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COVID-19 Vaccine Acceptance among Parents in Japan

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1. Purpose of the Study

Although vaccination is considered the most effective measure to prevent the spread of Coronavirus Disease 2019 (COVID-19), people identified in the "anti-vaccine" camp hesitate or avoid vaccination, raising a public health concern. In addition, many parents hesitate to vaccinate their children as the short- and long-term effects of vaccinating young children are unknown.

We conducted questionnaire surveys and semi-structured interviews to investigate factors that influence the parental decision regarding vaccination of children under the age of 18. We aim to make recommendations for policies that promote the immunization of children and gain knowledge that aids future public health campaigns.

2. Methods

2.1. Study Design

This collaborative study involved the University College of London (UCL) and Osaka University (OU). OU was responsible for the data collection, using a questionnaire and interviews, and analyzing the content of interviews conducted in Japan. This study comprised a web survey (questionnaires) and online interviews. At OU, the Ethics Committee of Osaka University Graduate School of Human Sciences approved this study. Informed consent was obtained from participants on the first page of the web survey and at the beginning of online interviews.

2.2. Participants

The participants of this study were parents of children under the age of 18. Forty participants were recruited after a screening process using the crowdsourcing system, CrowdWorks (CrowdWorks. Inc. (CW), Shibuya, Tokyo, Japan).

2.3. Screening Procedure

First, we asked the pool of participants (n = 998) of our ongoing panel survey on COVID-19 initiated in January 2020 about their willingness to participate in this study. Second, we administered a screening survey to those who had responded in the affirmative and consented to participate (n = 742). The screening survey was conducted by sending a direct mail (DM) on CW containing a link to the web survey constructed by Qualtrics (Qualtrics International Inc., Seattle, Washington, and Provo, Utah). The survey inquired about the following: individual's COVID vaccination status, family structure, presence and number of children, age and COVID vaccination status of the oldest child, and willingness to be interviewed. The survey's duration was approximately one minute. Respondents were given an honorarium of 15 yen, regardless of their decision to participate in the interview. Third, consenting participants who had children below the age of 18 were selected as candidates (n = 96). Finally, 40 participants were selected after considering the vaccination status of both parents and children. The selected candidates were contacted through DM via CW.

2.4. Excluding Criteria

Only Japanese residents were included in the questionnaire survey and interview. Those who migrated from Japan after answering the survey were excluded, considering the differences in terms of the situation, infection status, vaccination status, health insurance system, and administrative service. In the demographic information, sexual orientation and ethnicity were excluded, considering the psychosocial discomfort of asking Japanese people about these attributes.

2.5. Online Interview

We conducted the web survey and interviews via the videoconferencing system Zoom (Zoom Video Communications, Inc., San Jose, California). The one-hour web meeting comprised two parts, the questionnaire survey (approximately 15 min) and the interview (approximately 45 min). We began the meeting with a briefing, displaying a document explaining the study on the shared screen and obtaining informed consent. Data were collected from 1st December 2021 to 31st January 2022.

2.5.1. Web Survey

We used the following questionnaires to assess the participants' psychosocial profiles: The Strength and Difficulties Questionnaire (SDQ; Goodman, 1994 & 1997; Moriwaki & Kamio, 2014), General Anxiety Disorder-7 (GAD-7; Spitzer et al., 2006; Muramatsu, 2009), Patient Health Questionnaire-9 (PHQ-9; Spitzer et al., 1999; Muramatsu, 2014), University of California Los Angeles Loneliness Scale (UCLA LS;

Russell, 1978; Masuda et al., 2012), and Social Mistrust Scale (SMS; Wong et al., 2014; translated into Japanese by our study group). The questionnaire survey was administrated online using Qualtrics. During the response time, the microphone, camera, and screen sharing options were disabled.

2.5.2 Interview

Each 45-minute interview was conducted by a clinical psychologist. The participants were addressed by their nicknames. Due to ethical considerations, the camera and audio were turned on for both the interviewer and interviewee to detect quickly any changes caused by psychological distress. Only one participant refused to turn on the camera. No one withdrew from the interviews.

