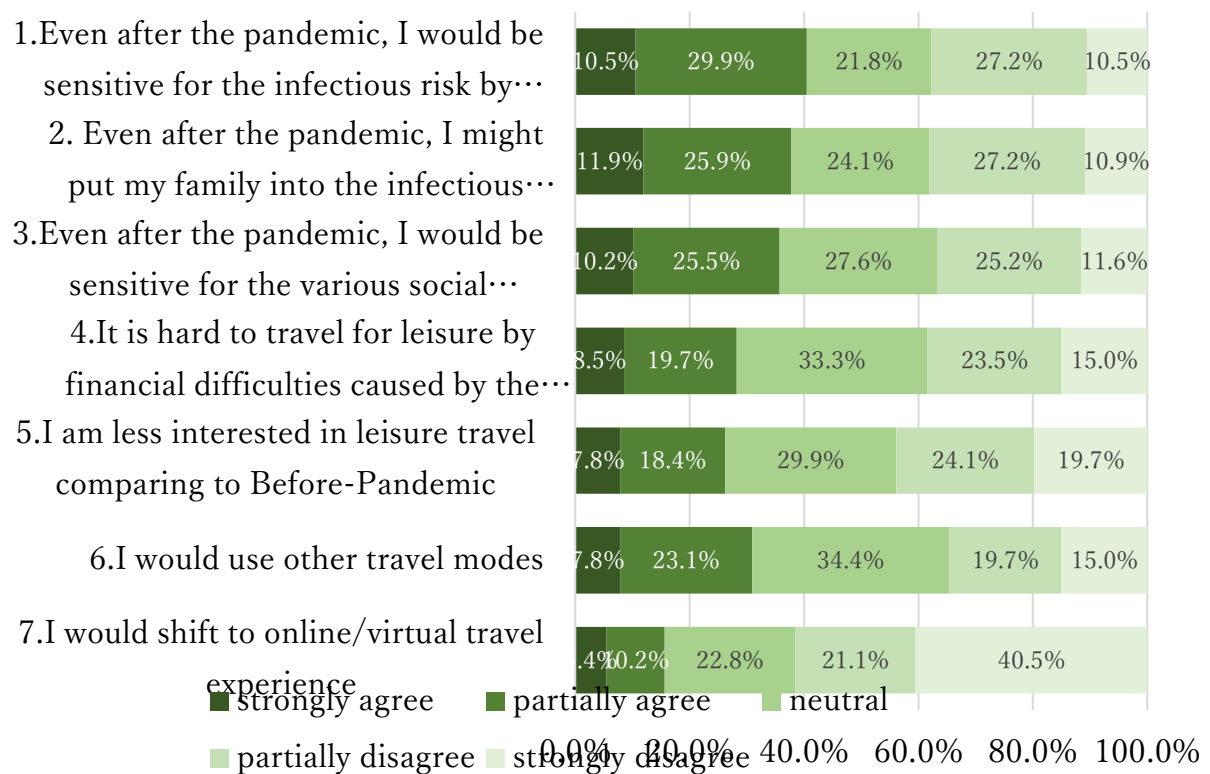


Figure 2-7 Result of Q27 “For the respondent who is likely to fly less for leisure purpose, please tell us the reason “

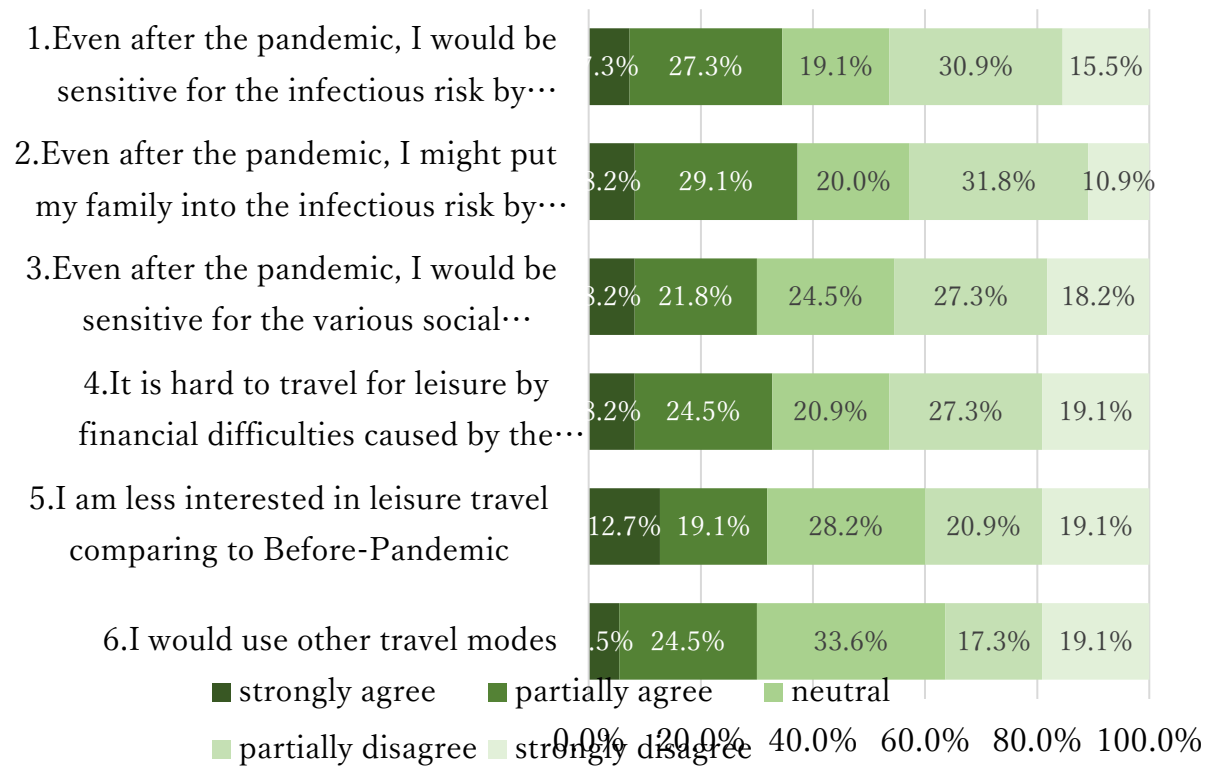


Figure 2-8 Result of Q28 “For the respondent who is likely to fly less for visiting friends/relatives purpose, please tell us the reason “

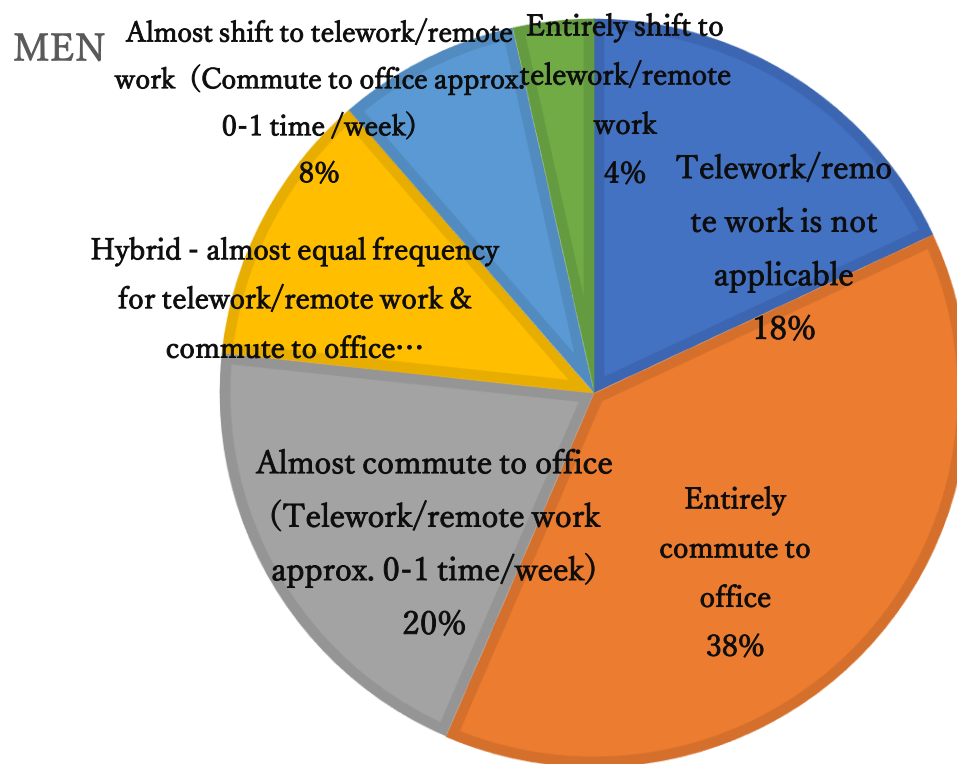


Figure 3-1 Working style of respondent (Male): Q29-30 “Choose one for the closet answer to reflect your working style after the pandemic” “Choose one for the closet answer to reflect your spouse's working style after the pandemic”

