Prevalence of and Risk Factors for Post–COVID-19 Condition during Omicron BA.5–Dominant Wave, Japan

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The increased risk for post–COVID-19 condition after the Omicron-dominant wave remains unclear. This population-based study included 25,911 persons in Japan 20–69 years of age with confirmed SARS-CoV-2 infection enrolled in the established registry system during July–August 2022 and 25,911 age- and sex-matched noninfected controls who used a self-reported questionnaire in January–February 2023. We compared prevalence and age- and sex-adjusted odds ratios of persistent COVID-19 symptoms (lasting ≥2 months). We evaluated factors associated with post–COVID-19 condition by comparing cases with and without post–COVID-19 condition. We analyzed 14,710 (8,392 cases and 6,318 controls) of 18,183 respondents. Post–COVID-19 condition proportion among cases was 11.8%, higher by 6.3% than 5.5% persistent symptoms among controls. Female sex, underlying medical conditions, mild to moderate acute COVID-19, and vaccination were associated with post–COVID-19 condition. Approximately 12% had post–COVID-19 condition during the Omicron-dominant wave, indicating the need for longer follow-up.

COVID-19 has caused a significant global disease burden since it was first identified in December 2019; as of May 2024, ≥750 million cases had been confirmed, and ≈7.5 million deaths had occurred worldwide (*1*). In addition to acute illnesses, the prolonged or recurrent symptoms occurring after an initial infection SARS-CoV-2, referred to as post–COVID-19 condition (*2*), have also raised concerns.

More than 65 million persons worldwide have post–COVID-19 condition (*3*). On the basis of estimates of those infected during March 2020–November 2021, a total of 10%–30% of nonhospitalized case-patients and 50%–70% of hospitalized case-patients have had post–COVID-19 condition. Frequently reported symptoms included fatigue, dyspnea, neurocognitive impairment, and loss of smell in patients infected during January 2020–August 2021 (*4*–*8*). The risk of developing post–COVID-19 condition was higher in female patients, those with severe acute COVID-19, or those with a greater number of acute symptoms (*4*,*7*,*9*,*10*). We noted those results in patients infected with variants before the Omicron variant emerged.

The Omicron variant was identified in November 2021; the BA.5 lineage of that variant was detected in April 2022 and has since spread worldwide. The Omicron variant tends to cause less severe acute symptoms (*11*) and has a similar or lower risk for post–COVID-19 condition than the previous variants (*12*–*16*). However, most previous studies concerning post–COVID-19 condition in relation to the Omicron variant, except those that used electronic health record data (*17*), were hospital-based (*13*–*15*,*18*–*21*) or population-based without a control group (*12*,*16*,*22*,*23*). Longer sequelae and risks for post–COVID-19 condition in persons infected with the Omicron variant compared with noninfected populations remain unknown. As the number of COVID-19 cases has increased, with greater infectivity of the Omicron variant (*24*) in addition reductions in nonpharmaceutical interventions (e.g., lockdowns, social distancing, mask requirements), it is crucial to investigate the potential long-term consequences of infection with the Omicron variant. We conducted a population-based study of symptoms after acute COVID-19 using a self-reported questionnaire in a large city in Japan. Our objective was to examine the increased risk for persistent symptoms after SARS-CoV-2 infection

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compared with a noninfected population, focusing specifically on the Omicron variant (especially the BA.5 lineage). We also investigated the factors associated with post–COVID-19 condition.

Methods

Study Design and Participants

We conducted a population-based study of community-dwelling adults 20–69 years of age who had confirmed SARS-CoV-2 infection during July–August 2022. We extracted data from the Japan Health Center Real-time Information-sharing System on COVID-19 (HER-SYS), the established registry system, and age- and sex-matched controls using a self-reported web-based questionnaire in Shinagawa City, a metropolitan area located in the Tokyo area of Japan. The population of Shinagawa City is ≈400,000 and its population density is 17,700 persons/km^2.

Japan experienced the 7th wave of COVID-19 in July 2022, caused by the Omicron subvariant BA.5 lineage. The prevalence of the BA.5 lineage increased from 67% in epidemiologic week 27 (July 7–10, 2022) to 92% in epidemiologic week 30 (July 25–31, 2022), becoming dominant (*25*). When COVID-19 was diagnosed by a positive reverse transcription PCR or a lateral flow antigen test for SARS-CoV-2 or a clinical diagnosis (for symptomatic close contacts), the attending physician was required to document every case in HER-SYS until September 26, 2022. Patients needed to see a physician to undergo a test for SARS-CoV-2 until the Ministry of Health, Labour, and Welfare approved over-the-counter antigen test kits on August 24, 2022. However, most patients visited a physician even after the over-the-counter antigen test kits became available rather than testing themselves at home. Therefore, most of the infected persons were registered in HER-SYS during the study period.

We selected participants registered in the HER-SYS database who were 20–69 years of age and infected with SARS-CoV-2 during July 1–August 31, 2022. We excluded 3,365 of the 29,276 identified infected residents who had died or moved out of the area and selected the remaining 25,911 infected persons as study participants (infected group). We matched data from HER-SYS and the Basic Resident Registration system (the municipal residence record of the name, birthdate, sex, and address of all residents living in a municipality) to identify noninfected residents who had never been registered in the HER-SYS database during the participant selection. We selected 25,911 age- and sex-matched noninfected persons (noninfected group) from the matched dataset (Figure 1). The ethics committee of the National Center for Global Health and Medicine approved this study (NCGM-S-004571).

We sent research information and invitations to the online questionnaire to the selected participants

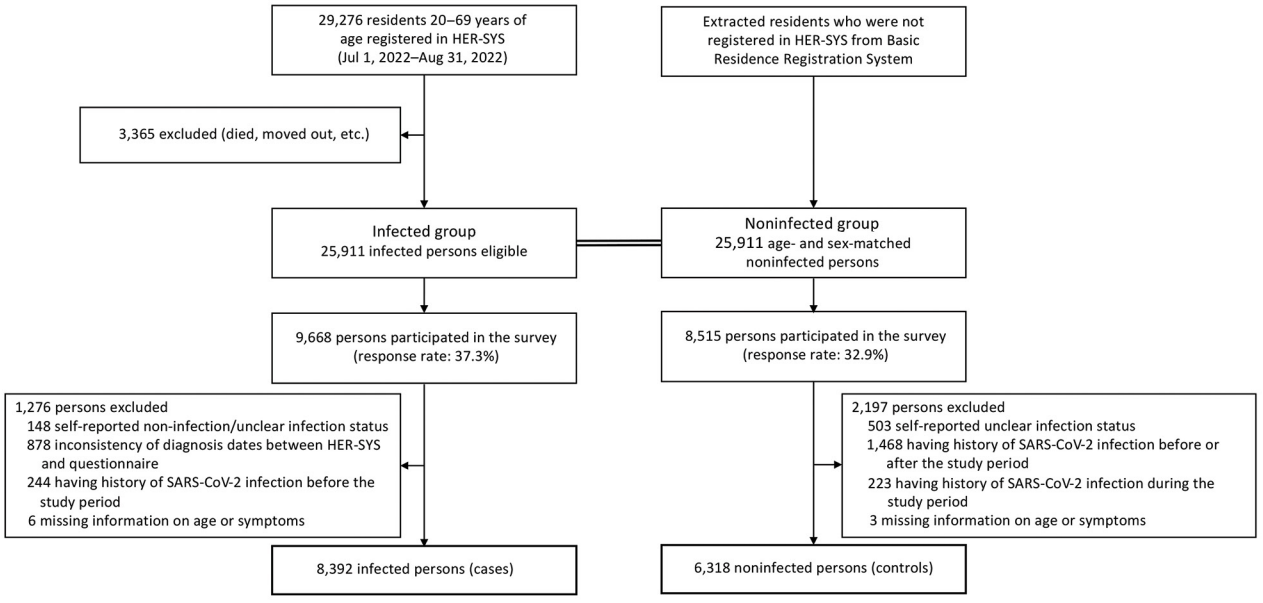

Figure 1. Flowchart of participant selection in study of prevalence and risk factors for post–COVID-19 condition during Omicron BA.5–dominant wave, Japan. Of 29,276 residents 20–69 years of age identified in the municipal HER-SYS database as infected with COVID-19, we selected a total of 25,911 participants; we extracted the same number of age- and sex-matched noninfected residents from the Basic Residence Registration System to serve as the control group. HER-SYS, Health Center Real-time Information-sharing System on COVID-19.