2.6. Statistical Analysis

Statistical Package for Social Science (SPSS) Statistics Version 21.0 (IBM, Armonk, NY) was used for all analyses. We opted to use parametric tests consistently to compare the cut-off points or scores of previous studies. Therefore, all data are presented in the form of mean ± SD.

2.7. Content Analysis

The extraction of categories and the generation of superordinate categories for content analysis were performed by six analysts to eliminate subjectivity. Five analysts were undergraduate or graduate students of Psychology or related fields at the Graduate School of Human Sciences, Osaka University. One was an Osaka University faculty member.

2.8. Ethics

This study was approved by the Osaka University Graduate School of Human Sciences Research Ethics Committee (HB021-097). Informed consent was obtained from all participants at the beginning of the video meeting and presented on the first page of the web survey.

3. Results

Forty people participated in this study (male = 13, female = 27, age = 39.8 $\pm$ 6.4), divided into 4 groups according to combinations created based on vaccination status (Table 1). The status of *vaccinated/ unvaccinated parents* depended on the interviewee's vaccination status. Table 1 shows the number of members and the male-female ratio in each group were not balanced.

Table 1. Four groups formed according to vaccination status

Groups	Abbr.	n (male:female)
unvaccinated parents + unvaccinated children	UU	7 (1:6)
vaccinated parents + unvaccinated children	VU	12 (4:8)
vaccinated parents + vaccinated children	VV	9 (3:6)
vaccinated parents + children planning to be vaccinated	VV'	12 (5:7)

3.1. Summary of psychological assessments

Table 2 displays the total and subscale scores.

**Table 2. The descriptive statistics of psychosocial assessments**

Questionnaires	Subscales	n	Minimum value	Maximum value	Mean	SD
PHQ-9 sum		40	0	21	4.5	4.7
GAD-7 sum		40	0	20	3.7	4.4
SMS sum		24	0	13	6.3	3.1
UCLA LS sum		40	23	78	44.3	11.0
SDQ S18+ TDS		40	8	29	16.5	5.0
	Emotional Symptoms	40	0	9	3.6	2.6
	Problems in Conduct	40	0	5	1.6	1.1
	Hyperactivity/Inattention	40	2	10	4.3	1.7
	Peer Problems	40	4	11	7.0	1.7
	Prosocial Behavior	40	2	10	5.8	2.1
SDQ P4-17 TDS		40	0	22	9.7	5.9
	Emotional Symptoms	40	0	9	2.0	2.1
	Problems in Conduct	40	0	7	1.8	1.5
	Hyperactivity/Inattention	40	0	10	3.7	2.6
	Peer Problems	40	0	8	2.2	1.8
	Prosocial Behavior	40	0	10	5.7	2.5

Note. PHQ-9: Patient Health Questionnaire-9, GAD-7: Generalized Anxiety Disorder-7, SMS: Social Mistrust Scale, UCLA LS: University of California, Los Angeles Loneliness Scale, SDQ: Strength and Difficulties Questionnaire; TDS: Total Difficulties Score. SD: Standard Deviation.
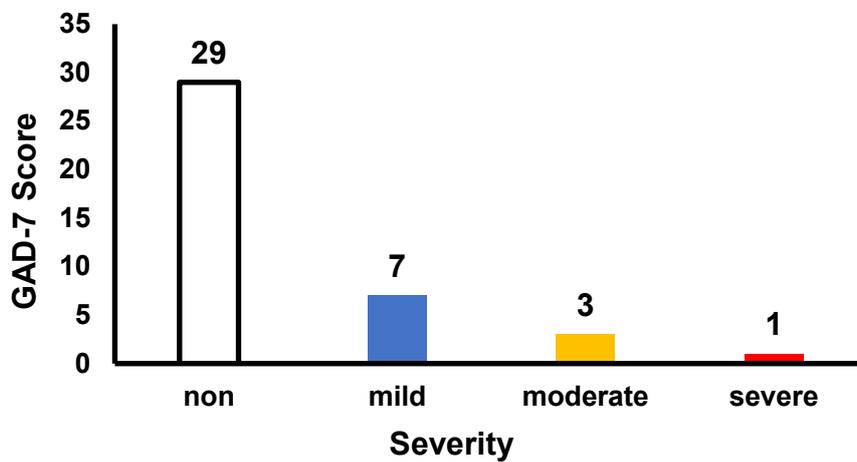
3.2. Severity of Depression and Anxiety