## WOMEN

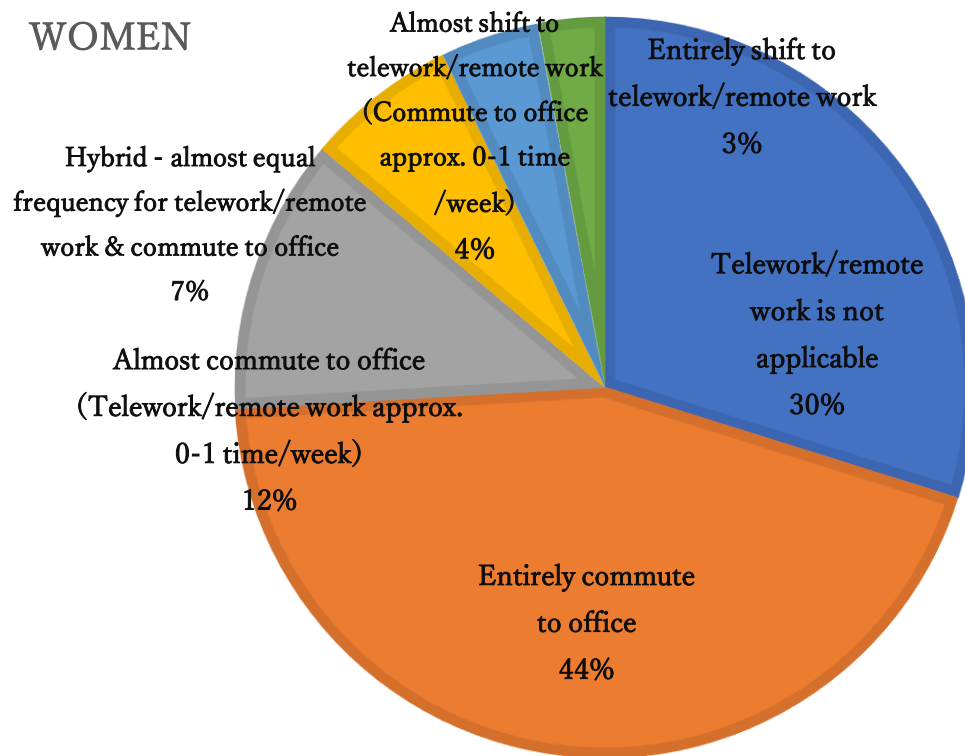


Figure 3-2 Working style of respondent (Female): Q29-30



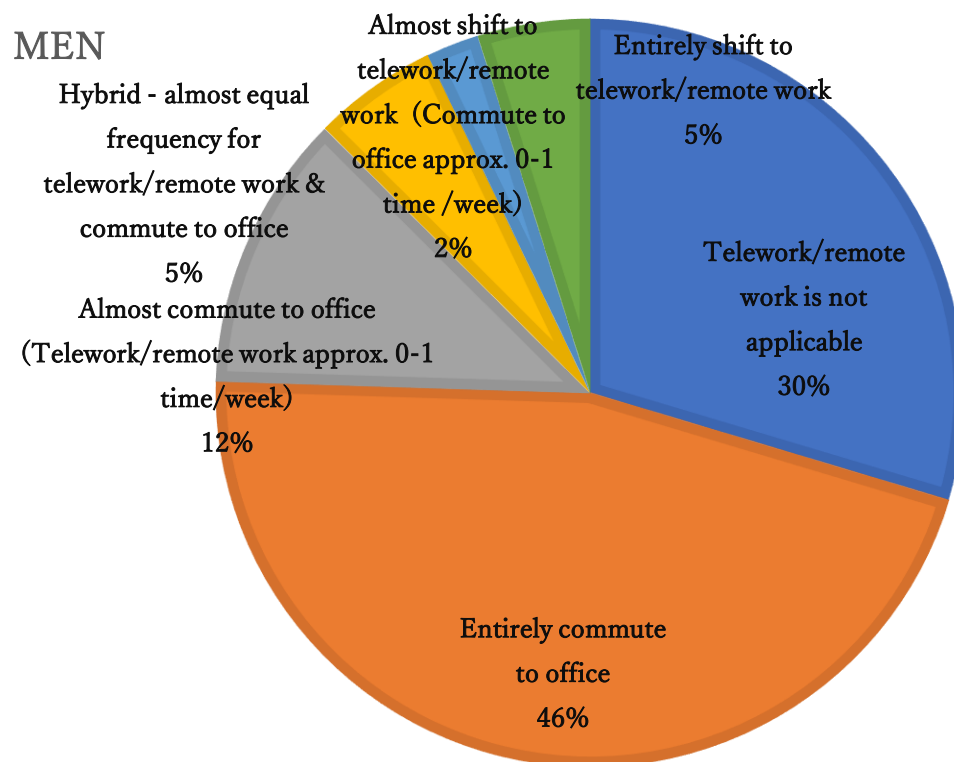


Figure 3-3 Working style of spouse of female respondent: Q29-30

## WOMEN

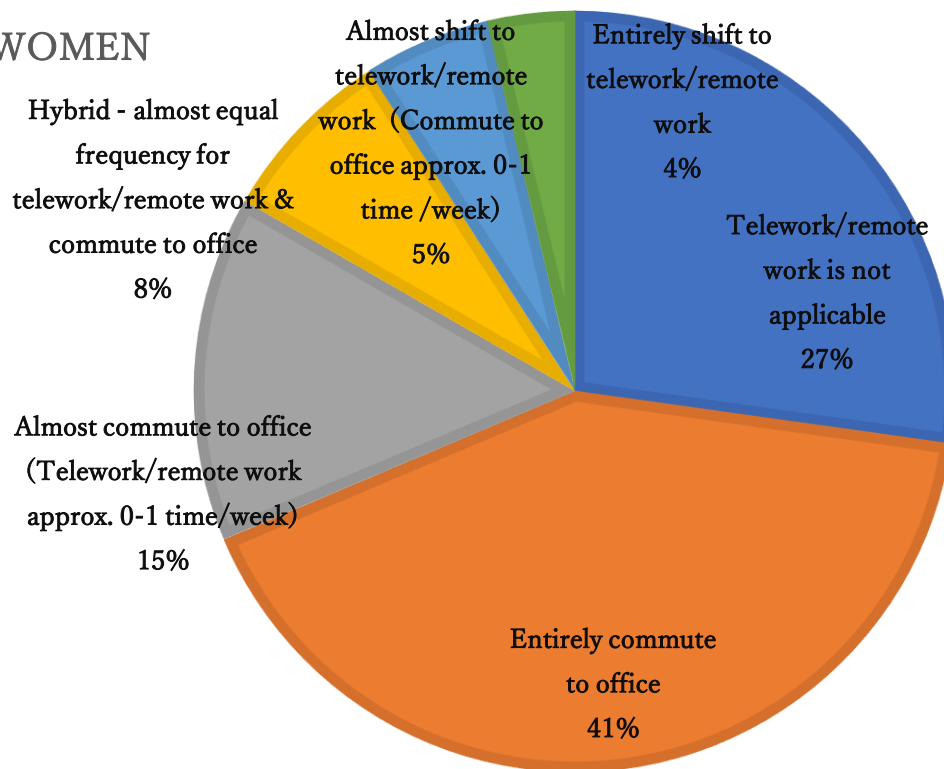


Figure 3-4 Working style of spouse of male respondent: Q29-30

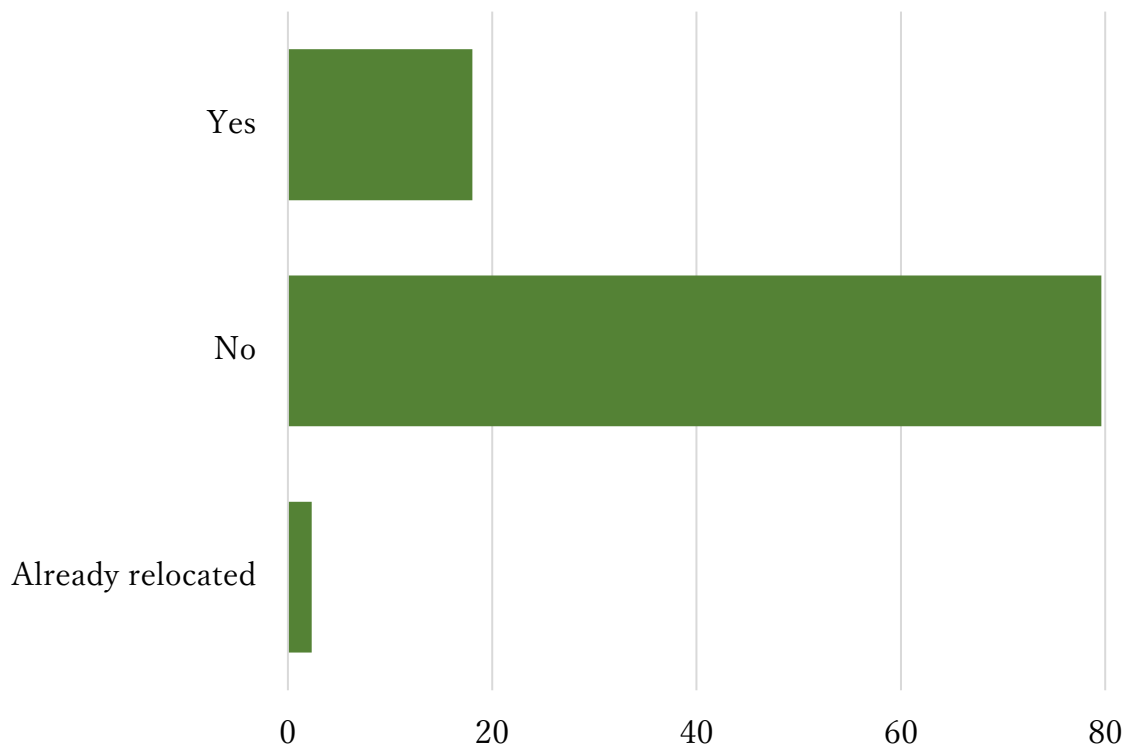


Figure 3-5 Result of Q31 “(Please answer this question if you marked 1-4 in Q.29) Do you consider relocation due to implementation of telework/remote work ?”

