

Social and Behavioral Factors Associated with Lack of Intent to Receive COVID-19 Vaccine, Japan

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Persons in Japan who did not intend to receive COVID-19 vaccines after widespread rollout were less likely than others to engage in preventive measures or to be afraid of getting infected or infecting others. They were also not less likely to engage in potentially high-risk behaviors, suggesting similar or higher exposure risks.

COVID-19 vaccines have become a critical tool in pandemic control (1). In Japan, BNT162b2 (Pfizer-BioNTech, <https://www.pfizer.com>), mRNA-1273 (Moderna, <https://www.modernatx.com>), and ChAdOx1 nCoV-19 (AZD1222; Oxford/AstraZeneca, <https://www.astrazeneca.com>) have been approved, but use of ChAdOx1 nCoV-19 has been minimal. For the Omicron variant, 2 doses of mRNA vaccines might not be highly protective against symptomatic infection, but early data suggest they are still highly protective against severe disease and that a booster dose provides further protection (2–4). Addressing persons at highest risk for severe or fatal COVID-19 who do not intend to be vaccinated has become paramount as we transition to the endemic phase, which is especially true in Japan because most persons are not protected by natural infection (5). Several studies have addressed reasons behind this hesitancy at the early stage of vaccine rollout (6–9), but evidence on attitudes toward risk for infection and prevention and risk behaviors is scarce.

We retrospectively analyzed an online survey about life during the COVID-19 pandemic conducted by a marketing research company in Japan during November 26–28, 2021, after the vaccine rollout had stabilized and 70% of the population had received 2 doses. The total number of survey participants was 2,500 (250 participants for each sex and 10-year age group, 20–60 years of age) (Appendix, <https://wwwnc.cdc.gov/EID/article/28/9/22-0300-App1.pdf>). We

extracted sociodemographic information, vaccination status (choices included vaccinated once, vaccinated twice, unvaccinated with intention to be vaccinated, unvaccinated without intention to be vaccinated, and prefer not to answer), attitudes toward COVID-19-related issues (e.g., whether participants were afraid of getting infected), and behaviors in the previous week (e.g., preventive measures such as mask-wearing and potentially high-risk behaviors such as visiting bars or restaurants) (10). For vaccination status, we categorized the first 3 options into vaccinated or intend to be vaccinated and the last 2 choices into no intention to be vaccinated, because persons who preferred not to answer likely did not intend to be vaccinated but were unwilling to disclose this information. Depending on the social or behavioral factor, we adjusted for potential confounders that were determined a priori (6–9). This study was reviewed and exempt from ethics approval by the Institutional Review Board of the National Institute of Infectious Diseases, Japan.

Overall, 2,069 (82.8%) participants had received 2 doses, 35 (1.4%) had received 1 dose, 95 (3.8%) were not vaccinated but intended to be, 203 (8.1%) had no intention of being vaccinated, and 98 (3.9%) preferred not to answer. By age group, proportions of vaccinated persons were similar to those in the general population of Japan (Appendix). The proportions of participants residing in each geographic region were also similar to the national distribution (Appendix). Compared with men 60–69 years of age, men 20–39 years of age, as well as women 20–40 years of age, were ≥ 2 -fold more likely to have no intention of being vaccinated (Appendix Table 1). Persons who did not intend to be vaccinated were less likely to be afraid of getting infected (adjusted odds ratio [aOR] 2.32, 95% CI 1.53–3.53), family members getting infected (aOR 2.50, 95% CI 1.68–3.71), infecting others (aOR 2.58, 95% CI 1.73–3.84), and bed shortages caused by a surge in severe COVID-19 cases (aOR 1.89, 95% CI 1.25–2.87). Persons who did not intend to be vaccinated also did not plan to receive a third (booster) dose, but 74% of persons who had received or intended to receive vaccines also intended to receive a booster dose. Persons without intention to be vaccinated were more likely to report not wearing a mask (aOR 2.01, 95% CI 1.52–2.65) and not using hand sanitizer (aOR 1.90, 95% CI 1.47–2.47) in the previous week. These persons were less likely to have gone shopping for nonessential goods in the past week (aOR 0.70, 95% CI 0.51–0.97), but no association was seen between vaccination intent and refraining from meeting with others (aOR

1.20, 95% CI 0.87–1.65) or going to crowded places or traveling (aOR 1.11, 95% CI 0.83–1.47). We also saw no association between vaccination intent and meeting noncohabitating friends, acquaintances, or family members (aOR 0.73, 0.47–1.12); dining out (aOR 0.92, 0.65–1.30); going out socially (aOR 0.87, 0.59–1.27); traveling (aOR 0.51, 0.22–1.22); or going to a gym (aOR 1.08, 0.64–1.83). We obtained similar results when we excluded persons who preferred not to answer regarding their vaccination status.