(25,911 each in the infected and noninfected group) by mail on January 11–13, 2023, approximately 6 months after infection for those who had COVID-19 (cases). Respondents were required to provide consent to participate in the study before accessing the website; those who agreed answered the questionnaire by February 13. At the beginning of the questionnaire, we asked participants if they had a diagnosis of COVID-19. If they answered "yes," they were directed to the questions for infected persons, which inquired about the number and date of infection episodes. If they answered "no," "I don't know," or "I prefer not to answer," they were directed to the questions for noninfected persons (Appendix, https://wwwnc.cdc.gov/EID/article/30/7/23-1723-App1.pdf). We included persons whose answers on infection status were consistent with HER-SYS data and whose first infection was within the study period.

Post–COVID-19 Condition (Cases) and Persistent Symptoms (Controls)

We asked the participants about the presence of 26 symptoms that emerged during or after the first SARS-CoV-2 infection for cases and in July 2022 for controls. The symptoms were selected from the International Severe Acute Respiratory and Emerging Infection Consortium COVID-19 questionnaire. Symptoms were fever, cough, fatigue, sore throat, chest pain, anorexia, brain fog, difficulty concentrating, anosmia, ageusia, shortness of breath, hair loss, muscle weakness, palpitations, sleep disorder, rhinorrhea, headache, joint pain and swelling, muscle aches, nausea/vomiting, abdominal pain, skin rash, eye-related symptoms, dizziness, erectile dysfunction (male only), and menstrual change (female only) (*26*). If a symptom was present, we asked about its timing and duration: whether they had the symptom at illness onset or 3 months after infection (infected group only), whether they had it at the time of the survey, and whether the symptom persisted for ≥2 months. For those who affirmed they had any symptoms, we asked the extent to which the symptoms hindered daily life at the time of response using an 11-point scale from 0 (no effect) to 10 (extreme hindrance) and categorized those responses into 4 levels: 0, no effect; 1–3, mild hindrance; 4–6, moderate hindrance; and 7–10, serious hindrance.

For cases, we defined post–COVID-19 condition based on the World Health Organization (WHO) definition (*27*): a symptom that persisted for ≥2 months after the acute phase. For brain fog, difficulty concentrating, hair loss, and muscle weakness, we defined post–COVID-19 condition as symptoms having lasted ≥2 months during the observation period regardless of the timing because those symptoms develop in the subacute phase (*17*,*28*). For controls, we defined persistent symptoms as symptoms lasting ≥2 months experienced between July 2022 and the date of the survey.

Variables

We asked infected persons about the severity of acute COVID-19 and categorized them into 4 groups according to the WHO clinical severity scale: asymptomatic, mild (symptomatic but not admitted to the hospital), moderate (admitted to the hospital, required supplemental oxygen, or both), and severe (received mechanical ventilation or intensive care admission) (*29*). We counted the number of infections because some participants had been infected >1 time during the observation period. We also asked participants about their demographics (i.e., age at the answering date, sex, height, and weight), underlying medical conditions before the infection (or before July 2022 in the noninfected group), lifestyle, and socioeconomic status (e.g., household income and educational level). We calculated equivalized household income by dividing household income by the square root of the household size. For vaccination status, we extracted the vaccination date, vaccination type, and number of vaccinations from the municipality's Vaccination Record System. We substituted the questionnaire responses for missing values for 1,589 (10%) respondents (e.g., those who had moved from the original municipality).

Statistical Analysis

We determined the participants' characteristics according to their infection status and compared using the *t*-test for continuous variables and χ^2 test for categorical variables. We calculated the proportions of overall and each post–COVID-19 condition (cases) and persistent symptoms (controls). Using multivariable logistic regression analysis, we calculated the age- and sex-adjusted odds ratios of each symptom in the cases compared with the persistent symptoms in the controls as a reference. We also investigated the risk factors associated with post–COVID-19 condition among cases using multivariate logistic regression models. Model 1 comprised age group and sex; model 2, underlying medical conditions, body mass index, severity, and vaccination status before infection; and model 3, household income and educational level. We conducted multiple imputations using chained equations to account for missing data in model 3; the proportion of missing values in household income

was 13.1%. We included all explanatory and outcome variables in the imputation model to create 50 imputed datasets. We also calculated the proportion of influence of post–COVID-19 condition on daily life. We defined statistical significance as a 2-sided p value <0.05. We used Stata version 17 MP software (StataCorp LLC, https://www.stata.com) for all analyses.

Results

A total of 51,822 persons were invited to participate in the study, of whom 18,183 responded to the questionnaire (response rate 35.1%). The response rate was higher in the infected group than in the noninfected group (37.3% vs. 32.9%, difference of 4.4% [95% CI 3.0%–5.8%]). The response rate was higher among female than male persons in all age groups of both infected and noninfected groups. Among male invitees, the difference in response rates between the infected and noninfected groups was large for age groups in their 50s (12.8% [95% CI 8.1%–17.5%]) and 60s (8.5% [95% CI 1.6%–15.4%]) (Table 1).

We excluded 3,473/18,183 respondents for responses of infectious status inconsistent with HER-SYS (answering different infection statuses or different diagnosis date) and reporting a prior infection and 9 because their records were missing data on age or symptoms. A total of 14,710 participants (8,392 cases and 6,318 controls) were eligible for the analysis (Figure 1). Mean age of all participants was 42.4 (SD 11.7) years; 8,502 (57.8%) participants were female and 6,087 (41.4%) male (Table 2). Mean age of case participants was 42.3 (SD 11.6) years; 4,802 (57.2%) case participants were female and 3,535 (42.1%) male. The mean follow-up period from SARS-CoV-2 infection to the response date was 167.9 (SD 14.5) days. Most cases (8,326 [99.2%] patients) demonstrated asymptomatic to mild disease, whereas 66 (0.8%) cases had moderate to severe disease.

The percentage of post–COVID-19 condition for cases was 11.8%, whereas the percentage of persistent symptoms among controls was 5.5% (Figure 2). The prevalence did not differ between cases under follow-up for <6 months (11.6%) and cases under follow-up for ≥6 months (12.6%). The most frequent post–COVID-19 condition was cough (3.7%), followed by difficulty concentrating (3.1%), hair loss (2.8%), fatigue (2.4%), and brain fog (2.2%). The most frequent persistent symptoms among the controls were sleep disorders (1.3%), followed by cough (0.9%), fatigue (0.7%), and rhinorrhea (0.7%). The age- and sex-adjusted odds ratio (OR) of any persistent symptoms for cases versus controls was 2.33 (95% CI 2.05–2.64). Symptoms with higher OR in cases than controls were ageusia (27.4 [95% CI 6.7–111.8]), muscle weakness (11.8 [95% CI 5.5–25.5]), anosmia (11.6 [95% CI 4.7–28.6]), hair loss (6.5 [95% CI 4.4–9.6]), and brain fog (5.9 [95% CI 3.8–9.0]).