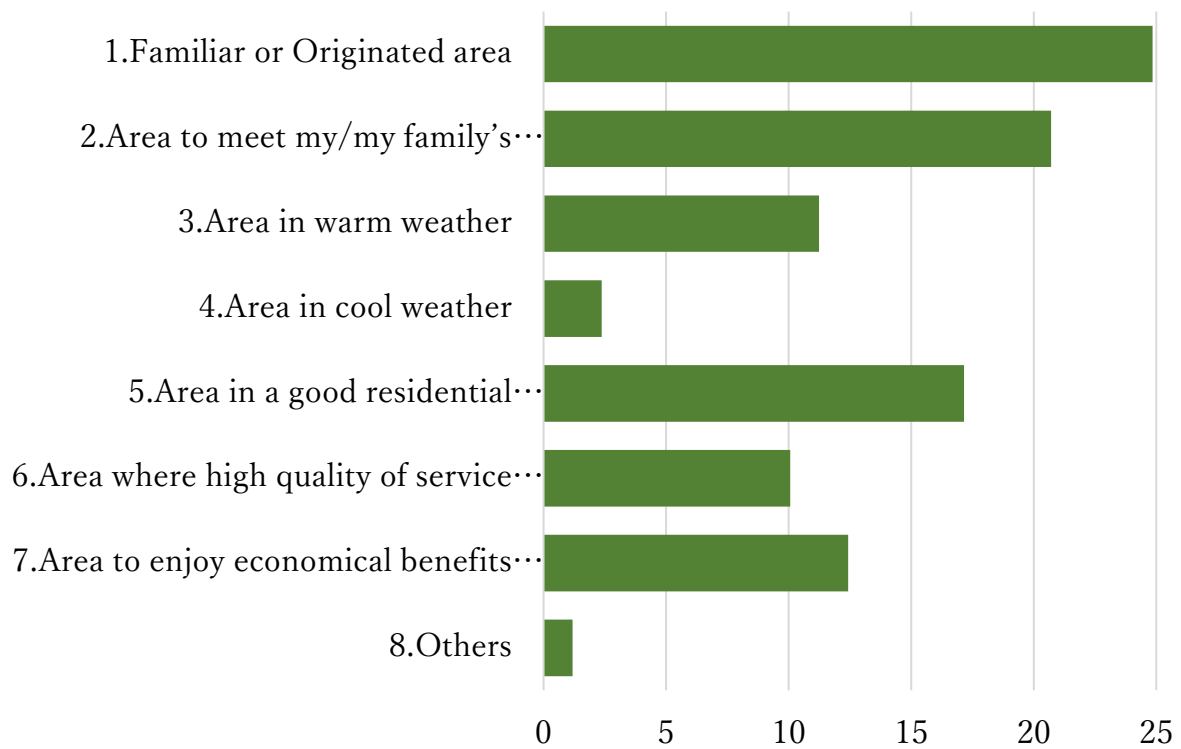


Figure 3-6 Result of Q32 “(Please answer this question if you marked 1 or 3 in Q.31) Choose the closest answers (up to 3) to identify the images to show your place of relocation”

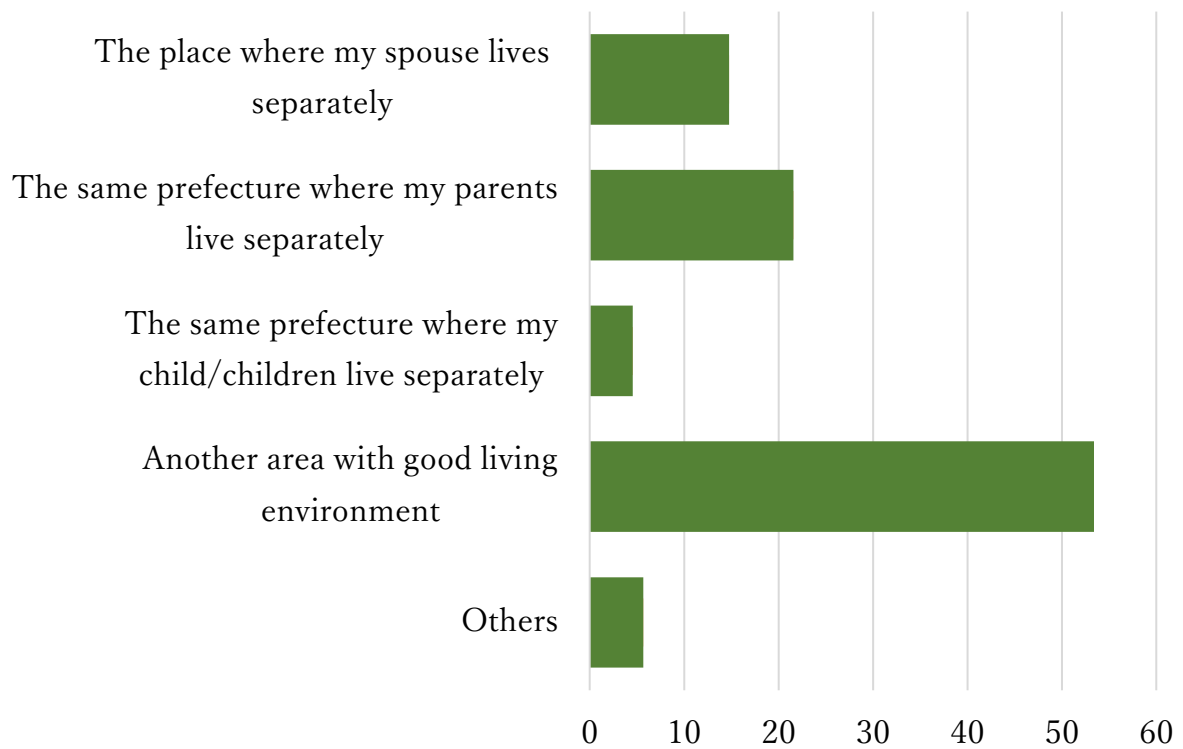


Figure 3-7 Result of Q33 “(Please answer this question if you marked 1 or 3 in Q.31) .Choose the closest answers (up to 3) to identify the images to show your place of relocation “

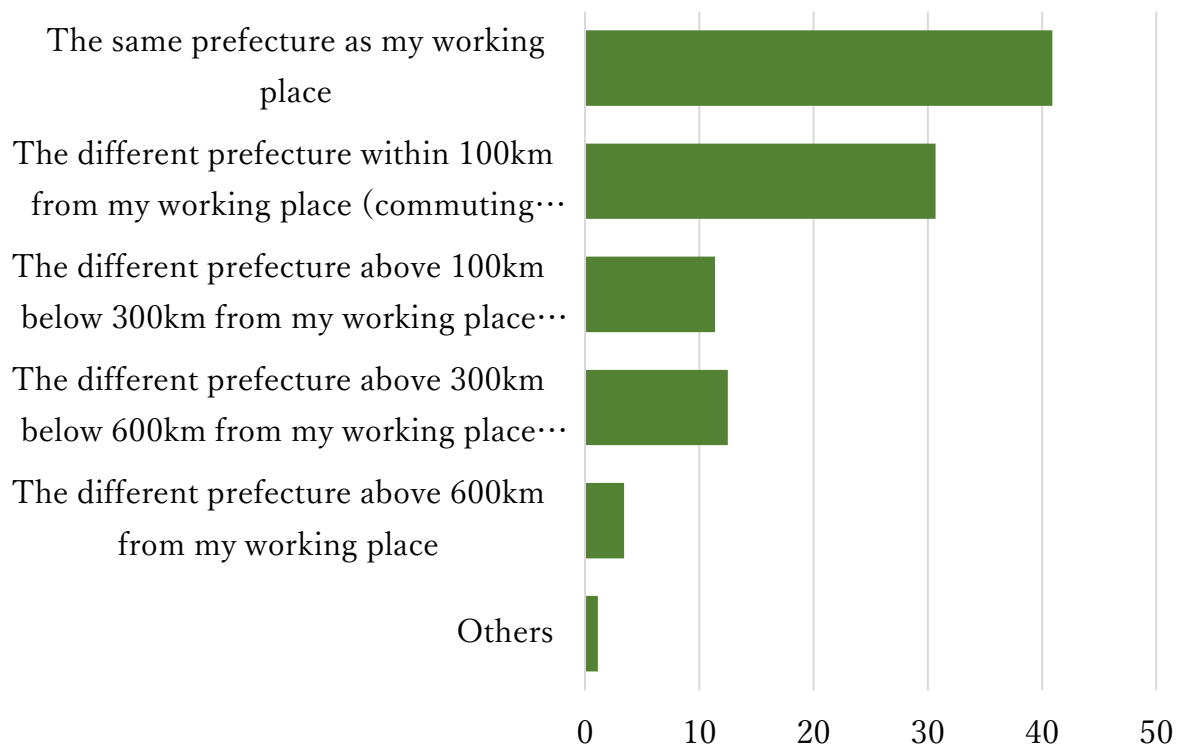


Figure 3-8 Result of Q34 “Choose the closest answers (up to 3) to identify the images to show your place of relocation “