Persons who did not intend to receive COVID-19 vaccines were less likely to engage in preventive measures or be afraid of getting infected or infecting others, but we observed no association between vaccine intention and engaging in potentially high-risk behaviors. These results suggest that these nonintenders have similar or higher exposure risks compared with vaccinees and intenders. Similar surveys might be considered in other countries to understand vaccine denial and inform policies and risk communication.

Limitations of our study include selection bias and recall bias. Social desirability bias might be an issue, but this survey about life during the pandemic was not administered as an assessment about COVID-19 vaccination intent.

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Appendix

Survey Background

The participants in the nationwide survey were those who voluntarily registered to be a panel member of a marketing research company. As of January 2022, the company had ≈5.41 million active panel members who have responded to ≥ 1 questionnaire in the past year (4.3% of 126.15 million population in Japan). In exchange for responding to questionnaires, panel members receive points that can be exchanged for products and services from partner companies.

The survey was conducted exclusively in Japanese. Although foreigners are an important consideration when formulating vaccination policy, they comprise only 2.2% (2.75 million out of 126.15 million) of the total population in Japan (1). The survey participants came from all 47 prefectures of Japan.

Comparison of Survey Participants and General Population of Japan

Since the survey was conducted on a voluntary basis, there was concern that the survey participants could differ from the general population of Japan. Therefore, we compared the survey participants and the general population for (1) proportion of persons vaccinated twice by age group and (2) geographic region of residence, in an attempt to evaluate the generalizability of our findings.

Data on the proportion of vaccinated persons in the general population by age group were only available for the date of accessing the data (i.e., February 14, 2022), but the national proportion of persons vaccinated twice has remained similar (73.0% on November 26, 2021, compared to 74.4% on February 14, 2022) (2). The proportion of individuals vaccinated twice among the survey participants was similar to the national distribution (Appendix Table 2). The proportions of participants residing in each geographic region were also similar to national proportions (Appendix Table 3).

Appendix Table 1. Association between lack of intention to receive COVID-19 vaccination and various social and behavioral factors based on a questionnaire conducted in late November 2021, Japan

Category	No intention to be vaccinated (n = 301)	Vaccinated or intend to be vaccinated (n = 2,199)	Crude odds ratio (95% CI)	Adjusted odds ratio (95% CI)
Age group, years/sex				
60–69/Male	16 (5.3)	234 (10.6)	1	-
50–59/Male	23 (7.6)	227 (10.3)	1.48 (0.76–2.88)	-
40–49/Male	27 (9.0)	223 (10.1)	1.77 (0.93–3.37)	-
30–39/Male	44 (14.6)	206 (9.4)	3.12 (1.71–5.70)	-
20–29/Male	43 (14.3)	207 (9.4)	3.04 (1.66–5.56)	-
60–69/Female	23 (7.6)	227 (10.3)	1.48 (0.76–2.88)	-

Category	No intention to be vaccinated (n = 301)	Vaccinated or intend to be vaccinated (n = 2,199)	Crude odds ratio (95% CI)	Adjusted odds ratio (95% CI)
50–59/Female	20 (6.6)	230 (10.5)	1.27 (0.64–2.52)	-
40–49/Female	36 (12.0)	214 (9.7)	2.46 (1.33–4.56)	-
30–39/Female	31 (10.3)	219 (10.0)	2.07 (1.10–3.89)	-
20–29/Female	38 (12.6)	212 (9.6)	2.62 (1.42–4.84)	-
Region of residence				
Hokkaido/Tohoku	36 (12.0)	259 (11.8)	1	-
Kanto	97 (32.2)	848 (38.6)	0.82 (0.55–1.24)	-
Chubu	60 (19.9)	347 (15.8)	1.24 (0.80–1.94)	-
Kinki	56 (18.6)	416 (18.9)	0.97 (0.62–1.51)	-
Chugoku/Shikoku	20 (6.6)	162 (7.4)	0.89 (0.50–1.59)	-
Kyushu	32 (10.6)	167 (7.6)	1.38 (0.82–2.31)	-
Marital status*				
Married, divorced, or widowed	130 (43.2)	1,353 (61.5)	1	1
Never married	171 (56.8)	846 (38.5)	2.10 (1.65–2.68)	1.85 (1.40–2.44)
Presence of children*				
Yes	84 (27.9)	1,036 (47.1)	1	1
No	217 (72.1)	1,163 (52.9)	2.30 (1.77–3.00)	2.01 (1.51–2.68)
Presence of cohabitants*				
Yes	203 (67.4)	1,730 (78.7)	1	1
No	98 (32.6)	469 (21.3)	1.78 (1.37–2.31)	1.66 (1.26–2.17)
Household income, Japanese Yen*				
4–10 million	60 (19.9)	832 (37.8)	1	1
>10 million	17 (5.7)	189 (8.6)	1.25 (0.71–2.19)	1.40 (0.79–2.48)
3–4 million	27 (9.0)	212 (9.6)	1.77 (1.09–2.85)	1.76 (1.08–2.86)
<3 million	80 (26.6)	406 (18.5)	2.73 (1.92–3.90)	2.90 (2.01–4.18)
Prefer not to answer	117 (38.9)	560 (25.5)	2.90 (2.08–4.03)	3.15 (2.24–4.41)
Occupation type*				
Business person (general)	71 (23.6)	604 (27.5)	1	1

