Table S1. Structure of the questionnaire.

| Questions | Options | Answer type |
|---|---|---|
| Sex | | single-answer |
| | Male | |
| | Female | |
| Age | | number-completion |
| Marriage | | single-answer |
| | Not married (including divorced or bereaved) | |
| | married | |
| Have children | | single-answer |
| | Yes | |
| | No | |
| Family income | | single-answer |
| | Less than 2 million yen | |
| | 2–4 million yen | |
| | 4–6 million yen | |
| | 6–8 million yen | |
| | 8–10 million yen | |
| | 10–12 million yen | |
| | 12–15 million yen | |
| | 15–20 million yen | |
| | More than 20 million yen | |
| | Do not know | |
| Private income | | single-answer |
| | Less than 2 million yen | |
| | 2–4 million yen | |
| | 4–6 million yen | |
| | 6–8 million yen | |
| | 8–10 million yen | |
| | 10–12 million yen | |
| | 12–15 million yen | |
| | 15–20 million yen | |
| | More than 20 million yen | |
| | Do not know | |
| Occupation | | single-answer |
| | Unemployed | |
| | Part-time job | |
| | Housewife (househusband) | |
| | Company employee (other) | |
| | Company employee (clerical) | |
| | Self-employed | |
| | Company employee (technical) | |
| | Free Business | |
| | Student | |
| | Other (free text) | |
| | Civil servants | |
| | Manager/Officer | |
| Student category | | single-answer |
| | Vocational school student | |

|  |  |  |
|---|---|---|
|  | Junior college student | |
|  | College student | |
|  | Graduate student | |
|  | Others | |
| Number of COVID-19 vaccination | | single-answer |
|  | 0 | |
|  | 1 | |
|  | 2 | |
|  | 3 | |
|  | 4 | |
|  | more than 5 | |
| Reasons for declining COVID-19 vaccination | | |
| Busy. | Likert scale | single-answer |
| Convenience to the venue is not good. | Likert scale | single-answer |
| Booking is troublesome. | Likert scale | single-answer |
| COVID-19 infection does not cause severe illness. | Likert scale | single-answer |
| No infection with COVID-19. | Likert scale | single-answer |
| Vaccine ineffectiveness. | Likert scale | single-answer |
| Already infected with COVID-19. | Likert scale | single-answer |
| Other infection control measures. | Likert scale | single-answer |
| Concerns about adverse reactions. | Likert scale | single-answer |
| Concerns about vaccine safety. | Likert scale | single-answer |
| Concerns about long-term effects of the vaccine. | Likert scale | single-answer |
| Pregnant and worried about the impact on the fetus. | Likert scale | single-answer |
| Concerns about impact on pre-existing medical conditions. | Likert scale | single-answer |
| There is distrust of vaccine development and regulators. | Likert scale | single-answer |
| Information from the government cannot be trusted. | Likert scale | single-answer |
| Distrust of healthcare in general. | Likert scale | single-answer |
| Few people around me have been infected with the COVID-19. | Likert scale | single-answer |
| Few people around me are vaccinated. | Likert scale | single-answer |
| People around me experienced severe adverse reactions. | Likert scale | single-answer |
| My doctor told me. | Likert scale | single-answer |
| Religious reason. | Likert scale | single-answer |
| Comorbidity | | multiple-answer |
|  | Hypertension | |
|  | Diabetes mellitus | |
|  | Bronchial asthma | |
|  | Anaphylactic shock | |
|  | Psychiatric disorders | |
|  | Gout | |
|  | Lipid disorders | |
|  | Rheumatoid arthritis | |
|  | Respiratory diseases | |
|  | Cardiovascular diseases | |