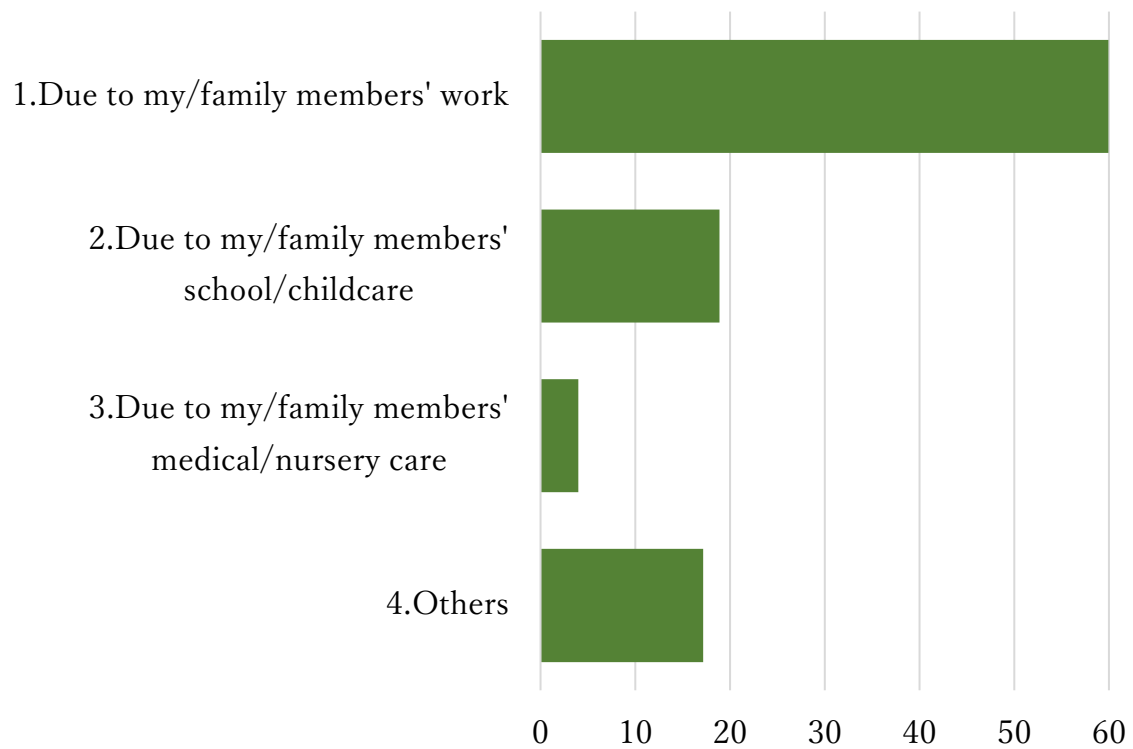


Figure 3-9 Result of Q35 “(Please answer this question if you marked 2 in Q.31)Please identify the reasons “

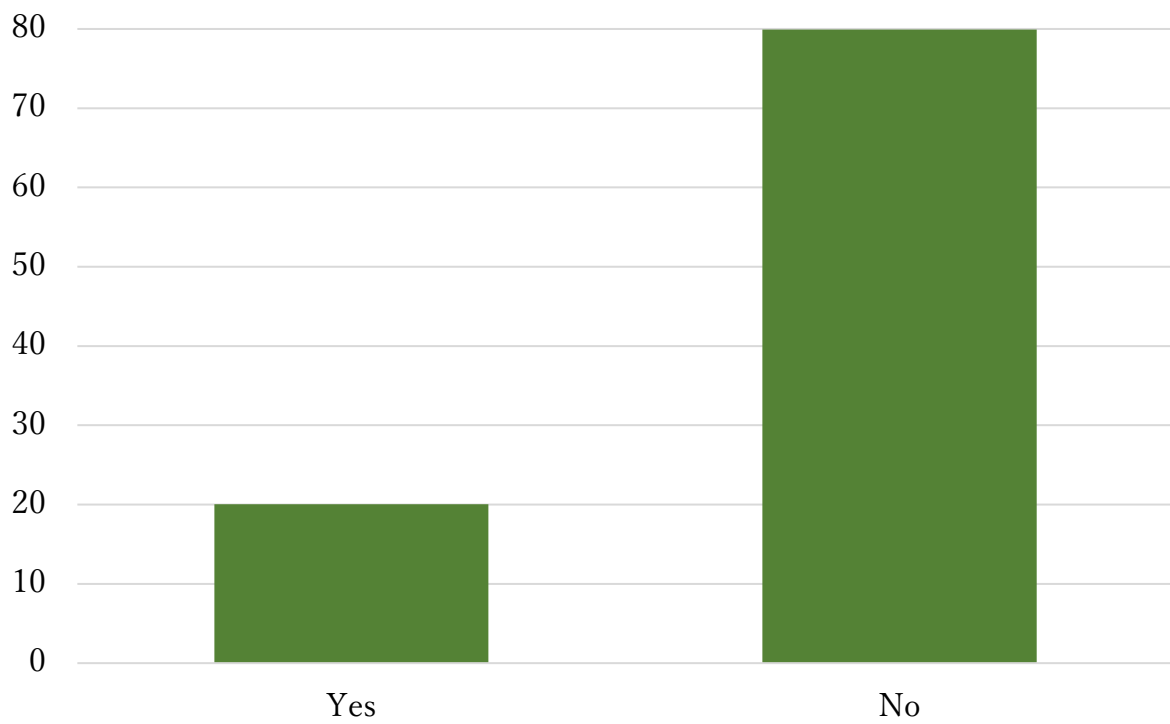


Figure 3-10 Result of Q36 “Do you consider the relocation if you had no restrictions (ie. Job, School, Childcare, Medical care, Nursing)”



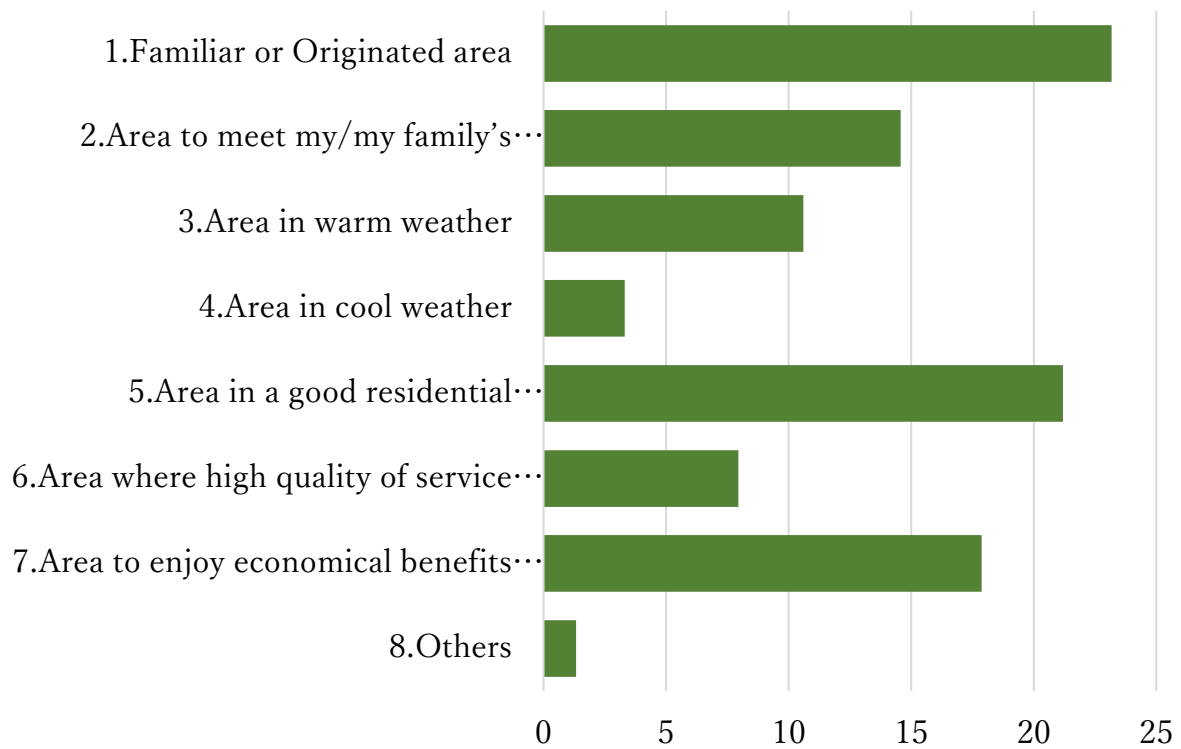


Figure 3-11 Result of Q37 “(Please answer this question if you marked 1 in Q.36) Choose the closest answers (up to 3) to identify the images to show your place of relocation”