Category	No intention to be vaccinated (n = 301)	Vaccinated or intend to be vaccinated (n = 2,199)	Crude odds ratio (95% CI)	Adjusted odds ratio (95% CI)
Business person (management)	5 (1.7)	143 (6.5)	0.30 (0.12–0.75)	0.33 (0.13–0.86)
Business person (executive)	5 (1.7)	40 (1.8)	1.06 (0.41–2.78)	1.45 (0.54–3.87)
Staff at public office or nonprofit organization, teacher	10 (3.3)	106 (4.8)	0.80 (0.40–1.61)	0.83 (0.41–1.68)
Contract worker	28 (9.3)	125 (5.7)	1.91 (1.18–3.07)	2.41 (1.47–3.95)
Self-employed (industry/commercial)	9 (3.0)	66 (3.0)	1.16 (0.55–2.43)	1.54 (0.72–3.29)
Self-employed (small office/home office)	3 (1.0)	8 (0.4)	3.19 (0.83–12.3)	4.15 (1.03–16.7)
Agriculture, forestry, fishery	1 (0.3)	9 (0.4)	0.95 (0.12–7.57)	1.19 (0.14–9.95)
Specialist (lawyer, healthcare worker)	6 (2.0)	72 (3.3)	0.71 (0.30–1.69)	0.77 (0.32–1.85)
Part-time employee	46 (15.3)	331 (15.1)	1.18 (0.80–1.75)	1.41 (0.92–2.16)
Homemaker	33 (11.0)	322 (14.6)	0.87 (0.56–1.35)	1.18 (0.72–1.94)
Student	17 (5.7)	78 (3.6)	1.85 (1.04–3.31)	1.61 (0.86–3.03)
Unemployed/retired	55 (18.3)	243 (11.1)	1.93 (1.31–2.82)	2.76 (1.83–4.16)
Other occupation	12 (4.0)	52 (2.4)	1.96 (1.00–3.85)	2.23 (1.12–4.42)
Being afraid of getting infected†				
Slightly to very afraid	263 (87.4)	2,082 (94.7)	1	1
Not at all	38 (12.6)	117 (5.3)	2.57 (1.74–3.79)	2.32 (1.53–3.53)
Being afraid of family members getting infected‡				
Slightly to very afraid	258 (85.7)	2,083 (94.7)	1	1
Not at all	43 (14.3)	116 (5.3)	2.99 (2.06–4.35)	2.50 (1.68–3.71)
Being afraid of infecting others†				
Slightly to very afraid	258 (85.7)	2,076 (94.4)	1	1
Not at all	43 (14.3)	123 (5.6)	2.81 (1.94–4.07)	2.58 (1.73–3.84)
Being afraid of bed shortages due to a surge in severe COVID-19 cases†				
Slightly to very afraid	263 (87.4)	2,077 (94.5)	1	1
Not at all	38 (12.6)	122 (5.6)	2.46 (1.67–3.62)	1.89 (1.25–2.87)