We display the severity and distributions of depression and anxiety scores accessed using PHQ-9 and GAD-7 below (Figure 1-a, b, & Figure 2). The cut-off points for PHQ-9 and GAD-7 were established based on a previous study (Muramatsu, 2014).

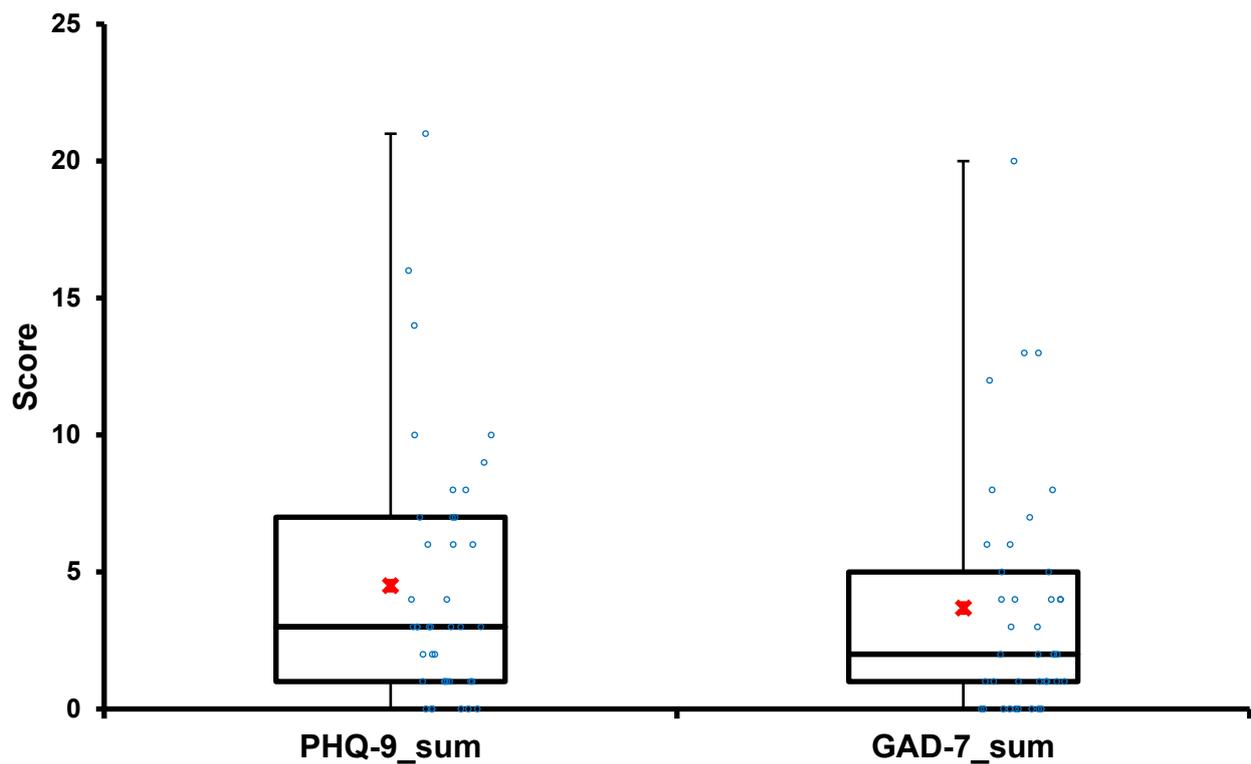**Figure 1-a. The severity of depression**
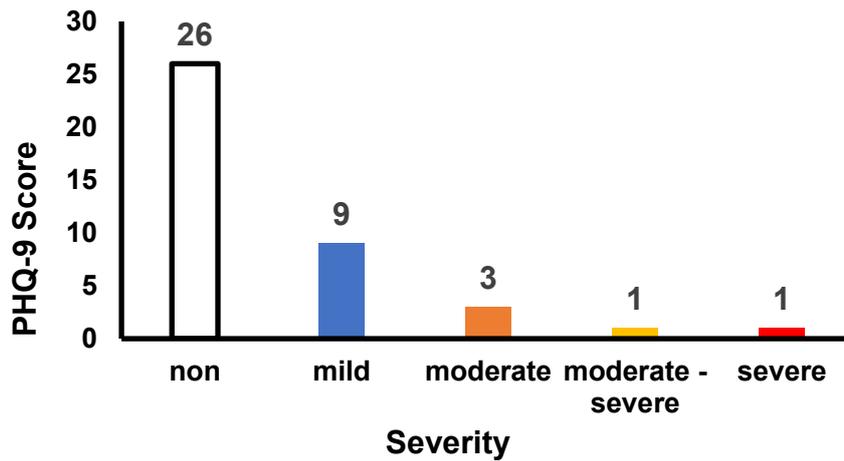
Figure 1-b. The severity of Anxiety