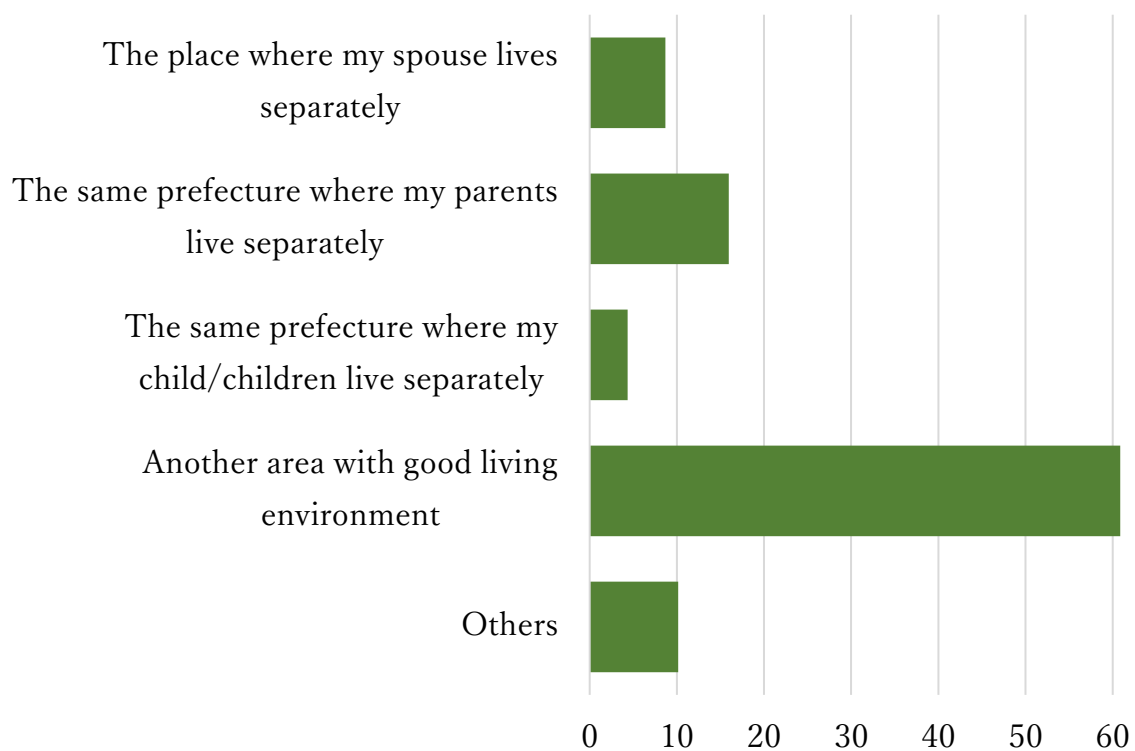


Figure 3-12 Result of Q38 “(Please answer this question if you marked 1 or 3 in Q.31) .Choose the closest answers (up to 3) to identify the images to show your place of relocation “

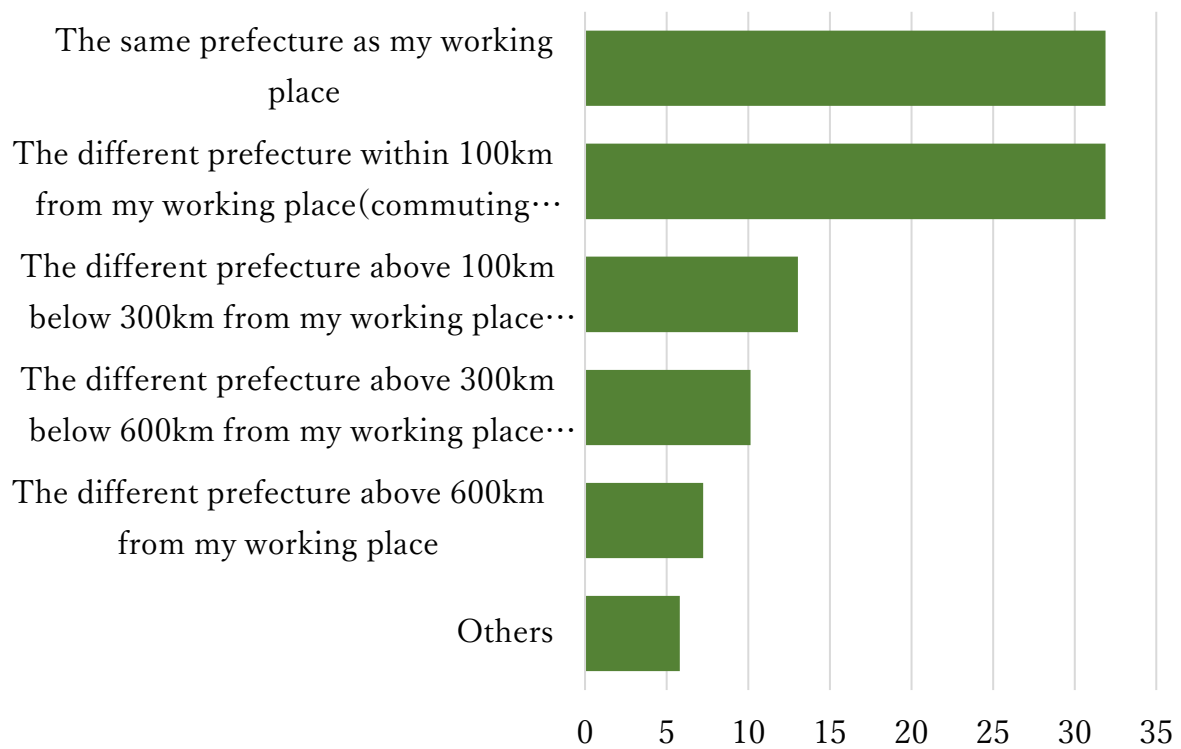


Figure 3-13 Result of Q39 “Choose the closest answers (up to 3) to identify the images to show your place of relocation “

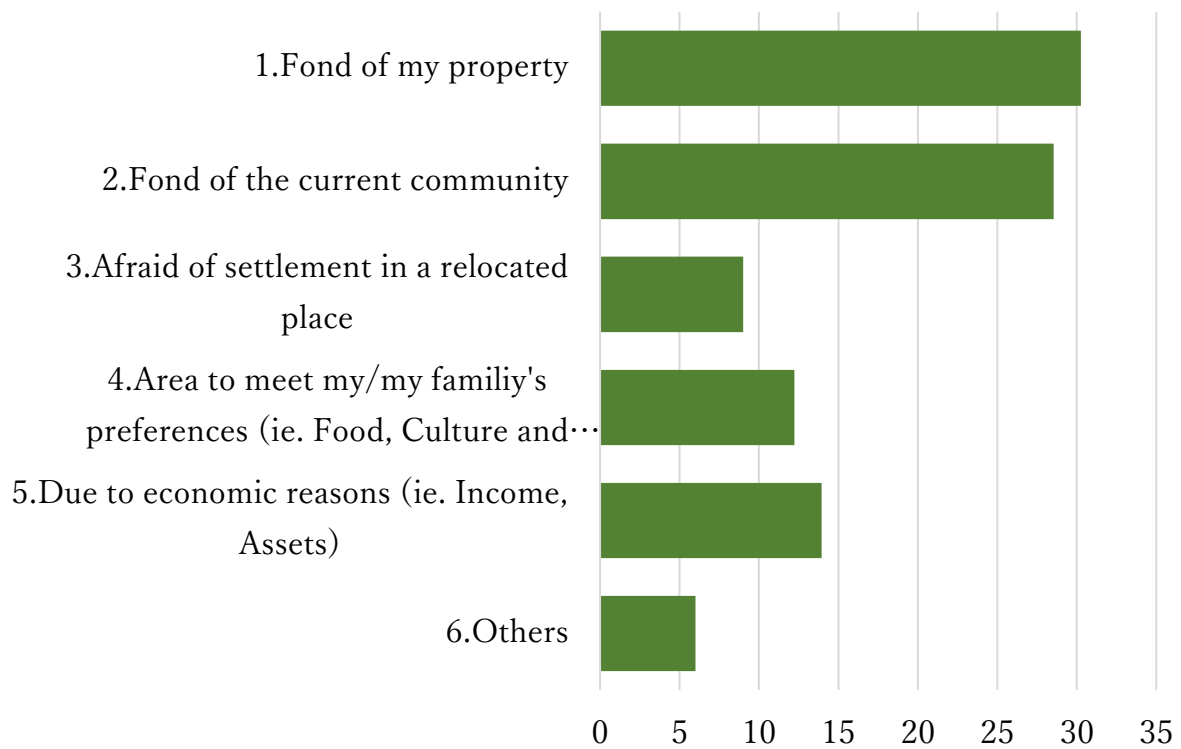


Figure 3-14 Result of Q40 “(Please answer this question if you marked 1 in Q.36) Please identify the reasons.”