We conducted multivariable logistic regression analysis to investigate the factors associated with post–COVID-19 condition among cases (Table 3, https://wwwnc.cdc.gov/EID/article/30/7/23-1723-T3.htm). In all 3 models, participants 40–49 years of age had higher odds of having post–COVID-19 condition than those 20–29 years (OR 1.26, 95% CI 1.01–1.57 for model 3); female participants had higher odds of having post–COVID-19 condition than male participants (OR 2.00, 95% CI 1.71–2.34). When models were further adjusted, 2 variables were

Table 1. Response rates of persons in study of prevalence and risk factors for post–COVID-19 condition during BA.5 Omicron-dominant wave, Japan*

	Infected persons				Noninfected persons				Difference in response rates (95% CI)
Age group, y	HER-SYS†	No. participants	No. responses	Response rate, %	BRRS‡	No. participants	No. responses	Response rate, %	
Male patients									
20–29	3,404	2,979	611	20.5	3,404	2,979	574	19.3	1.2 (–3.3 to 5.7)
30–39	3,806	3,328	1,120	33.7	3,806	3,328	896	26.9	6.8 (2.8–10.8)
40–49	3,461	3,058	1,061	34.7	3,461	3,058	943	30.8	3.9 (–0.2 to 8.0)
50–59	2,586	2,243	923	41.2	2,586	2,243	636	28.4	12.8 (8.1–17.5)
60–69	1,152	1,024	413	40.3	1,152	1,024	326	31.8	8.5 (1.6–15.4)
Subtotal	14,409	12,632	4,129	32.7	14,409	12,632	3,375	26.7	6.0 (3.9–8.1)
Female patients									
20–29	3,682	3,218	960	29.8	3,682	3,218	912	28.3	1.5 (–2.6 to 5.6)
30–39	4,028	3,582	1,565	43.7	4,028	3,582	1,491	41.6	2.1 (–1.4 to 5.6)
40–49	3,671	3,313	1,554	46.9	3,671	3,313	1,423	43.0	3.9 (3.2–7.5)
50–59	2,386	2,166	971	44.8	2,386	2,166	884	40.8	4.0 (–0.5 to 8.5)
60–69	1,100	1,000	402	40.2	1,100	1,000	333	33.3	6.9 (–0.1 to 13.9)
Subtotal	14,867	13,279	5,456	41.1	14,867	13,279	5,047	38.0	3.1 (1.2–5.0)
Total	29,276	25,911	9,668	37.3	29,276	25,911	8,515	32.9	4.4 (3.0–5.8)

*BRRS, Basic Resident Registration system; HER-SYS, Health Center Real-Time Information-Sharing System.
†Numbers of SARS-CoV-2–infected persons extracted from the HER-SYS database.
‡Numbers of age- and sex-adjusted noninfected persons extracted from the Basic Resident Registration system database.

Table 2. Characteristics of participants in study of prevalence and risk factors for post–COVID-19 condition during BA.5 Omicron-dominant wave, Japan*

Characteristic	Cases, n = 8,392	Controls, n = 6,318	p value
Mean age, y (±SD)	42.3 (±11.6)	42.4 (±11.8)	0.63
Age group, y			0.29
20–29	1,316 (15.7)	1,036 (16.4)	
30–39	2,340 (27.9)	1,674 (26.5)	
40–49	2,326 (27.7)	1,766 (28.0)	
50–59	1,695 (20.2)	1,270 (20.1)	
60–70†	715 (8.5)	572 (9.1)	
Patient sex			0.01
M	3,535 (42.1)	2,552 (40.4)	
F	4,802 (57.2)	3,700 (58.6)	
Prefer not to answer	55 (0.7)	66 (1.0)	
Mean BMI, kg/m^2 (±SD)	22.1 (±3.5)	22.3 (±3.8)	0.08
BMI, kg/m^2			0.001
<18.5	932 (11.1)	757 (12.0)	
18.5–25.0	5,902 (70.3)	4,271 (67.6)	
≥25.0	1,406 (16.8)	1,174 (18.6)	
Underlying medical conditions‡			0.01
0	6,445 (76.8)	4,752 (75.2)	
1	1,382 (16.5)	1,057 (16.7)	
≥2	565 (6.7)	509 (8.1)	
Hypertension	557 (6.6)	441 (7.0)	0.41
Dyslipidemia	396 (4.7)	362 (5.7)	0.01
Respiratory diseases	394 (4.7)	317 (5.0)	0.37
Depression/anxiety	272 (3.2)	243 (3.8)	0.05
Heart diseases	197 (2.3)	180 (2.8)	0.06
Malignancy	169 (2.0)	131 (2.1)	0.80
Diabetes	152 (1.8)	167 (2.6)	0.001
No. COVID-19 vaccinations§			<0.001
0	685 (8.2)	412 (6.5)	
1	49 (0.6)	28 (0.4)	
2	1,675 (20.0)	1,145 (18.1)	
≥3	5,983 (71.3)	4,733 (74.9)	
Household income, ¥			0.002
<4 million	2,520 (34.5)	2,022 (32.0)	
4–8 million	3,699 (50.7)	2,614 (41.4)	
≥8 million	1,077 (14.8)	858 (13.6)	
Education level			0.68
High school or lower	1,242 (14.8)	961 (15.2)	
Some college	1,710 (20.4)	1,259 (19.9)	
College or higher	5,299 (63.1)	4,004 (63.4)	
Mean follow-up, d (±SD)	167.9 (±14.5)	NA	
No. SARS-CoV-2 infections			
1	8,284 (98.7)	NA	
2	108 (1.3)	NA	
Severity of infection			
Asymptomatic	228 (2.7)	NA	
Mild	8,098 (96.5)	NA	
Moderate/severe	66 (0.8)	NA	

*Values are no. (%) except as indicated. Continuous variables were compared by using *t*-tests; categorical variables were compared by using χ^2 tests. BMI, body mass index; NA, not applicable.
†Includes patients who turned 70 years of age between the participant selection and survey periods.
‡Respiratory diseases included interstitial lung diseases, asthma, and chronic obstructive pulmonary diseases. Heart diseases included myocardial infarction, angina, heart failure, arrhythmia, myocarditis, and cardiomyopathy. Mental disorder included anxiety and depression.
§Number of vaccinations administered until 14 d before infection (cases) or before June 2022 (controls).

associated with having post–COVID-19 condition: having any underlying medical conditions (OR 1.36, 95% CI 1.16–1.59, compared with no underlying medical conditions), and severity of acute COVID-19 (mild, OR 2.07, 95% CI 1.18–3.66; moderate, OR 4.49, 95% CI 1.97–10.23, compared with asymptomatic). Those participants vaccinated before infection had lower odds of developing post–COVID-19 condition (OR 0.75, 95% CI 0.60–0.95, compared with unvaccinated). Socioeconomic status, including household income and educational level, was not associated with post–COVID-19 condition.

Among the 992 cases who had experienced any post–COVID-19 condition, 84 (8.5%) answered that the condition was a serious hindrance on their daily lives at the time of response. A total of 402 (40.5%)