Note. PHQ-9: Patient Health Questionnaire-9, Generalized Anxiety Disorder-7. The horizontal axis shows the severity and the vertical axis shows the score. The numbers indicate the degrees in the graph.

Figure 2. The distribution of depression and anxiety

Note. PHQ-9: Patient Health Questionnaire-9, Generalized Anxiety Disorder-7. The horizontal axis shows the severity and the vertical axis shows the score. The red cross marks ($\times$) indicate the mean score and the blue dots ($\bigcirc$) represent the raw data.

3.3. Reasons for getting/refusing vaccination among Parents and Children

First, a private contractor was hired to transcribe the interviews. Next, we conducted a content analysis. We considered each interview as one coherent text and extracted 363 sentences based on four categories of reasons: *reasons for parents being vaccinated* (A), *for parents being unvaccinated* (B), *for parents who had their children vaccinated* (C), and *for parents whose children remained unvaccinated* (D). Finally, the extracted sentences were coded and categorized by six analysts. Table 3 displays the classification scheme.

Table 3. The categories abstracted from interviews

	(A) Reasons for parents being vaccinated	(B) Reasons for parents had their children vaccinated	(C) Reasons for parents being unvaccinated	(D) Reasons for parents whose children remained unvaccinated
Decision making based on information	Opinions from experts, health care professionals, and people engaged in vaccination		Lack of information	Lack of information
	-	-	Distrust towards mass media	Distrust towards mass media
	-	-	Acquiring and trusting anti-vaccination information	-
	Information from/discussion with spouse	-	-	-
	-	Child's consent	-	Child's lack of consent
	Consideration of advantages and disadvantages	Consideration of advantages and disadvantages	-	Consideration of advantages and disadvantages
Basic opinions for vaccination	Not hesitant to be vaccinated	-	Intuitive and emotional refusal to be vaccinated	More cautious about vaccinating children than vaccinating themselves
	-	-	Aversion to injections	Aversion to injections

	-	-	（Reluctance towards voluntary immunization）	Reluctance towards voluntary immunization
Social impacts	Vaccinated after considering vaccination status in the surroundings	Vaccinated after considering vaccination status in the surroundings	Unvaccinated after considering the vaccination status in the surroundings; i.e., no need to get vaccinated if people in the surroundings are vaccinated.	Vaccinated/Unvaccinated after considering the vaccination status in the surroundings; i.e., if the infection is controlled, I will not have my children vaccinated.
	Occupational reasons	Concerns about school infection	（Low impact of COVID-19 in real life ）	-
	-	Social disadvantages of children	-	-
	Peer pressure	Peer pressure	Peer pressure backlash	(Peer pressure backlash）
	Concerns about infection in partners and households	-	-	-
	Concern about social impact on surroundings	-	-	-
Social support for vaccination	Accessibility of vaccination	Accessibility of vaccination	-	-
	-	-	(Hassles in going to get vaccinated）	-
	-	-	Difficulty in decision making regarding vaccination	Missed the opportunity to get vaccinated