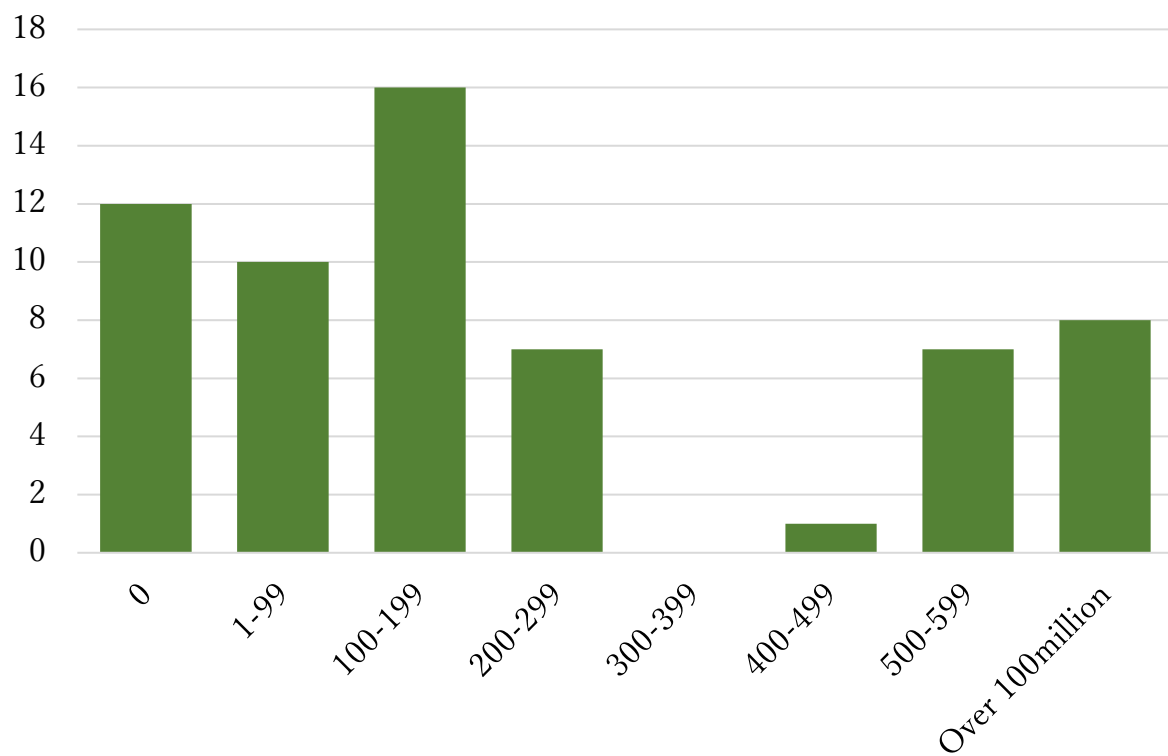


Figure 3-15 Public subsidy of cash payment at the time of relocation: Q41 “Which kind of public subsidies will drive you to consider relocation?”

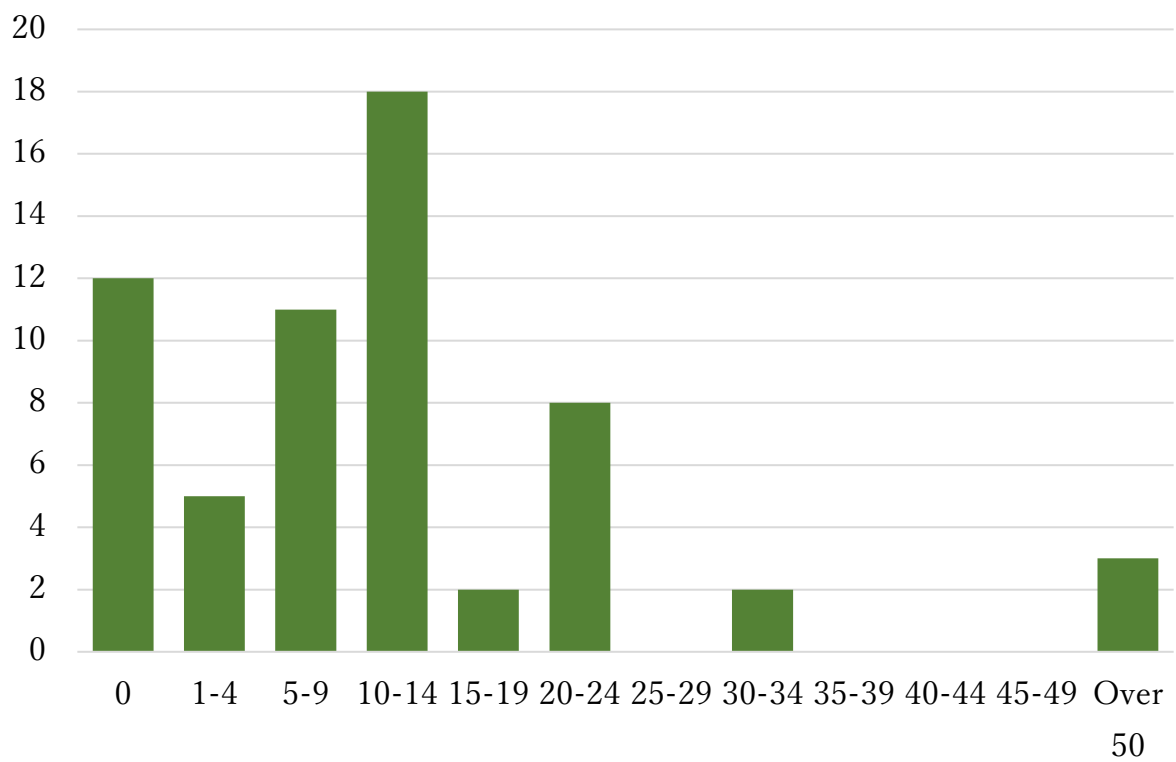


Figure 3-16 Public subsidy of cash payment after the settlement (Amount): Q41

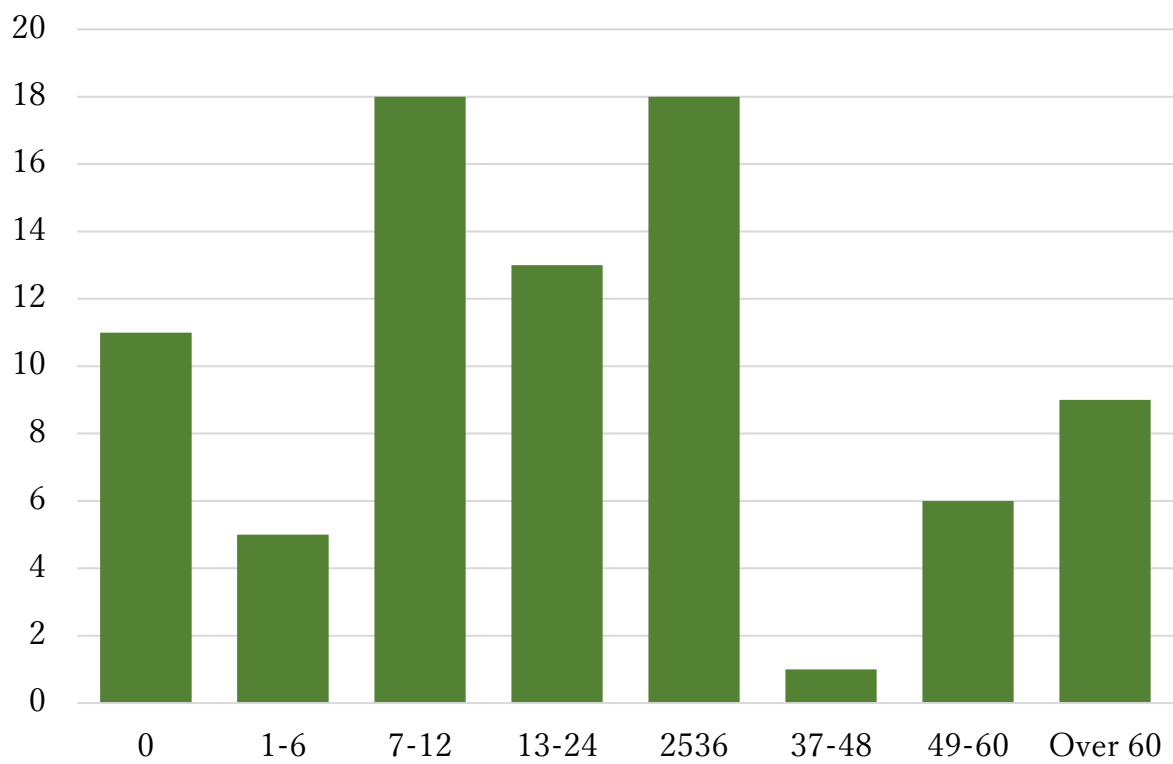


Figure 3-17 Public subsidy of cash payment after the settlement (Duration): Q41

Table 1

Questionnaire

**1. Section of screening**

1. Sex

2. Age

3. Place of Residence

Hokkaido
Aomori
Iwate
Miyagi
Akita
Yamagata
Fukushima
Ibaraki
Tochigi
Gunma
Saitama
Chiba
Tokyo
Kanagawa
Niigata
Toyama
Ishikawa
Fukui
Yamanashi
Nagano
Gifu
Shizuoka
Aichi