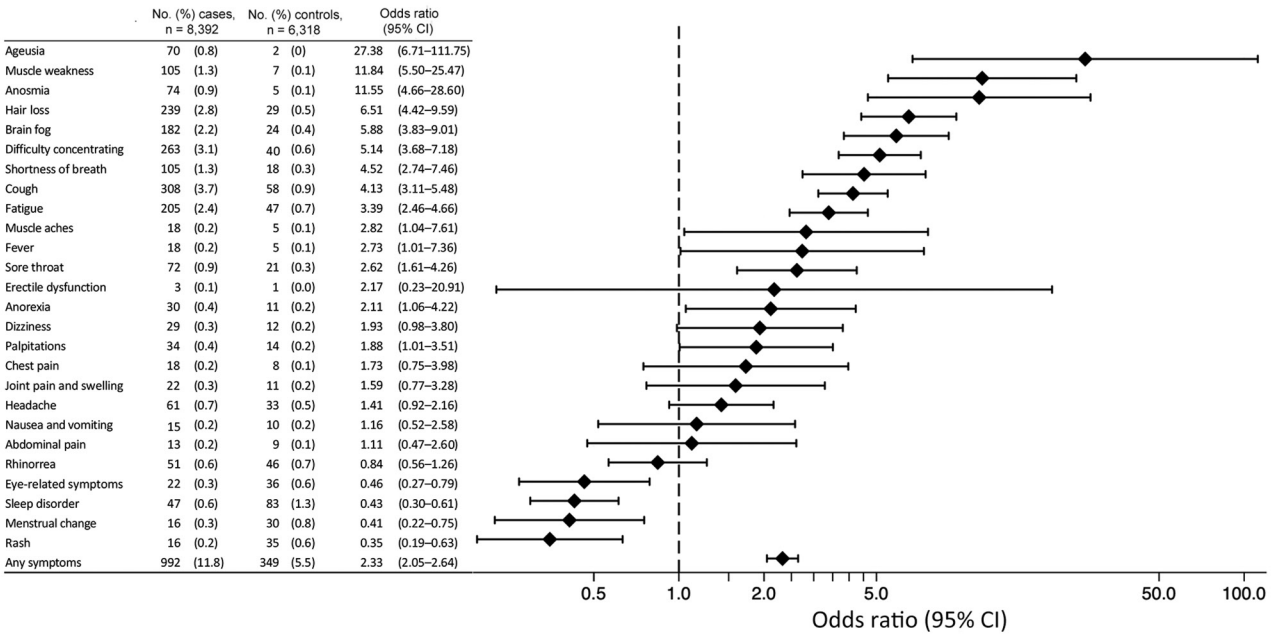

Figure 2. Prevalence and age- and sex-adjusted odds ratios of persistent symptoms in cases compared with controls in study of prevalence and risk factors for post–COVID-19 condition during Omicron BA.5–dominant wave, Japan. All cases and controls are included in the multivariable logistic regression analysis to estimate the odds ratio of developing post–COVID-19 condition among cases compared with controls adjusting for age (as a continuous variable) and sex.

noted that it was no hindrance, 362 (36.5%) mild hindrance, and 144 (14.5%) moderate hindrance.

Discussion

We conducted a population-based study using a self-reported questionnaire among adults in Japan who had confirmed SARS-CoV-2 infection during July–August 2022, when the Omicron BA.5 subvariant was dominant. We compared their post–COVID-19 condition with concordant persistent symptoms among noninfected controls. The percentage of post–COVID-19 condition was 11.8% for cases, which was 2.3 times higher than the 5.5% of persistent symptoms noted in controls. The cases had a 6.2% higher prevalence of post–COVID-19 condition than the controls, suggesting that their symptoms were likely associated with SARS-CoV-2 infection.

Population-based studies of infected persons in the United Kingdom (n = 56,003) and the United States (n = 1,480) using smartphone applications reported that the prevalence of post–COVID-19 condition associated with the Omicron variant, defined as symptoms lasting 4 weeks after the infection, was 4.5%–18.7% (*12*,*23*). Another population-based study of infected persons in the United States (n = 16,091) showed a prevalence of 11.2% (*16*) applying the WHO definition of the continuation or development of new symptoms 3 months after the initial SARS-CoV-2 infection, with those symptoms lasting for ≥2 months with no other explanation (*27*). Although the definition of post–COVID-19 condition varies among previous studies (*12*,*16*,*23*,*27*), the proportion shown in our study is consistent with previous results. In those reports, post–COVID-19 condition was less prevalent among those infected during the Omicron variant–dominant wave than those infected during the previous waves with the ancestral strain predominance (*16*,*23*). However, although a multicenter prospective cohort study showed a higher proportion of prolonged severe fatigue and multiple symptoms at 3 months during the pre-Delta wave than that during the Delta and Omicron waves, the differences disappeared after accounting for sociodemographics and vaccination status (*19*). Systematic reviews suggested that vaccination before infection was associated with a lower risk of experiencing post–COVID-19 condition (*30*,*31*). Similarly, we found that vaccination before infection was associated with lesser post–COVID-19 condition. An in-depth study would clarify whether the reduced risk for post–COVID-19 condition during the Omicron wave was a result of the differences in strains, the effect of vaccination, or both.

Population-based large cohort studies in the United Kingdom (n = 606,434 and n = 486,149) and Germany (n = 11,710) reported that patients infected with previous-variant SARS-CoV-2 frequently experienced persistent symptoms such as fatigue, shortness of breath, concentration difficulties, memory disturbance, hair loss, and anosmia (*5*,*7*,*32*). Studies

on patients infected with the Omicron variant, including a population-based study in the United States (n = 16,091) and hospital-based studies from China (n = 1,829) and India (n = 524), revealed that fatigue, brain fog, cough, and shortness of breath were frequently observed as post–COVID-19 condition (*13*,*16*,*33*). Our findings were comparable with previous results; we observed that post–COVID-19 condition after the Omicron-dominant epidemic frequently included neurologic symptoms such as difficulty concentrating, fatigue, and brain fog, in addition to cough and hair loss. In addition, those neurologic symptoms, as well as ageusia, anosmia, and muscle weakness, were distinctive symptoms among cases, who showed a higher OR than controls. Fatigue and neurocognitive impairment are reportedly related to impaired health recovery and reduced working capacity, even among young and middle-aged adults, after mild infection

Table 3. Factors associated with the prevalence and risk factors for post–COVID-19 condition during BA.5 Omicron-dominant wave, Japan*

Factor	No. at risk, n = 8,392	No. (%) cases,† n = 992	Model 1		Model 2		Model 3	
			OR (95% CI)	p value	OR (95% CI)	p value	OR (95% CI)	p value
Age group, y								
20–29	1,316	134 (10.2)	Referent	NA	Referent	NA	Referent	NA
30–39	2,340	289 (12.4)	1.31 (1.05–1.63)	0.02	1.23 (0.98–1.54)	0.07	1.22 (0.97–1.52)	0.08
40–49	2,326	307 (13.2)	1.40 (1.12–1.74)	0.003	1.32 (1.06–1.65)	0.01	1.26 (1.01–1.57)	0.05
50–59	1,695	206 (12.2)	1.33 (1.05–1.69)	0.02	1.23 (0.96–1.56)	0.10	1.16 (0.91–1.48)	0.24
60–70	715	56 (7.8)	0.83 (0.60–1.16)	0.28	0.75 (0.53–1.05)	0.10	0.70 (0.50–0.98)	0.04
Patient sex								
M	3,535	280 (7.9)	Referent	NA	Referent	NA	Referent	NA
F	4,802	703 (14.6)	1.98 (1.71–2.30)	<0.001	2.05 (1.76–2.39)	<0.001	2.00 (1.71–2.34)	<0.001
Underlying medical conditions								
Yes	1,947	263 (13.5)	NA	NA	1.36 (1.15–1.60)	<0.001	1.36 (1.16–1.59)	<0.001
No	6,445	729 (11.3)	NA	NA	Referent		Referent	NA
BMI, kg/m^2								
<18.5	932	119 (12.8)	NA	NA	0.94 (0.76–1.17)	0.59	0.94 (0.76–1.16)	0.58
18.5–25.0	5,902	686 (11.6)	NA	NA	Referent		Referent	NA
≥25.0	1,406	162 (11.5)	NA	NA	1.09 (0.90–1.32)	0.36	1.09 (0.90–1.31)	0.39
Severity of acute COVID-19								
Asymptomatic	228	13 (5.7)	NA	NA	Referent		Referent	NA
Mild	8,098	965 (11.9)	NA	NA	2.00 (1.13–3.52)	0.02	2.07 (1.18–3.66)	0.01
Moderate	64	14 (21.9)	NA	NA	4.00 (1.73–9.23)	0.001	4.49 (1.97–10.23)	<0.001
Severe	2	0	NA	NA	NA	NA	NA	NA
Vaccination before infection								
Yes	7,707	890 (11.5)	NA	NA	0.74 (0.59–0.92)	0.01	0.75 (0.60–0.95)	0.02
No	685	102 (14.9)	NA	NA	Referent	NA	Referent	NA
Household income, ¥								
<4 million	2,520	295 (11.7)	NA	NA	NA	NA	Referent	NA
4–8 million	3,699	433 (11.7)	NA	NA	NA	NA	1.05 (0.89–1.25)	0.54
≥8 million	1,077	128 (11.9)	NA	NA	NA	NA	1.10 (0.87–1.40)	0.43
Education level								
High school or lower	1,242	137 (11.0)	NA	NA	NA	NA	Referent	NA
Some college	1,710	252 (14.7)	NA	NA	NA	NA	1.20 (0.95–1.50)	0.12
College or higher	5,299	583 (11.0)	NA	NA	NA	NA	1.01 (0.82–1.25)	0.92