	Childcare concerns	-	(Childcare concerns）	-
	-	-	-	Concerns about support system for post-vaccination emergencies
Opinions about COVID-19 and its vaccination	Infection prevention	Infection prevention	-	-
	Preventing severe infection	Preventing severe infection	-	-
	Fear of infection	-	-	-
	Expectations about vaccine	-	Distrust of vaccines	Distrust of vaccines
	Tolerance for adverse effects	-	Concerns about adverse effects	Concerns about adverse effects
	-	-	Concerns about medium- to long-term bodily effects	Concerns about medium- to long-term bodily effects
	-	-	Doubts about the speed of regulatory approval	Doubts about the speed of regulatory approval
	Peace of mind through vaccination	-	-	-
	-	-	Confidence in autoimmunity	(Confidence in autoimmunity）

Note. Lower categories consisted of more than 2 cords; the categories in the parenthesis were those comprising only one cord.

3.4 Comparing categories of reasons

We compared the categories among the four reasons to understand the profiles of each reason and context properly. Therefore, we compared (A) with (B), (C) with (D), (A) with (C), and (B) with (D), respectively.

Reasons for parents being vaccinated (A) vs. reasons for parents having their children vaccinated (B).

Commonalities. Regarding the reasons for vaccination of parents and children, the commonalities were presented in terms of *consideration of advantages and disadvantages*, *peer pressure, vaccination after considering the vaccination status in the surroundings*, *prevention of infection*, *prevention of serious illness*, and *accessibility of vaccination*.

Differences. Differences between parents and their children based on reasons for vaccination concern *occupational reasons*, *school infection*, and *social disadvantage for the child*. Parents were vaccinated due to *professional reasons*, and they decided to vaccinate their children due to the fear of school infection. Parents were also concerned about the social disadvantage of their children's incomplete vaccination status, i.e., examinations, bullying due to non-vaccination, or isolation. Furthermore, the child's consent was also cited as a reason that incentivized children's vaccination.

Reasons for parents being unvaccinated (C) vs. Reasons for parents whose children remained unvaccinated (D)

Commonalities and differences. First, *lack of information* and *distrust of mass media* for (C) and (D) influenced informed decisions. The *child's lack of consent* and *consideration of advantages and disadvantages* were present only in (D). Second, there were *aversions to injections* and *reluctance to voluntary immunization* both in (C) and (D). These reasons were based on basic opinions about vaccination. There was *intuitive and emotional refusal to be vaccinated* in (C), and *there was more caution about vaccinating children than parents themselves* in (D), which accounts for the differences. Third, there were *unvaccinated after considering the vaccination status in the surroundings* and *no need to get vaccinated if people in the surroundings are vaccinated* in (C). There was *vaccinated or unvaccinated considering the vaccination status of the surroundings*; *if the infection is controlled* and *I will not have my children vaccinated* in (D) with respect to social impact. Both (C) and (D) included *peer backlash.* Fourth, regarding the social supports for vaccination, there were *hassles of going to get vaccinated*, *difficulty in decision making regarding vaccination*, and *childcare concerns* in (C). Instead, there were *missed the opportunity to get vaccinated* and *concerns about support system for post-vaccination emergencies* in (D). Finally, regarding opinions about COVID-19 and its vaccination, *distrust of vaccines*, *concerns about adverse effects*, *concerns about medium- to long-term bodily effects*, *doubt about speed of regulatory approval*, and *confidence in autoimmunity* were identified in categories (C) and (D).