|  | Allergic diseases | |
|  | Immunodeficiency diseases | |
|  | Malignant tumors | |
|  | Thyroid diseases | |
|  | Liver disease | |
|  | Kidney disease | |
|  | Others | free-text answer |
|  | None | |
| Influenza vaccination after 2019. | | single-answer |
|  | Yes | |
|  | None | |
| Infected with SARS-CoV-2 | | single-answer |
|  | Yes | |
|  | No | |
| Symptoms after SARS-CoV-2 infection. | | multiple-answer |
|  | No symptoms | |
|  | fever | |
|  | Cough | |
|  | Sore throat | |
|  | Headache | |
|  | Joint and muscle pain | |
|  | Taste or smell disorders | |
|  | diarrhea | |
|  | Lethargy | |
|  | Breathlessness | |
|  | Inability to speak, move or consciousness disorders | |
|  | Skin rashes | |
|  | Eye irritation or pain | |
|  | Chest pain | |
|  | Other | free-text answer |
| COVID-19 conspiracy beliefs | | |
| Big pharma is encouraging the spread of COVID-19 to make money | | single-answer |
|  | Yes | |
|  | No | |
| COVID-19 was developed by the government as part of a bioweapons program. | | single-answer |
|  | Yes | |
|  | No | |
| 5G is causing the COVID-19 | | single-answer |
|  | Yes | |
|  | No | |
| The COVID-19 is a myth to force vaccinations on people | | single-answer |
|  | Yes | |
|  | No | |
| There is no such thing as the COVID-19 | | single-answer |
|  | Yes | |

|  | No |  |
| --- | --- | --- |
| Trusted sources |  |  |
| Facebook | Likert scale | single-answer |
| Twitter | Likert scale | single-answer |
| Instagram | Likert scale | single-answer |
| YouTube | Likert scale | single-answer |
| Government | Likert scale | single-answer |
| Public health center | Likert scale | single-answer |
| Television | Likert scale | single-answer |
| Newspaper | Likert scale | single-answer |
| Weekly magazine | Likert scale | single-answer |
| Primary care physician | Likert scale | single-answer |
| Healthcare professional | Likert scale | single-answer |
| Pharmaceutical company | Likert scale | single-answer |
| Friend | Likert scale | single-answer |
| Family | Likert scale | single-answer |
| Others (free text) | Likert scale | single-answer |
| What information do you want to know about COVID-19 vaccine? |  | multiple-answer |
|  | Adverse Reactions |  |
|  | Safety |  |
|  | Efficacy |  |
|  | Genetic Effects |  |
|  | Cost |  |
|  | Future COVID-19 vaccination schedule |  |
|  | None in particular |  |
| Disadvantages of not vaccinated |  | multiple-answer |
|  | Discriminated against for not vaccinating |  |
|  | Forced to vaccinate |  |
|  | I was fired from my job |  |
|  | Infected with SARS-CoV-2 |  |
|  | Other | free-text answer |
|  | None in particular |  |

The Likert scale options were as follows: 1, not at all applicable; 2, not very much; 3, cannot say either way; 4, somewhat true; and 5, very applicable.