*Associations were determined by using multivariable logistic regression models for 8,392 infected persons (cases). Model 1 included age (as a categorical variable) and sex; model 2 added preexisting medical conditions (factor variable), BMI (categorical variable), severity of acute COVID-19 (categorical variable), and vaccination before infection (factor variable); model 3 added household income and education level (categorical variables). BMI, body mass index; NA, not applicable; OR, odds ratio.
†Number of cases who had post–COVID-19 condition.

(*7*). Our results showed that ≈10% of those who had post–COVID-19 condition had persistent difficulties in daily living 4.5–7 months after the Omicron-dominant wave, which may have led to a deterioration in economic conditions or work productivity. Although background socioeconomic status was not associated with developing post–COVID-19 condition in this study, further investigation is required to evaluate the effect of post–COVID-19 condition on changes in economic conditions, schooling, and employment.

Large-scale population-based cohort studies on infection before the Omicron wave found that post–COVID-19 condition was more common in female persons, smokers, persons with obesity, those with more severe acute COVID-19 symptoms, and those who were deprived or had lower household income (*5*,*7*,*32*). Moreover, hospital-based studies in China (n = 21,799) and South Africa (n = 4,685) showed that the female sex, concurrent conditions, and severe acute illnesses were associated with post–COVID-19 condition in association with the Omicron variant (*14*,*21*), which was consistent with our findings. Although the results regarding age are unclear, some studies on the Omicron variant have suggested that the population 18–50 years of age has a higher risk for post–COVID-19 condition (*21*,*34*). Our study showed that post–COVID-19 condition for those infected during the Omicron-dominant epidemic was also more prevalent in middle-aged persons. A substantial proportion of the working-age population might have been affected; of 9 million persons infected during July–August 2022 in Japan, 31.2% were in their 30s and 40s (*35*).

The strengths of this study are the large number of participants including noninfected controls, the population-based approach, and the inclusion of all infected residents registered in the HER-SYS database within a municipality. We compared the infected persons with noninfected persons as a control and assessed the proportion of post–COVID-19 condition after the Omicron-dominant wave.

The first limitation of this study is that the response rate was higher among the infected group than the noninfected group overall. The infected participants may have been more interested in the survey on COVID-19 and post–COVID-19 condition. However, because we did not specify the purpose of the survey to investigate the post–COVID-19 condition but rather informed the participants that we aimed to investigate the effect of the pandemic on their health and daily lives, we believe that the influence of interest in post–COVID-19 condition on the responses to the questionnaire was small. Moreover, the response rate was higher for infected and noninfected female participants and middle-aged infected male participants; this finding could have been because those persons were inherently willing to answer questionnaires more than other persons, or because patients with those attributes (such as female sex and middle age) suffered more from persistent symptoms and had a higher motivation to answer the questionnaire. The results could be biased in both ways; however, we believe the effect was small because the higher odds of having post–COVID-19 condition in our study were consistent with findings from previous studies. Second, although we excluded those who self-reported having SARS-CoV-2 infection, it is possible that some infected persons were included in the controls, causing an underestimation of the difference in persistent symptoms between the cases and controls. Third, because the study was retrospective, recall bias may have occurred. In addition, because we relied on self-reporting, we could not rule out the possibility that the participants' symptoms were caused by conditions other than COVID-19. However, we estimated the symptoms attributable to COVID-19 by comparing with a noninfected control group. Finally, although this study included all infected persons registered in the nationally established registry system, caution is needed to generalize the results of this single-city analysis to other populations in Japan.

In this population-based study, 11.8% of patients with COVID-19 had post–COVID-19 condition during the Omicron-dominant wave; this rate was 2.3 times higher than the persistent symptoms among noninfected controls. Among the cases, female sex, underlying medical conditions, and severity of acute COVID-19 were associated with having post–COVID-19 condition. We recommend a longer follow-up study of the effects on daily life and socioeconomic status after infection during the Omicron-dominant wave.

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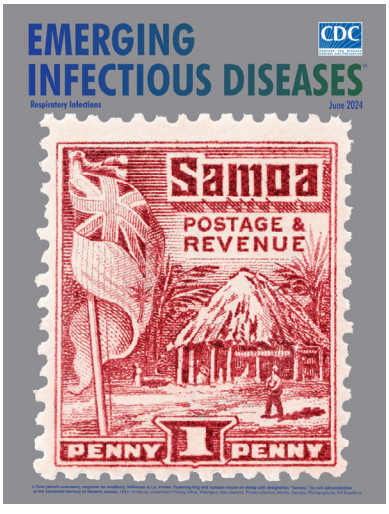
- Severe Human Parainfluenza Virus Community- and Healthcare-Acquired Pneumonia in Adults at Tertiary Hospital, Seoul, South Korea, 2010–2019
- Electronic Health Record–Based Algorithm for Monitoring Respiratory Virus–Like Illness
- Carbapenem-Resistant and Extended-Spectrum β-Lactamase–Producing Enterobacterales in Children, United States, 2016–2020
- Chest Radiograph Screening for Detecting Subclinical Tuberculosis in Asymptomatic Household Contacts, Peru



- *Yersinia ruckeri* Infection and Enteric Redmouth Disease among Endangered Chinese Sturgeons, China, 2022
- Follow-Up Study of Effectiveness of 23-Valent Pneumococcal Polysaccharide Vaccine Against All-Type and Serotype-Specific Invasive Pneumococcal Disease, Denmark
- Outbreak of Highly Pathogenic Avian Influenza A(H5N1) Virus in Seals, St. Lawrence Estuary, Quebec, Canada
- Estimates of SARS-CoV-2 Hospitalization and Fatality Rates in the Prevaccination Period, United States
- Trends in Nationally Notifiable Infectious Diseases in Humans and Animals during COVID-19 Pandemic, South Korea
- Incubation Period and Serial Interval of Mpox in 2022 Global Outbreak Compared with Historical Estimates
- Evolution and Antigenic Differentiation of Avian Influenza A(H7N9) Virus, China
- SARS-CoV-2 Disease Severity and Cycle Threshold Values in Children Infected during Pre-Delta, Delta, and Omicron Periods, Colorado, USA, 2021–2022
- Lack of Transmission of Chronic Wasting Disease Prions to Human Cerebral Organoids

EMERGING INFECTIOUS DISEASES

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Prevalence and Risk Factors of Post–COVID-19 Condition during Omicron BA.5–Dominant Wave, Japan

Appendix

Shown on the following pages is the questionnaire sent to residents in Shinagawa City, a metropolitan area located in the Tokyo area of Japan, who were 20–69 years of age and infected with SARS-CoV-2 during July 1–August 31, 2022, along with noninfected residents as controls (25,911 in each group).