Reasons why parents were vaccinated (A) vs. Reasons why parents were unvaccinated (C).
Commonalities and differences. Many contradictory categories were obtained for (A) and (C). First, informed decisions of the participants were dependent on *opinions from experts, health care professionals, and people engaged in vaccination* in (A), and *lack of information*, *distrust of mass media*, and *acquiring and trusting anti-vaccine information* accessed from Social Network System (SNS) in (C). Second, the participants were *not hesitant to be vaccinated* in (A). There *was intuitive and emotional refusal to be vaccinated* in (C) related to opinions about vaccination. However, there was an *aversion to injections* in (C) but not in (A). Third, regarding the social impact, *vaccinated after considering the vaccination status in the surroundings* was identified in category (A), and *unvaccinated after considering the vaccination status in the surroundings,* and *no need to get vaccinated if people in the surroundings are vaccinated* in (C). *Peer pressure* was obtained in (A). In contrast, *peer pressure backlash* was obtained in (C). Fourth, there was the *accessibility of vaccination* in (A), but there were *hassles of going to get vaccinated* and *difficulty in decision-making regarding vaccination* in (C). Regarding the social support for vaccination. *Childcare concern* was the only reason in common, found in both (A) and (C). Finally, *infection prevention* and *preventing severe infection* were obtained in (A). In contrast, there was *confidence in autoimmunity* in (C) related to opinions about COVID-19 and vaccination. Subsequently, there were *expectations of the vaccine* and *tolerance for adverse effects* (A) and *distrust of vaccines* and *concerns about adverse effects* in (C). Finally, *fear of infection* and *peace of mind through vaccination* were found in (A). In contrast, *concerns about medium- to long-term bodily effects* and *doubts about the speed of regulatory approval* were found in (C).

Reasons for parents had their children vaccinated (B) vs. Reasons for parents had their children unvaccinated (D)
Commonalities. *Consideration of advantages and disadvantages* were obtained in both (B) and (D) despite the difference in contexts. Individuals in category (B) thought the advantages of vaccination outweighed the disadvantages, and those in (D) thought that the disadvantages outweighed the advantages. Parents made their decisions regarding their children's vaccination after considering the vaccine status in the surroundings, but the contexts differed. After considering the surroundings, people decided to get the vaccination for their children in (B) and to refuse it in (D).

Differences. *Infection prevention*, *preventing severe infection*, *concerns about school infection*, and *social disadvantage of children* were identified in category (B). *Concern about adverse effects*, *distrust of vaccines*, *lack of information*, and *distrust of the mass media* were obtained in category (D). Furthermore, there was the *child's consent* in (B) and the *child's lack of consent* in (D).

4. Discussion and conclusion

This study aimed to identify factors that promoted or discouraged vaccination among parents of children under the age of 18. Parents' and children's vaccination status and intentions may be influenced by their infection status at the time and their eligibility for vaccination. The interviews in this study were conducted from December 1, 2021, to January 31, 2022, when the infection situation in Japan was in a dormant period, which was between the fifth and sixth wave, and when domestic adjustments were underway for vaccinating children (to expand vaccination coverage) (See supplemental information, 5-1 & 5-2).

In this study, we qualitatively analyzed how parents made decisions regarding COVID-19 vaccination in changing circumstances. As the COVID-19 situation is dynamic, people's behavior is fluid. Therefore, further research is needed to clarify factors that promote or discourage vaccination of parents and children.