Category	No intention to be vaccinated (n = 301)	Vaccinated or intend to be vaccinated (n = 2,199)	Crude odds ratio (95% CI)	Adjusted odds ratio (95% CI)
Intention to receive COVID-19 booster vaccine (third dose)				
Yes	0 (0.0)	1,688 (76.8)	1	1
No	203 (67.4)	319 (14.5)	N/A	N/A
Prefer not to answer	98 (32.6)	192 (8.7)	N/A	N/A
Mask-wearing in the past week†				
Yes	188 (62.5)	1,759 (80.0)	1	1
No	113 (37.5)	440 (20.0)	2.40 (1.86–3.10)	2.01 (1.52–2.65)
Use of hand sanitizer in the past week†				
Yes	159 (52.8)	1,570 (71.4)	1	1
No	142 (47.2)	629 (28.6)	2.23 (1.75–2.85)	1.90 (1.47–2.47)
Handwashing with soap in the past week†				
Yes	135 (44.9)	1,370 (62.3)	1	1
No	166 (55.2)	829 (37.7)	2.03 (1.59–2.59)	1.88 (1.45–2.43)
Refrain from using public transport in the past week§				
Yes	60 (19.9)	457 (20.8)	1	1
No	241 (80.1)	1,742 (79.2)	1.05 (0.78–1.42)	1.05 (0.76–1.43)
Refrain from meeting others (including for work) in the past week†				
Yes	56 (18.6)	508 (23.1)	1	1
No	245 (81.4)	1,691 (76.9)	1.31 (0.97–1.79)	1.20 (0.87–1.65)
Refrain from going to crowded places such as events, traveling, or restaurants/bars in the past week‡				
Yes	78 (25.9)	654 (29.7)	1	1
No	223 (74.1)	1,545 (70.3)	1.21 (0.92–1.59)	1.11 (0.83–1.47)
Teleworking or remote learning in the past week†				
Yes	31 (10.3)	232 (10.6)	1	1
No	270 (89.7)	1,967 (89.5)	1.03 (0.69–1.53)	0.94 (0.61–1.45)
Gathering information about preventive measures against COVID-19 in the past week†				
Yes	55 (18.3)	626 (28.5)	1	1
No	246 (81.7)	1,573 (71.5)	1.78 (1.31–2.42)	1.56 (1.14–2.15)
Going shopping to buy food and essential goods in the past week‡				
No	101 (33.6)	611 (27.8)	1	1

Category	No intention to be vaccinated (n = 301)	Vaccinated or intend to be vaccinated (n = 2,199)	Crude odds ratio (95% CI)	Adjusted odds ratio (95% CI)
Yes	200 (66.5)	1,588 (72.2)	0.76 (0.59–0.98)	0.90 (0.69–1.19)
Going shopping to buy non-essential goods in the past week‡				
No	247 (82.1)	1,646 (74.9)	1	1
Yes	54 (17.9)	553 (25.2)	0.65 (0.48–0.89)	0.70 (0.51–0.97)
Meeting friends, acquaintances, or family members who live separately (noncohabitants) in the past week‡				
No	274 (91.0)	1,932 (87.9)	1	1
Yes	27 (9.0)	267 (12.1)	0.71 (0.47–1.08)	0.73 (0.47–1.12)
Going to work/school in the past week‡				
No	196 (65.1)	1,111 (50.5)	1	1
Yes	105 (34.9)	1,088 (49.5)	0.55 (0.43–0.70)	0.58 (0.43–0.79)
Going out to eat in the past week‡				
No	256 (85.1)	1,801 (81.9)	1	1
Yes	45 (15.0)	398 (18.1)	0.80 (0.57–1.11)	0.92 (0.65–1.30)
Going out socially in the past week‡				
No	264 (87.7)	1,902 (86.5)	1	1
Yes	37 (12.3)	297 (13.5)	0.90 (0.62–1.29)	0.87 (0.59–1.27)
Traveling in the past week‡				
No	295 (98.0)	2,109 (95.9)	1	1
Yes	6 (2.0)	90 (4.1)	0.48 (0.21–1.10)	0.51 (0.22–1.22)
Going to a gym in the past week¶				
No	283 (94.0)	2,071 (94.2)	1	1
Yes	18 (6.0)	128 (5.8)	1.03 (0.62–1.71)	1.08 (0.64–1.83)
Going to yoga in the past week¶				
No	281 (93.4)	2,114 (96.1)	1	1
Yes	20 (6.6)	85 (3.9)	1.77 (1.07–2.93)	1.84 (1.10–3.11)

*Odds ratio adjusted for age group/sex and region.

†Odds ratio adjusted for age group/sex, region, marital status, presence of children, presence of cohabitants, household income, and occupation.

‡Odds ratio adjusted for age group/sex, region, marital status, presence of children, presence of cohabitants, and household income.

§Odds ratio adjusted for age group/sex, region, household income, and occupation.

¶Odds ratio adjusted for age group/sex, region, and household income.

Appendix Table 2. Proportions of individuals vaccinated twice among survey participants and the general population of Japan

Age group, years	Survey participants (%)	General population*
20–29	75.4	79.0
30–39	77.2	79.4
40–49	82.8	83.0
50–59	88.6	90.8
60–69	89.8	89.5

*Based on published data from the Vaccination Record System (2).

Appendix Table 3. Proportions of individuals residing in each geographic region among survey participants and the general population of Japan

Region of residence	Survey participants (%)	General population*
Hokkaido/Tohoku	11.8	10.9
Kanto	37.8	34.6
Chubu	16.3	16.8
Kinki	18.9	17.7
Chugoku/Shikoku	7.3	8.7
Kyushu	8.0	11.3

*Based on data from the 2020 Census (1).

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