Appendix

Questionnaire (written in green indicates directions)

Survey on the health of residents during COVID-19 pandemic		
	The purpose of this survey is to ask about your health and daily life during the Coronavirus Disease 2019 (COVID-19) pandemic and the recovery status of those who have had COVID-19 in order to provide reference for future healthcare systems. Please read the enclosed "Regarding Cooperation with the 'Survey on the health of residents during COVID-19 pandemic,'" and if you agree to cooperate with this survey, please click the "I agree" button to proceed to the answer section. This work was supported by MHLW Research on Emerging and Re-emerging Infectious Diseases and Immunization (Program Grant Number JPMH21HA2011).	I agree.
Section 1 (questionnaire for all participants)		
Q	Respondent	1=the person himself/herself 2=substitute
Q	Sex (of the person himself/herself)	1=male 2=female 3=I prefer not to answer
Q	Age (of the person himself/herself)	year
Q	Have you ever been diagnosed to be a close contact with someone who had COVID-19?	1=Yes 2=No 3=I don't know 4=I prefer not to answer
Q	Has anyone living with you been diagnosed with COVID-19	1=Yes 2=No

		3=No roommate (living alone) 4=I don't know 5=I prefer not to answer
Q	Have you ever been diagnosed to have COVID-19? Yes → move to the questionnaire for infected persons; other answers → move to the questionnaire for noninfected persons	1=Yes 2=No 3=I don't know 4=I prefer not to answer

	Section 2-A (questionnaire for infected persons)	
Q	How many times have you been diagnosed with COVID-19?	Once Twice Three times or more
	(Show only the number of times diagnosed) When was the date of diagnosis? If you do not know the exact date, please provide an approximate date. First diagnosis date | B year | C month | D day Second diagnosis date | B year | C month | D day Third diagnosis date | B year | C month | D day	Choose from below B: 2019, 2020, 2021, 2022, 2023 C: January–December D: 1–31, unknown
Q	How was your medical condition when you had COVID-19 for the first time?	
	Did you have any symptoms?	1=Yes 2=No 3=I don't know
	Were you diagnosed with pneumonia?	1=Yes 2=No 3=I don't know
	Were you hospitalized?	1=Yes 2=No 3=I don't know

	<Those reported being hospitalized>Were you admitted to the intensive care unit (ICU)?	1=Yes 2=No 3=I don't know
	Was oxygen administered?	1=Yes 2=No 3=I don't know
	<Those with oxygen administration>Please select all methods of oxygen administration received at that time. 1 2 3 4 5 6	1=Nasal cannula 2=oxygen mask 3=high-flow nasal cannula 4=noninvasive positive pressure ventilation (NPPV) 5=mechanical ventilation 6=extracorporeal membrane oxygenation (ECMO) 7=Oxygen was administered, but I don't know how.
Q	How was your medical condition when you had COVID-19 for the second time?	
	Did you have any symptoms?	1=Yes 2=No 3=I don't know
	Were you hospitalized?	1=Yes 2=No 3=I don't know
	Was oxygen administered?	1=Yes 2=No 3=I don't know
	Were you intubated (mechanical ventilation)?	1=Yes 2=No 3=I don't know
Q	How was your medical condition when you had COVID-19 for the third time?	
	Did you have any symptoms?	1=Yes 2=No 3=I don't know
	Were you hospitalized?	1=Yes 2=No 3=I don't know
	Was oxygen administered?	1=Yes 2=No 3=I don't know
	Were you intubated (mechanical ventilation)?	1=Yes 2=No 3=I don't know
Q	<Female only>Were you pregnant when you had COVID-19? (multiple choices)	1=Yes 2=No 3=I don't know 4=I prefer not to answer

	<Those who answered yes, multiple choice>During which infection episode were you pregnant?	First infection, second infection, third infection, other
	<Those who answered yes>What was the gestational age at the time of the first infection?	1=First trimester (≤15 weeks gestation) 2=Second trimester (≥16weeks and ≤27 weeks) 3=Third trimester (≥28 weeks) 4=I don't know the gestational age at the time of infection
	<Those who answered yes>What was the gestational age at the time of the second infection?	1=First trimester (≤15 weeks gestation) 2=Second trimester (≥16weeks and ≤27 weeks) 3=Third trimester (≥28 weeks) 4=I don't know the gestational age at the time of infection
	<Those who answered yes>What was the gestational age at the time of the third infection?	1=First trimester (≤15 weeks gestation) 2=Second trimester (≥16weeks and ≤27 weeks) 3=Third trimester (≥28 weeks) 4=I don't know the gestational age at the time of infection
Q	We would like to ask you about the symptoms that appeared after the COVID-19 diagnosis. Please select the symptoms that existed between the COVID-19 diagnosis in the summer of 2022 to date. Please check all that apply regarding the duration of the symptoms.	<Selecting symptoms will display "Was present from the time of infection through the recovery period", "Was present at 3 months after the

- If the symptoms were present from the time of infection through the recovery period, check “Was present from the time of infection through the recovery period”
- If the symptoms were present at 3 months after the infection, check “Was present after three months of infection”
- If the symptom lasted 2 months or more, check “lasted 2 months or more”
- If the symptom is present, check “Still present”

If none of the symptoms were present, please select “No symptoms of any of the above” at the bottom.

*For those who had COVID-19 more than once, please answer the following questions regarding the infection in the summer of 2022.

Symptoms that have existed between the COVID-19 diagnosis in the summer of 2022 to date	Symptom	Was present from the time of infection through the recovery period	Was present at 3 months after the infection	Lasted 2 months or more	Still present
□	Fever (≥37.5 °C)	□	□	□	□

infection”, “Lasted 2 months or more”, and “Still present”.>

□	Cough	□	□	□	□
□	Fatigue	□	□	□	□
□	Sore throat	□	□	□	□
□	Chest pain	□	□	□	□
□	Lack of appetite (anorexia)	□	□	□	□
□	Brain fog (Brain fog is a state such as being “foggy,” “confused,” “having difficulty learning new things,” “indecisive,” or “unable to think clearly.”)	□	□	□	□
□	Difficulty in concentrating	□	□	□	□
□	Loss of smells (smelling disorder)	□	□	□	□
□	Loss of tastes (tasting disorder)	□	□	□	□
□	Shortness of breath	□	□	□	□
□	Hair loss	□	□	□	□
□	Muscle weakness	□	□	□	□
□	Palpitations	□	□	□	□

□	Difficulty sleeping, waking up at night or early in the morning (sleep disorder)	□	□	□	□	
□	Runny nose	□	□	□	□	
□	Headache	□	□	□	□	
□	Joint pain or swelling	□	□	□	□	
□	Muscle pain	□	□	□	□	
□	Nausea and vomiting	□	□	□	□	
□	Abdominal pain	□	□	□	□	
□	Skin rash	□	□	□	□	
□	Eye symptoms (eye pain, itching, foreign body sensation, redness, watery eyes, blurred vision, difficulty seeing)	□	□	□	□	
□	Dizziness	□	□	□	□	
□	Erectile disfunction (male only)	□	□	□	□	
□	Menstrual change (female only)	□	□	□	□	
□	Other 1 (in detail)	□	□	□	□	

	□	Other 2 (in detail)	□	□	□	□	
	□	No symptoms of any of the above					
Q	To what extent are the symptoms after COVID-19 you selected in the previous question currently interfering with your daily life? Please choose a number from 0 to 10, with 0 being "no hindrance at all" and 10 being "extreme hindrance."						0 to 10
Q	Are you currently receiving treatment for any of the symptoms selected in the previous question?						1=Yes 2=No
	<Those who answered yes> Please select all treatments you are currently receiving.						1=in-patient care 2=out-patient care 3=prescription drugs (other than herbal medicines) 4=prescription drugs (herbal medicines) 5=over-the-counter drug 6=rehabilitation 7=psychological counseling 8=other ( )
Q	Please select all new diseases diagnosed at medical facilities after COVID-19 diagnosis in the summer of 2022.						1=Malignancy 2=Myocardial infarction, angina 3=Heart failure 4=Arrhythmia 5=Myocarditis/cardiomyopathy

		6=Stroke 7=Hypertension 8=Hyperlipidemia 9=Gout (Hyperuricemia) 10–12=Diabetes (Type 1, type 2, I don't know if it's type 1 or 2) 13=Interstitial pneumonia/interstitial lung disease 14=Asthma 15=Pulmonary embolism 16=Chronic obstructive pulmonary disease (COPD) 17=Hepatitis/cirrhosis 18–19=Chronic kidney disease (with dialysis, without dialysis) 20=Connective tissue disease 21=Shingles 22=Dementia 23=Depression 24=Anxiety 25=Other 0=None

	Section 2-B (questionnaire for noninfected persons)	

Q

We would like to ask you about the symptoms that appeared after July 2022.