Mie
Shiga
Kyoto
Osaka
Hyogo
Nara
Wakayama
Tottori
Shimane
Okayama
Hiroshima
Yamaguchi
Tokushima
Kagawa
Ehime
Kochi
Fukuoka
Saga
Nagasaki
Kumamoto
Oita
Miyazaki
Kagoshima
Okinawa
Overseas

4. Did you use a regular operation flight after January 1, 2018 ?(Either or both domestic/international)

Yes
-----

No
Not sure

## 2. Section of questionnaire

Q1. Number of people living or staying together to share household expense (Including yourself)\_  
person(s)

Q2 . Total annual household income (Approximately)

Less than JPY 2.5M
JPY 2.5M – 5M
JPY 5M – 7.5M
JPY 7.5M – 10M
JPY 10M – 12.5M
JPY 12.5M – 15M
JPY 15M – 17.5M
JPY 17.5M – 20M
20M -

Q3. Tenure of dwelling

Owned houses
Owned apartment
Rented house owned by private company
Housing for company employee and civil servant
Rented houses owned by the urban renaissance agency and housing corporations
Rented rooms and others

Q4. Place of your residence

City
Ward
Town
Village

Q5. Breakdown of your household to share living expenses

Before school age: __person(s)
Elementary/Junior-high school student: __person(s)
High school student: __person(s)
Your or your spouse's father/mother to require assistance or care: __person(s)

Q6. Do you have spouse, children or parents (includes spouse's parents) living in another place?

Yes
No

Q7-1. Identify your family members living in another place. (Nominate maximum 6 persons - Based on frequency of interaction)

	Spouse	Children	Parents (Including your spouse's parents)	Nobody to live in another place
1 <sup>st</sup> person				
2 <sup>nd</sup> person				
3 <sup>rd</sup> person				
4 <sup>th</sup> person				
5 <sup>th</sup> person				
6 <sup>th</sup> person				

Q7-2. Identify the place of residence and reason to live in another place (Nominate maximum 6 persons - Based on frequency of interaction)

	Hokkaido	Aomori	.....	Okinawa	Overseas
1 <sup>st</sup> person					
2 <sup>nd</sup> person					
3 <sup>rd</sup> person					
4 <sup>th</sup> person					
5 <sup>th</sup> person					

6 <sup>th</sup> person					
------------------------	--	--	--	--	--

Q8.Marital status (Includes Common Law couple)

Married or Have spouse/partner
Never Married
Widowed
Divorced

Q9.Highest level of education completed

Junior high school
High school
Vocational school
College
University-undergraduate level
University-graduate school
Others

Q10. Identify the closest answer to show your working status

(Holding Paid Job) Primary engaged in a paid job
(Holding Paid Job) Primary engaged in a housework, occasionally engaged in a paid job
(Holding Paid Job) Primary attending school, occasionally engaged in a paid job
(Holding Paid Job) Others
(No Paid Job) Dedicate to housework
(No Paid Job) Dedicate to studying
(No Paid Job) Others

Q11. Principal place of your work

Hokkaido
Aomori
Iwate
Miyagi
Akita

Yamagata
Fukushima
Ibaraki
Tochigi
Gunma
Saitama
Chiba
Tokyo
Kanagawa
Niigata
Toyama
Ishikawa
Fukui
Yamanashi
Nagano
Gifu
Shizuoka
Aichi
Mie
Shiga
Kyoto
Osaka
Hyogo
Nara
Wakayama
Tottori
Shimane
Okayama
Hiroshima

Yamaguchi
Tokushima
Kagawa
Ehime
Kochi
Fukuoka
Saga
Nagasaki
Kumamoto
Oita
Miyazaki
Kagoshima
Okinawa
Overseas

Q12. Identify the closest answer to show the category of your occupation

Administrative /Managerial
Professional/Engineering
Clerical
Sales
Services
Security
Agriculture/Forestry/Fishery
Manufacturing/Processing
Vehicle/machine operation
Construction/Mining
Delivery, cleaning, packaging etc..
Miscellaneous

Q13.Occupational Status

Permanent employee in private company/institution
---

Executive member in private company/institution
Public servant
Part-time job
Contracted/Temporary employee
Self-Employed (With paid staff)
Self-Employed (Without paid staff)
家族従業者（自家営業の手伝い） Staff of Family business
Others

Q14. Working status of your spouse

(Holding Paid Job) Primary engaged in a paid job
(Holding Paid Job) Primary engaged in a housework, occasionally engaged in a paid job
(Holding Paid Job) Primary attending school, occasionally engaged in a paid job
(Holding Paid Job) Others
(No Paid Job) Dedicate to housework
(No Paid Job) Dedicate to studying
(No Paid Job) Others

Q15. Principal place of your spouse's work

Hokkaido
Aomori
Iwate
Miyagi
Akita
Yamagata
Fukushima
Ibaraki
Tochigi
Gunma

Saitama
Chiba
Tokyo
Kanagawa
Niigata
Toyama
Ishikawa
Fukui
Yamanashi
Nagano
Gifu
Shizuoka
Aichi
Mie
Shiga
Kyoto
Osaka
Hyogo
Nara
Wakayama
Tottori
Shimane
Okayama
Hiroshima
Yamaguchi
Tokushima
Kagawa
Ehime
Kochi



Fukuoka
Saga
Nagasaki
Kumamoto
Oita
Miyazaki
Kagoshima
Okinawa
Overseas

Q16. Category of occupation of your spouse

Administrative /Managerial
Professional/Engineering
Clerical
Sales
Services
Security
Agriculture/Forestry/Fishery
Manufacturing/Processing
Vehicle/machine operation
Construction/Mining
Delivery, cleaning, packaging etc..
Miscellaneous

Q17.Occupational Status of your spouse

Permanent employee in private company/institution
Executive member in private company/institution
Public servant
Part-time job
Contracted/Temporary employee

Self-Employed (With paid staff)
Self-Employed (Without paid staff)
Staff of Family business
Others

Q18. Approximately how many times did you use domestic flights in 2019 ? (Count one time for one round trip)

\_\_\_Times

Q19. Regarding the above number of usage, approximately how many times did you use domestic flights for business purpose?

\_\_\_Times

Q20. Regarding the above number of usage, approximately how many times did you use domestic flights for leisure purpose ?

\_\_\_Times

Q21. Regarding the above number of usage, approximately how many times did you use domestic flights for visiting friends/relatives purpose ?

\_\_\_Times

Q22. After the pandemic of COVID-19, approximately how many times will you use domestic flights per one year ? (Count one time for one round trip)

Note: "After the pandemic" indicates the situation which there would be a certain number of patients but vaccination has been almost completed nationwide and medical methodologies are put in place. No subsidy for promoting consumption in the service industry.

\_\_\_Times

Q23. Regarding the above number of usage, approximately how many times will you use domestic flights for business purpose ?

\_\_\_Times

Q24. Regarding the above number of usage, approximately how many times will you use domestic flights for leisure purpose ?

\_\_\_Times

Q25. Regarding the above number of usage, approximately how many times will you use domestic flights for visiting friends/relatives purpose ?