Table S2. Tabulation of reasons for declining COVID-19 vaccination

| | Very applicable | Somewhat true | Cannot say either way | Not very much | Not at all applicable |
|---|---|---|---|---|---|
| Busy. | 20 (7.6) | 30 (11.5) | 77 (29.4) | 33 (12.6) | 102 (38.9) |
| Convenience to the venue is not good. | 21 (8.0) | 22 (8.4) | 86 (32.8) | 39 (14.9) | 94 (35.9) |
| Booking is troublesome. | 43 (16.4) | 41 (15.6) | 67 (25.6) | 34 (13) | 77 (29.4) |
| COVID-19 infection does not cause severe illness. | 26 (9.9) | 42 (16) | 101 (38.5) | 33 (12.6) | 60 (22.9) |
| No infection with COVID-19. | 14 (5.3) | 15 (5.7) | 107 (40.8) | 33 (12.6) | 93 (35.5) |
| Vaccine ineffectiveness. | 58 (22.1) | 33 (12.6) | 104 (39.7) | 34 (13) | 33 (12.6) |
| Already infected with COVID-19. | 37 (14.1) | 17 (6.5) | 39 (14.9) | 13 (5) | 156 (59.5) |
| Other infection control measures. | 34 (13) | 51 (19.5) | 74 (28.2) | 26 (9.9) | 77 (29.4) |
| Concerns about adverse reactions. | 154 (58.8) | 56 (21.4) | 29 (11.1) | 6 (2.3) | 17 (6.5) |
| Concerns about vaccine safety. | 147 (56.1) | 52 (19.8) | 35 (13.4) | 10 (3.8) | 18 (6.9) |
| Concerns about long-term effects of the vaccine. | 107 (40.8) | 53 (20.2) | 59 (22.5) | 16 (6.1) | 27 (10.3) |
| Pregnant and worried about the impact on the fetus. | 7 (2.7) | 8 (3.1) | 41 (15.6) | 10 (3.8) | 196 (74.8) |
| Concerns about the impact on pre-existing medical conditions. | 34 (13.0) | 34 (13.0) | 59 (22.5) | 38 (14.5) | 97 (37.0) |
| There is distrust of vaccine development and regulators. | 95 (36.3) | 58 (22.1) | 55 (21.0) | 18 (6.9) | 36 (13.7) |
| Information from the government cannot be trusted. | 88 (33.6) | 58 (22.1) | 65 (24.8) | 20 (7.6) | 31 (11.8) |
| Distrust of healthcare in general. | 41 (15.6) | 57 (21.8) | 81 (30.9) | 35 (13.4) | 48 (18.3) |
| Few people around me have been infected with the COVID-19. | 32 (12.2) | 56 (21.4) | 69 (26.3) | 53 (20.2) | 52 (19.8) |
| Few people around me are vaccinated. | 15 (5.7) | 20 (7.6) | 83 (31.7) | 61 (23.3) | 83 (31.7) |
| People around me experienced severe adverse reactions. | 40 (15.3) | 47 (17.9) | 59 (22.5) | 35 (13.4) | 81 (30.9) |
| My doctor told me. | 8 (3.1) | 8 (3.1) | 48 (18.3) | 20 (7.6) | 178 (67.9) |
| Religious reason. | 3 (1.1) | 1 (0.4) | 34 (13) | 19 (7.3) | 205 (78.2) |

Table S3. Tabulation of media that the participants trust

| | Very applicable | Somewhat true | Cannot say either way | Not very much | Not at all applicable |
|---|---|---|---|---|---|
| Facebook | 4 (1.5) | 13 (5.0) | 74 (28.2) | 32 (12.2) | 139 (53.1) |
| Twitter | 16 (6.1) | 38 (14.5) | 73 (27.9) | 37 (14.1) | 98 (37.4) |
| Instagram | 8 (3.1) | 17 (6.5) | 82 (31.3) | 34 (13.0) | 121 (46.2) |
| YouTube | 21 (8.0) | 37 (14.1) | 85 (32.4) | 30 (11.5) | 89 (34.0) |
| Government | 10 (3.8) | 32 (12.2) | 91 (34.7) | 36 (13.7) | 93 (35.5) |
| Public health center | 8 (3.1) | 46 (17.6) | 94 (35.9) | 30 (11.5) | 84 (32.1) |
| Television | 22 (8.4) | 43 (16.4) | 70 (26.7) | 40 (15.3) | 87 (33.2) |
| Newspaper | 12 (4.6) | 28 (10.7) | 80 (30.5) | 44 (16.8) | 98 (37.4) |
| Weekly magazine | 2 (0.8) | 14 (5.3) | 77 (29.4) | 48 (18.3) | 121 (46.2) |
| Primary care physician | 9 (3.4) | 48 (18.3) | 94 (35.9) | 28 (10.7) | 83 (31.7) |
| Healthcare professional | 11 (4.2) | 51 (19.5) | 94 (35.9) | 23 (8.8) | 83 (31.7) |
| Pharmaceutical company | 3 (1.1) | 21 (8.0) | 95 (36.3) | 39 (14.9) | 104 (39.7) |
| Friend | 15 (5.7) | 43 (16.4) | 108 (41.2) | 30 (11.5) | 66 (25.2) |
| Family | 23 (8.8) | 51 (19.5) | 93 (35.5) | 31 (11.8) | 64 (24.4) |
| Others | 21 (8.0) | 6 (2.3) | 46 (17.6) | 5 (1.9) | 184 (70.2) |