Please select the symptoms that existed between July 2022 to date.

- If the symptom lasted 2 months or more, check "lasted 2 months or more"
- If the symptom is present, check "Still present"

If none of the symptoms were present, please select "No symptoms of any of the above" at the bottom.

Symptoms that have existed from July 2022 to date	Symptom	Lasted 2 months or more	Still present
□	Fever (≧37.5 °C)	□	□
□	Cough	□	□
□	Fatigue	□	□
□	Sore throat	□	□
□	Chest pain	□	□
□	Lack of appetite (anorexia)	□	□
□	Brain fog (Brain fog is a state such as being "foggy," "confused," "having difficulty learning new things," "indecisive," or "unable to think clearly.")	□	□
□	Difficulty in concentrating	□	□

□	Loss of smells (smelling disorder)	□	□
□	Loss of tastes (tasting disorder)	□	□
□	Shortness of breath	□	□
□	Hair loss	□	□
□	Muscle weakness	□	□
□	Palpitations	□	□
□	Difficulty sleeping, waking up at night or early in the morning (sleep disorder)	□	□
□	Runny nose	□	□
□	Headache	□	□
□	Joint pain or swelling	□	□
□	Muscle pain	□	□
□	Nausea and vomiting	□	□
□	Abdominal pain	□	□
□	Skin rash	□	□
□	Eye symptoms (eye pain, itching, foreign body sensation, redness, watery eyes, blurred vision, difficulty seeing)	□	□
□	Dizziness	□	□
□	Erectile disfunction (male only)	□	□
□	Menstrual change (female only)	□	□

	□	Other 1 (in detail)	□	□	
	□	Other 2 (in detail)	□	□	
	□	No symptoms of any of the above	□	□	
Q	Please select all new diseases diagnosed at medical facilities after July 2022.				1=Malignancy 2=Myocardial infarction, angina 3=Heart failure 4=Arrhythmia 5=Myocarditis/cardiomyopathy 6=Stroke 7=Hypertension 8=Hyperlipidemia 9=Gout (Hyperuricemia) 10–12=Diabetes (Type 1, type 2, I don't know if it's type 1 or 2) 13=Interstitial pneumonia/interstitial lung disease 14=Asthma 15=Pulmonary embolism 16=Chronic obstructive pulmonary disease (COPD) 17=Hepatitis/cirrhosis 18–19=Chronic kidney disease (with dialysis, without dialysis) 20=Connective tissue disease

		21=Shingles 22=Dementia 23=Depression 24=Anxiety 25=Other 0=None
	<Female only>Have you been pregnant between July 2022 to date?	1=Yes 2=No 3=I don't know 4=I prefer not to answer

Section 3 (questionnaire for all participants)

	We would like to ask about COVID-19 vaccines.	
Q	How many doses of COVID-19 vaccine have you received so far?	0 (unvaccinated), once, twice, three times, four times or more
Q	Please indicate the date of vaccination. If you do not know the exact date, please provide an approximate date. (Displayed according to the number of vaccinations selected) First dose : A year B month Second dose : A year B month Third dose : A year B month Fourth dose : A year B month	Choose from below A: 2020, 2021, 2022, 2023 B : January–December

	We would like to ask about your health and daily life.	
Q	Current height	cm

Q	Current weight	kg
Q	Weight about 6 months ago For infected persons: Weight about 6 months ago (before COVID-19 diagnosis in summer 2022)	kg
Q	Do you currently have "breathlessness"? Please choose one that comes closest.	1=No breathlessness 2=I only get breathless with strenuous exercise 3=I get short of breath when hurrying on level ground or walking up a slight hill 4=On level ground, I walk slow than people of my age because of breathlessness, or I have to stop for breath when walking at my own pace on the level 5=I stop for breath after walking about 100 m or after a few minutes on level ground 6=I am too breathless to leave the house or I am breathless when dressing/undressing
Q	Do you currently have "fatigue"? Please choose one that comes closest. If you do not have "fatigue," please choose "Fully active."	1=Fully active, able to carry on all (infected persons: pre-disease) performance without restriction 2=Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature, e.g., light house work, office work 3=Ambulatory and capable of all selfcare but unable to carry out any work activities. Up and about more than 50% of waking hours 4=Capable of only limited selfcare, confined to bed or chair more than 50% of waking hours

		5=Completely disabled. Cannot carry on any selfcare. Totally confined to bed or chair
Q	Please select all diseases diagnosed at medical institutions before July 2022. For infected persons: Please select all diseases diagnosed at medical facilities prior to the COVID-19 infection in the summer of 2022.	1=Malignancy 2=Myocardial infarction, angina 3=Heart failure 4=Arrhythmia 5=Myocarditis/cardiomyopathy 6=Stroke 7=Hypertension 8=Hyperlipidemia 9=Gout (Hyperuricemia) 10–12=Diabetes (Type 1, type 2, I don't know if it's type 1 or 2) 13=Interstitial pneumonia/interstitial lung disease 14=Asthma 15=Pulmonary embolism 16=Chronic obstructive pulmonary disease (COPD) 17=Hepatitis/cirrhosis 18–19=Chronic kidney disease (with dialysis, without dialysis) 20=Connective tissue disease 21=Shingles 22=Dementia 23=Depression 24=Anxiety

		25=Other 0=None
Q	On or about July 2022 (infected persons: at the time of COVID-19 diagnosis in summer 2022), were you treated with steroids (excluding ointments), anticancer drugs, immunosuppressive drugs or biologics (such as Remicade)?	1=Yes 2=No 3=I don't know
Q	Do you smoke cigarettes (cigarettes, heated tobacco products, e-cigarettes including nicotine)?	1=Never smoked cigarettes habitually before 2=Smoked cigarettes in the past but have quit 3=Currently still smoking cigarettes
	<Those who answered to have quit> When did you quit smoking cigarettes?	1=Before COVID-19 diagnosis (noninfected persons: before July 2022) 2=After COVID-19 diagnosis (noninfected persons: after July 2022)
	<Those who answered currently smoking> Has the amount of cigarettes you smoke changed compared with that 6 months ago (infected persons: 6 months ago (before COVID-19 infection in summer 2022))?	1=Decreased 2=Unchanged 3=Increased
Q	How often do you currently drink alcohol (alcohol-containing beverages)?	1=I don't drink at all (can't drink) 2=Hardly drink (about once a month) 3=1–3 times a month 4=1–2 times a week 5=3–4 times a week 6=5–6 times a week 7=every day

	<Those who chose other than "don't drink at all" above> What is the average amount of alcohol you drink per day? Please choose one that applies to you in terms of sake.	1=Less than 1 cup (180ml) of sake 2=1 cup of sake 3=2 cups of sake 4=3–4 cups of sake 5=5 cups of sake
	Compared with that 6 months ago (infected person: 6 months ago (before COVID-19 infection in summer 2022)), has the amount of alcohol you drink changed?	1=I quit 2=Decreased 3=Unchanged 4=Increased (started drinking)
Q	Please select your current average daily sleep duration.	1=less than 5 hours 2=5 hours 3=6 hours 4=7 hours 5=8 hours 6=9 hours 7=10 hours or more
Q	Compared with that 6 months ago (infected persons: 6 months ago (before COVID-19 infection in summer 2022)), has your sleeping duration changed?	1=Decreased 2=Unchanged 3=Increased
Q	How much sports or exercise do you currently do on average per week in total?	5=7 hours or more 4=5–6 hours 3=3–4 hours 2=1–2 hours 1=seldom or never