\_\_\_Times

Q26. For the respondent who is likely to fly less for business purpose, please tell us the reason

	strongly disagree	partially disagree	neutral	partially agree	strongly agree
1. Even after the pandemic, I would be sensitive for the infectious risk by using flights					
2. Even after the pandemic, I might put my family into the infectious risk by using flights					
3. Even after the pandemic, I would have less travel budget for business comparing to Before-Pandemic					
4. Even after the pandemic, I am afraid that my business partners/customers might be sensitive for the infectious risk by using flights					
5. I would use other travel modes					
6. I would use digital/online communication tools					

Q27. For the respondent who is likely to fly less for leisure purpose, please tell us the reason

	strongly disagree	partially disagree	neutral	partially agree	strongly agree
1. Even after the pandemic, I would be sensitive for the infectious risk by using flights					
2. Even after the pandemic, I might put my family into the infectious risk by using flights					
3. Even after the pandemic, I would be sensitive for the various social disadvantages (ie. Isolation or discrimination from community, Unemployment)					

4. It is hard to travel for leisure by financial difficulties caused by the pandemic					
5. I am less interested in leisure travel comparing to Before-Pandemic					
6. I would use other travel modes					
7. I would shift to online/virtual travel experience					

Q28. For the respondent who is likely to fly less for visiting friends/relatives purpose, please tell us the reason

	strongly disagree	partially disagree	neutral	partially agree	strongly agree
1. Even after the pandemic, I would be sensitive for the infectious risk by using flights					
2. Even after the pandemic, I might put my family into the infectious risk by using flights					
3. Even after the pandemic, I would be sensitive for the various social disadvantages (ie. Isolation or discrimination from community, Unemployment)					
4. It is hard to travel for leisure by financial difficulties caused by the pandemic					
5. I am less interested in leisure travel comparing to Before-Pandemic					
6. I would use other travel modes					

Q29. Choose one for the closet answer to reflect your working style after the pandemic

Entirely shift to telework/remote work
Almost shift to telework/remote work (Commute to office approx. 0-1 time /week)

Hybrid - almost equal frequency for telework/remote work & commute to office
Almost commute to office (Telework/remote work approx. 0-1 time/week)
Entirely commute to office
Telework/remote work is not applicable

Q30. Choose one for the closet answer to reflect your spouse's working style after the pandemic

Entirely shift to telework/remote work
Almost shift to telework/remote work (Commute to office approx. 0-1 time /week)
Hybrid - almost equal frequency for telework/remote work & commute to office
Almost commute to office (Telework/remote work approx. 0-1 time/week)
Entirely commute to office
Telework/remote work is not applicable

Q31.(Please answer this question if you marked 1-4 in Q.29) Do you consider relocation due to implementation of telework/remote work ?

Yes
No
Already relocated

Q32.(Please answer this question if you marked 1 or 3 in Q.31) Choose the closest answers (up to 3) to identify the images to show your place of relocation

Familiar or Originated area
Area to meet my/my family's preferences (ie. Food, Culture and Sport)
Area in warm weather
Area in cool weather
Area in a good residential environment

Area where high quality of service for education, childcare, medical care and nursery provided
Area to enjoy economical benefits (ie. Low living cost)
Others

Q33.(Please answer this question if you marked 1 or 3 in Q.31) .Choose the closest answers (up to 3) to identify the images to show your place of relocation

The place where my spouse lives separately
The same prefecture where my parents live separately
The same prefecture where my child/children live separately
Another area with good living environment
Others

Q34.Choose the closest answers (up to 3) to identify the images to show your place of relocation

The same prefecture as my working place
The different prefecture within 100km from my working place (commuting time = approx. 2hrs)
The different prefecture above 100km below 300km from my working place (commuting time = approx. 1-2hrs by Shinkansen)
The different prefecture above 300km below 600km from my working place (commuting time = approx. 2-4hrs by Shinkansen)
The different prefecture above 600km from my working place
その他 Others

Q35.(Please answer this question if you marked 2 in Q.31)Please identify the reasons

Due to my/family members' work
Due to my/family members' school/childcare
Due to my/family members' medical/nursery care

Others
--------

Q36. Do you consider the relocation if you had no restrictions (ie. Job, School, Childcare, Medical care, Nursing)

Yes
No

Q37. (Please answer this question if you marked 1 in Q.36) Choose the closest answers (up to 3) to identify the images to show your place of relocation

Familiar or Originated area
Area to meet my/my family's preferences (ie. Food, Culture and Sport)
Area in warm weather
Area in cool weather
Area in a good residential environment
Area where high quality of service for education, childcare, medical care and nursery provided
Area to enjoy economical benefits (ie. Low living cost)
Others

Q38. Same as Q.33

The place where my spouse lives separately
The same prefecture where my parents live separately
The same prefecture where my child/children live separately
Another area with good living environment
Others

Q39. Same as Q.34

The same prefecture as my working place
The different prefecture within 100km from my working place (commuting time = approx. 2hrs)

The different prefecture above 100km below 300km from my working place (commuting time = approx. 1-2hrs by Shinkansen)
The different prefecture above 300km below 600km from my working place (commuting time = approx. 2-4hrs by Shinkansen)
The different prefecture above 600km from my working place
Others

Q40. (Please answer this question if you marked 1 in Q.36) Please identify the reasons.

Fond of my property
Fond of the current community
Afraid of settlement in a relocated place
Area to meet my/my family's preferences (ie. Food, Culture and Sport)
Due to economic reasons (ie. Income, Assets)
Others

Q41. Which kind of public subsidies will drive you to consider relocation?

Cash payment at the time of relocation (Non-recurring)
Cash payment after the settlement - Amount xxx Yen/Month
Cash payment after the settlement - Duration xxx/Month

Q42. How do you define "the end of pandemic" ? (Choose all situations to meet the criteria)

The number of infectious cases is under control, such as a situation that medical service is not constrained
Almost zero infections case
Medicines/Remedies are available as same as a seasonal flu



The rate of completion of vaccination is approx. 50%
The rate of completion of vaccination is approx. 70%
The rate of completion of vaccination is approx. 90%
No restrictions for commercial activities
Wearing mask is not requested
Social distance is not requested
No restrictions for Crowded places
No restrictions for Close contacts
No restrictions for Confined spaces
Others
None of above

"Q43. There are two ways of thinking or behavior for risk as the following proverbs,

(1) "Nothing ventured, nothing gained." (2) "A wise man keeps away from danger".

How do you evaluate yourself based on the following conditions? : Mark 1 if you completely agree with (1) and mark 5 if you completely agree with (2). "

5	4	3	2	1
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Q44. Are you afraid of the symptoms of COVID-19 (ie. Death, Aftereffects) ?

Strongly disagree
Partially disagree
Neither disagree nor agree
Partially agree
Strongly agree

Q45. Are you afraid of the social disadvantages caused by infection of COVID-19 (ie. unemployment, decrease of income, isolation from community) ?

Strongly disagree
Partially disagree

Neither disagree nor agree
Partially agree
Strongly agree

Q46. Please choose the closest answer to express your recognition for usage of flight before the pandemic of COVID-19?

	strongly disagree	disagree	neutral	partially agree	strongly agree
1. Were you generally afraid of safety when using flights?	23.4	39.6	14.8	18.0	4.2
2. Were you afraid of infectious diseases on using flights?	33.1	30.9	16.3	15.2	4.6
3. Were you afraid of social disadvantages (ie. Unemployment, decrease of income, isolation from community) ?	39.4	28.2	19.4	9.8	3.2

Q47. Please choose the closest answer to express your recognition for usage of flight under the pandemic of COVID-19?

	strongly disagree	disagree	neutral	partially agree	strongly agree
1. Are you generally afraid of safety when using flights?	12.3	27.5	19.0	29.6	11.6
2. Are you afraid of infectious diseases on using flights?	7.8	23.1	17.1	36.8	15.3
3. Are you afraid of social disadvantages (ie. Unemployment, decrease of income, isolation from community) ?	12.0	24.1	25.8	26.1	12.0

Q48. Please choose the closest answer to express your recognition for usage of flight after the pandemic of COVID-19? "The end of pandemic" means the situation that there would be a certain number of infections, however vaccination is generally available and preventive measures / remedies are established.)

	strongly disagree	disagree	neutral	partially agree	strongl y agree
1. Will you be generally afraid of safety when using flights?	19.5	37.8	20.4	18.9	3.4
2. Will you be afraid of infectious diseases on using flights?	18.4	35.0	23.6	19.6	3.4
3. Will you be afraid of social disadvantages (ie. Unemployment, decrease of income, isolation from community) ?	22.9	33.6	26.4	13.8	3.2

Table 2 Estimated population to prefer relocation by region

	Prefer to relocate/ All sample	Willing to move over 300km/ All sample	Willing to move over 300km/ Prefer to relocate	Population over age 18	Estimated population to prefer relocation	Estimated population to move over 300km	All sample
	(A) %	(B) %	(C) %	(D) k	(E)=(A)*(D) k	(F)=(B)*(D) k	(G) obs.
Hokkaido Tohoku	2.82	0.56	20.00	11970.8	338.2	67.6	177
Kanto	7.75	1.62	20.93	37551.3	2909.4	608.9	555
*Metropolitan Tokyo	9.46	2.70	28.57	12181.0	1152.3	329.2	222
Chubu	3.46	0.35	10.00	19489.3	674.4	67.4	289
Kansai	5.36	1.15	21.43	17562.7	942.1	201.9	261
Chugoku Shikoku	0.71	0.00	0.00	9348.7	66.8	0.0	140
Kyushu Okinawa	2.81	0.00	0.00	11960.8	336.0	0.0	178
Total	4.88	0.88	17.95	107883.6	5259.3	944.0	1600

Table 3 Estimation of potential air demand created by relocation

	Potential air demand by relocation	Ratio
	(X) k/year	(Y)=((X)/44326)*100 %
Hokkaido Tohoku	1623.2	3.7
Kanto	14614.6	33.0
*Metropolitan Tokyo	7901.2	17.8
Chubu	1618.5	3.7
Kansai	4844.9	10.9
Chugoku Shikoku	0.0	0.0
Kyushu Okinawa	0.0	0.0
Total	22655.6	51.1