5. Supplemental Information

5.1. New coronavirus cases in Japan during the data acquisition period

There were very few new infections at the beginning of December 2021, when the web surveys and interviews commenced. The number of new cases per day from late October to the middle of December 2021 was approximately the lowest during the spread of the new variant. However, it gradually increased, starting in late December 2021, and it peaked at the end of January 2022 (See the figure below; cited from the open data by the Ministry of Health, Labor, and Welfare in Japan, https://www.mhlw.go.jp/stf/covid-19/open-data.html)
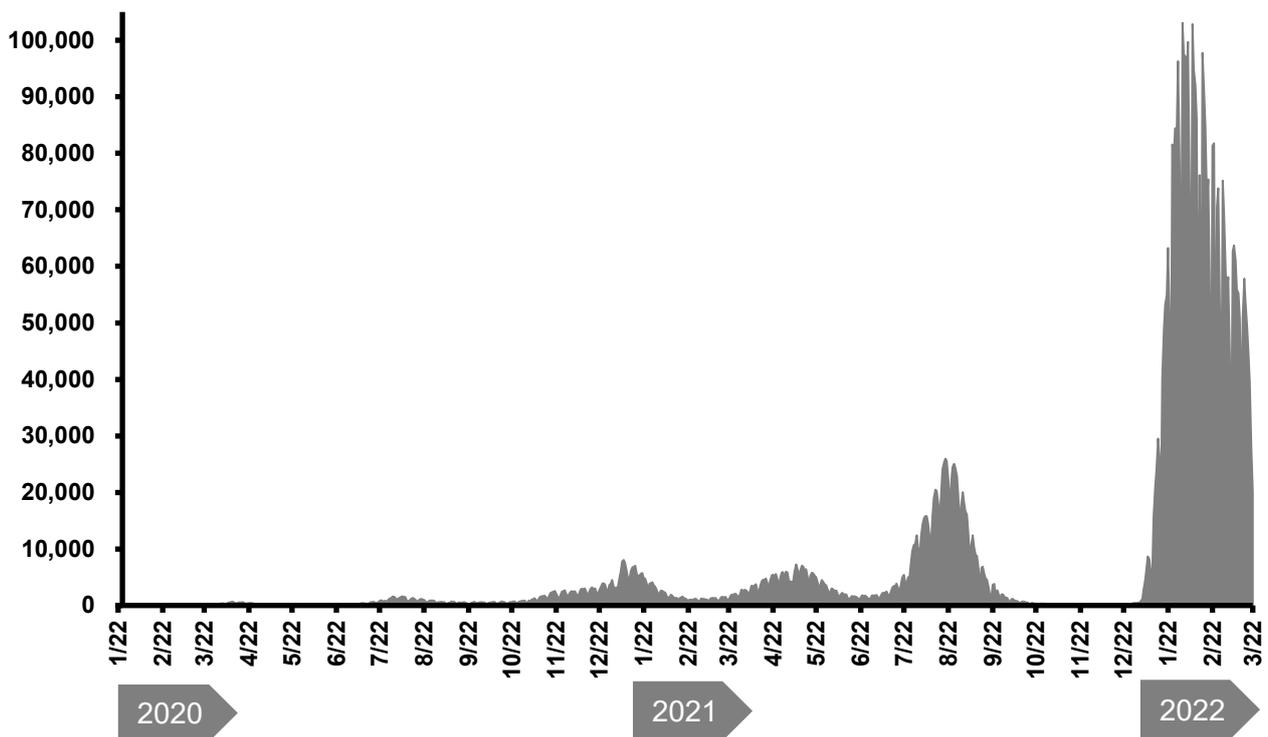
Change of the new coronavirus cases based on the open data by ministry of health, labor, and welfare in Japan

5.2. Trends related to vaccination in Japan

Vaccination Coverage. Vaccination coverage, from 1st December 2021 to 31st January 2022, in Japan was as follows: 1st 76.63%–77.24, 2nd 75.77%–76.70% 2nd, 3rd 0.00% (1560 until December 2) – 3.32%. (We calculated the vaccination rate, referring to the website of the Japanese Cabinet Secretariat: https://www.kantei.go.jp/jp/headline/kansensho/vaccine.html)

Vaccination eligibility. Initially, the target population of the COVID-19 vaccine was children older than 12 years of age and adults. At the beginning of November 2021, speculations on the regulatory application of pediatric vaccination at and above age five became public. Later, in January 2022, this pediatric vaccination policy was approved in Japan.