<table>
<tr><td>Q</td><td>How much time do you currently spend walking indoors or outdoors on average per day?</td><td>4=3 hours or more
3=about 2 hours
2=about 1 hour
1=about 30 minutes
0=seldom or never</td></tr>
<tr><td>Q</td><td>Compared with that 6 months ago (infected persons: 6 months ago (before COVID-19 infection in summer 2022)), have you changed the way you move your body or how long you sit?
<table>
<tr><th></th><th>Decreased</th><th>Unchanged</th><th>Increased</th></tr>
<tr><td>Frequency and duration of sports and exercise</td><td>□</td><td>□</td><td>□</td></tr>
<tr><td>Time spent walking indoors and outdoors</td><td>□</td><td>□</td><td>□</td></tr>
<tr><td>Sitting time</td><td>□</td><td>□</td><td>□</td></tr>
</table></td><td></td></tr>
<tr><td>Q</td><td><For those aged 50 years or older only>
Please select “Yes” or “No” for the following five items.</td><td></td></tr>
</table>

	Have you lost 2 kg or more in the past 6 months?	□	□
	Do you think you walk slower than before?	□	□
	Do you go for a walk for your health at least once a week?	□	□
	Can you recall what happened 5 minutes ago?	□	□
	In the past 2 weeks, have you felt tired without a reason?	□	□

Q For each item, please indicate how often you feel.

	None of the time	Seldom of the time	Often	All of the time
How often do you feel that you lack companionship?	□	□	□	□
How often do you feel left out?	□	□	□	□
How often do you feel isolated from others?	□	□	□	□

<table>
<tr>
<td>Q</td>
<td>During the past 30 days, about how often did you feel ...
<table>
<tr><th></th><th>None of the time</th><th>A little of the time</th><th>Some of the time</th><th>Most of the time</th><th>All of the time</th></tr>
<tr><td>...nervous?</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td></tr>
<tr><td>...hopeless?</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td></tr>
<tr><td>...restless or fidgety?</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td></tr>
<tr><td>...so depressed that nothing could cheer you up?</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td></tr>
<tr><td>...that everything was an effort?</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td></tr>
<tr><td>...worthless?</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td></tr>
</table>
</td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>Over the last 2 weeks, how often have you been bothered by thoughts that you would be better off dead or of hurting yourself in some way?</td>
<td>1＝Not at all
2＝Several days
3＝More than half the days
4＝Nearly every day</td>
</tr>
</table>

Q	What is your current marital status?	1＝Unmarried 2＝Married 3＝Widowed 4＝Divorced 5＝Prefer not to answer
Q	Who do you currently live with? Please check all persons living with you.	1＝Spouse 2＝Child 3＝Parent 4＝Other (　　)
Q	<Those who check the above question> How many people are currently living with you (not including you)?	persons
	Of the number of people living with you above, how many are under the age of 18 (not including you)?	persons
Q	What was the last school you graduated from?	1＝Junior high school 2＝High school 3＝Vocational school 4＝Some college 5＝University 6＝Graduate school 7＝Prefer not to answer
Q	What is your household income (including taxes and income from pensions and dividends) in 2021?	1＝No household income 2＝＜500,000 yen 3＝≥500,000 yen and ＜1,000,000 yen 4＝≥1,000,000 yen and ＜2,000,000 yen 5＝≥2,000,000 yen and ＜4,000,000 yen

		6＝≧4,000,000 yen and＜6,000,000 yen 7＝≧6,000,000 yen and＜8,000,000 yen 8＝≧8,000,000 yen and＜10,000,000 yen 9＝≧10,000,000 yen and＜12,000,000 yen 10＝≧12,000,000 yen and＜14,000,000 yen 11＝≧14,000,000 yen 12＝Prefer not to answer/don't know
Q	Has your financial situation changed compared with that 6 months ago (infected persons: 6 months ago (before COVID-19 infection in summer 2022))?	1＝Very worse 2＝Worse 3＝Unchanged 4＝Better 5＝Very better
Q	Please select one of your main occupations at present. If you have more than one occupation, please select one main job.	1＝ Administrative and managerial 2＝Professional and engineering (healthcare) 3＝Professional and engineering （nursing care/welfare） 4＝Professional and engineering （childcare/education） 5＝ Professional and engineering （other） 6＝Clerical 7＝Service (accommodation industry) 8＝Service (restaurant business serving alcohol beverage) 9＝Service (restaurant business without serving alcohol beverage)

		10=Service (entertainment) 11=Service (other) 12=Sales (retail store owners, sales clerks, etc.) 13=Security 14=Manufacturing process 15=Agricultural, forestry and fishery 16=Transport and machine operation 17=Construction and mining 18=Carrying, cleaning, packaging, and related 19=Student 20=Housewife/ husehusband 21=Not apply to the above 22=Unemployed
Q	Please select one of your current employment statuses (including student). If you have more than one type of employment, please choose one main status.	1=Regular employee (manager) 2=Regular employee (other than managers) 3=Executive of company or corporation 4=Self-employed worker 5=Assistance in private business 6=Dispatched worker from temporary labor agency 7=Contract employee 8=Part-time worker 9=Doing piecework at home 10=Students 11=Housewife/ husehusband

		12=Unemployed 13=Other (　　)
Q	<Display selected occupations> Is the occupation here the same as the occupation as of July 1, 2022?	1＝Yes 2＝No
	<Those who answered no> Please select your occupation as of July 1, 2022. If you have more than one occupation, please select one main occupation.	1= Administrative and managerial 2=Professional and engineering (healthcare) 3=Professional and engineering (nursing care/welfare) 4=Professional and engineering (childcare/education) 5= Professional and engineering (other) 6=Clerical 7=Service (accommodation industry) 8=Service (restaurant business serving alcohol beverage) 9=Service (restaurant business without serving alcohol beverage) 10=Service (entertainment) 11=Service (other) 12=Sales (retail store owners, sales clerks, etc.) 13=Security 14=Manufacturing process 15=Agricultural, forestry and fishery 16=Transport and machine operation 17=Construction and mining

		18=Carrying, cleaning, packaging, and related 19=Student 20=Housewife/husbehusband 21=Not apply to the above 22=Unemployed
Q	<<Display selected employment status> Is the employment status here the same as of July 1, 2022?	1＝Yes 2＝No
	<Those who answered no> Please select your employment status as of July 1, 2022. If you have more than one employment status, please select one main status.	1=Regular employee (manager) 2=Regular employee (other than managers) 3=Executive of company or corporation 4=Self-employed worker 5=Assistance in private business 6=Dispatched worker from temporary labor agency 7=Contract employee 8=Part-time worker 9=Doing piecework at home 10=Students 11=Housewife/husbehusband 12=Unemployed 13=Other ( )
Q	In the past 6 months, have you experienced any of the following? Please select all that apply.	1＝Working (schooling) hours increased 2＝Working (schooling) hours decreased 3＝ Telecommuting (online classes) has increased 4＝Telecommuting (online classes) has decreased 5＝I have found a job (entered to school)

		6＝I took a leave of absence 7＝Changed jobs (schools) 8＝Retired (withdrew from school) 9＝I've been frequently absent 10＝Other（ ） 11＝None of the above
	<Those who selected No.1–10 above> Please select all applicable reasons.	1＝Because I was instructed by my employer or school 2＝Due to deteriorating health conditions caused by COVID-19 3＝Due to deteriorating health conditions caused by conditions other than COVID-19 4＝Due to a new need for childcare or nursing care for a family member, etc. 5＝For financial reasons 6＝Because I could no longer pay my tuition fees 7＝Other（ ）