Table S4 Basic characteristics of participants by clusters

| Cluster (N) Variable (n (%)) | 1 (28) | 2 (85) | 3 (149) | Univariable p-value |
|---|---|---|---|---|
| Female | 6 (21.4) | 50 (58.8) | 70 (47.0) | **0.002** |
| Age (mean [SD]) | 42.5 [13.9] | 50.5 [13.5] | 47.6 [15.9] | **0.046** |
| Marriage | 11 (39.3) | 40 (47.1) | 57 (38.3) | 0.41 |
| Have Children | 10 (35.7) | 47 (55.3) | 61 (40.9) | **0.012** |
| Family income | | | | **0.039** |
|     Less than 2 million yen | 1 (3.6) | 9 (10.6) | 29 (19.5) | |
|     2–4 million yen | 5 (17.9) | 25 (29.4) | 31 (20.8) | |
|     4–6 million yen | 7 (25.0) | 15 (17.6) | 31 (20.8) | |
|     6–8 million yen | 4 (14.3) | 6 (7.1) | 15 (10.1) | |
|     8–10 million yen | 3 (10.7) | 6 (7.1) | 9 (6.0) | |
|     10–12 million yen | 0 (0.0) | 4 (4.7) | 2 (1.3) | |
|     12–15 million yen | 1 (3.6) | 2 (2.4) | 2 (1.3) | |
|     15–20 million yen | 0 (0.0) | 0 (0.0) | 1 (0.7) | |
|     More than 20 million yen | 0 (0.0) | 1 (1.2) | 0 (0.0) | |
|     Do not know | 6 (21.4) | 17 (20.0) | 29 (19.5) | |
| Private income | | | | **0.034** |
|     Less than 2 million yen | 8 (28.6) | 35 (41.2) | 69 (46.3) | |
|     2–4 million yen | 4 (14.3) | 23 (27.1) | 33 (22.1) | |
|     4–6 million yen | 8 (28.6) | 7 (8.2) | 14 (9.4) | |
|     6–8 million yen | 1 (3.6) | 2 (2.4) | 5 (3.4) | |
|     8–10 million yen | 0 (0.0) | 3 (3.5) | 5 (3.4) | |
|     10–12 million yen | 0 (0.0) | 0 (0.0) | 1 (0.7) | |
|     12–15 million yen | 0 (0.0) | 0 (0.0) | 0 (0.0) | |
|     15–20 million yen | 0 (0.0) | 1 (1.2) | 0 (0.0) | |
|     More than 20 million yen | 6 (21.4) | 14 (16.5) | 21 (14.1) | |
|     Do not know | | | | |
| Occupation | | | | 0.051 |
|     Civil servants | 0 (0.0) | 1 (1.2) | 2 (1.3) | |
|     Manager/Officer | 0 (0.0) | 2 (2.4) | 1 (0.7) | |
|     Company employee (clerical) | 3 (10.7) | 9 (10.6) | 10 (6.7) | |
|     Company employee (technical) | 5 (17.9) | 2 (2.4) | 12 (8.1) | |
|     Company employee (other) | 2 (7.1) | 12 (14.1) | 22 (14.8) | |
|     Self-employed | 2 (7.1) | 9 (10.6) | 11 (7.4) | |
|     Freelancer | 2 (7.1) | 2 (2.4) | 3 (2.0) | |
|     Housewife (househusband) | 3 (10.7) | 11 (12.9) | 25 (16.8) | |
|     Part-time job | 5 (17.9) | 14 (16.5) | 23 (15.4) | |
|     Student | 0 (0.0) | 0 (0.0) | 6 (4.0) | |
|     Other | 0 (0.0) | 3 (3.5) | 2 (1.3) | |
|     Unemployed | 6 (21.4) | 20 (23.5) | 32 (21.5) | |
| Comorbidity | 4 (14.3) | 27 (31.8) | 53 (35.6) | **0.011** |
| Influenza vaccination after 2019. | 1 (0.4) | 8 (9.4) | 12 (8.1) | **0.002** |
| Infected with SARS-CoV-2 | 6 (21.4) | 25 (29.4) | 36 (24.2) | **0.002** |
| Conspiracy theory | 5 (17.9) | 27 (31.8) | 56 (37.6) | **0.010** |
| Experience Disadvantages of not vaccinated | 2 (7.1) | 16 (18.8) | 20 (13.4) | **0.006** |

We conducted univariable multinominal logistic regression analysis. The significant values are indicated in bold.

According to the exchange rate, as of August 2, 2023, 1 Japanese yen was equal to 0.0070 US dollars.