

Impact of the Spread of COVID-19 on Maternal Examination Behaviors and the Burden on Delivery Facilities in Japan

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Abstract

To evaluate the impact of behavioral restrictions on perinatal care caused by the COVID-19 pandemic, we conducted a questionnaire survey of 1976 medical institutions handling deliveries across Japan. The survey examined changes in the number of antenatal checkups due to behavioral restrictions, visit restrictions at medical institutions, and the acceptance of COVID-19-infected pregnant and nursing mothers. An increased burden was observed at delivery hospitals, irrespective of whether they accepted infected pregnant and nursing mothers. Some medical institutions were unable to manage infected pregnant women and transferred them to other facilities, highlighting the need for role-sharing among institutions. The number of antenatal checkups showed a decreasing trend, indicating that the pandemic negatively affected checkup attendance. However, no clear increase in perinatal deaths was observed during the observation period, despite the reduction in the number of checkups.

Keywords

COVID-19, Behavioral Restriction, Antenatal Checkup, Questionnaire Survey

1. Introduction

COVID-19 significantly altered societal behavior in Japan. Strict behavioral restrictions and mask-wearing were requested to prevent infection [1]. Vaccination was promoted, and in August 2021, vaccination for pregnant and nursing women was recommended regardless of gestational age [2]. In response to the pandemic, infection prevention measures at medical institutions were also strengthened. Fears of COVID-19 infection may have made pregnant women hesitant to attend routine antenatal checkups [3]. Telemedicine remains underdeveloped in Japan, and certain aspects of antenatal health examinations, such as ultrasound scans, cannot be performed remotely. Some pregnant women reconsidered their birth plans, seeking alternative delivery facilities, or birthing centers.

Amid the uncertainties of the COVID-19 pandemic, there was a potential increase in demand for cesarean sections [4]. Additionally, the need for enhanced infection control measures, such as personal protective equipment and isolation rooms, placed further strain on delivery facilities. Medical institutions also faced challenges in maintaining adequate staffing levels due to staff illnesses or quarantine requirements.

A questionnaire survey offers valuable insights into how these challenges impacted different regions of Japan and can help healthcare authorities develop tailored responses. Several previous studies have highlighted the increased anxiety among pregnant women during the pandemic and the potential consequences of missed checkups. However, limited research has specifically focused on the impact of COVID-19-related behavioral restrictions on antenatal care. Our study aims to fill this gap by providing data on the changes in the number of antenatal checkups, the impact on maternal health, and healthcare workers' burdens.

2. Method

A survey targeting 1976 medical institutions providing delivery services across Japan was conducted in March 2024. Questionnaires were mailed to these institutions and returned using enclosed envelopes. The survey included 10 multiplechoice questions (**Table 1**). A clinic with inpatient facilities of fewer than 19 beds is classified as a clinic with beds, while institutions with 20 or more beds are classified as hospitals. In Japan, the perinatal care system consists of core hospitals and affiliated clinics or hospitals forming a perinatal medical zone. Core hospitals with neonatal intensive care units (NICUs) manage high-risk pregnancies, pregnancy-related complications, and most consultations for COVID-19-infected patients.

In Japan, expectant mothers are entitled to up to 14 antenatal health examinations at public expense without co-payment. Survey results were aggregated by calculating response ratios for each question (from Question 4 onward) based on the total number of collected questionnaires.

The Ethics Committee of Nagano Municipal Hospital reviewed and approved this study on October 11, 2023, confirming that there were no ethical concerns (Approval No. 2023 Municipal Hospital Ethics No. 0039).

3. Results

Among the 1976 surveyed delivery facilities (932 hospitals and 1044 clinics), 1012 valid responses were collected, resulting in a response rate of 51.2%. Of these, 513

responses were from hospitals, and 499 were from clinics.

Table 1. A questionnaire from a national survey administered to all birthing centers.

Questionnaire from a National Survey Administered to All Birthing Centers			
Q1. What is the size of your medical institution?	Hospital (proceed to Q2)	Clinic (proceed to Q4)	
Q2. (For hospitals) Is your institution designated for outpatient COVID-19 care?	Yes	No	
Q3. (For hospitals) Does your institution have a respiratory medicine or infectious disease physician on staff?	Yes	No	
All medical institutions were asked the following questions regarding the status of antenatal health checkups between January 2019 and December 2022:			
Q4. Were there any limitations on the number of antenatal health checkups provided?	Yes	No	
Q5. Were there any restrictions on the number of chaperones allowed during antenatal check-ups?	Yes	No	
Q6. Were there any restrictions on outpatient visits other than antenatal checkups?	Yes	No	
Q7. Were medical examination restrictions imposed by the local government?	Yes	No	
Q8. Did your facility accept pregnant or nursing women infected with COVID-19?	Yes	No	
Q9. Did your medical staff work longer hours due to the acceptance of COVID-19-infected pregnant or nursing mothers?	Yes	No	
Q10. Did the acceptance of COVID-19-infected pregnant women increase the psychological burden on your medical staff?	Yes	No	

Among the respondents, 349 facilities (348 hospitals and 1 clinic) were designated as COVID-19 outpatient institutions. A total of 117 facilities (68 hospitals and 49 clinics) implemented restrictions on the number of antenatal checkups, and 908 facilities (438 hospitals and 470 clinics) restricted family accompaniment during checkups. Restrictions on outpatient visits other than antenatal checkups were reported by 453 facilities (218 hospitals and 235 clinics).

A total of 664 facilities (437 hospitals and 227 clinics) accepted COVID-19-infected pregnant women. Of the 638 facilities (399 hospitals and 239 clinics) that responded, respondents reported an increased workload due to patient admissions. Among these, 577 facilities (388 hospitals and 189 clinics) actually received COVID-19-infected pregnant or nursing mothers, while 61 facilities (11 hospitals and 50 clinics) did not. Furthermore, 755 facilities (443 hospitals and 312 clinics) reported an increased psychological burden on healthcare workers due to accepting infected pregnant women (**Table 2**).

The average number of antenatal checkups per woman was 9.77 in 2019, 9.64 in 2020, 9.74 in 2021, and 9.70 in 2022. According to the Japan Society of Obstetrics and Gynecology's Perinatal Database, there were 233,818 registered births, 232,573 deliveries, and 1628 perinatal deaths in 2019; 203,607 registered births,

202,633 deliveries, and 1256 perinatal deaths in 2020; and 212,776 registered births, 211,582 deliveries, and 1527 perinatal deaths in 2021. The perinatal death ratio (per 1,000 deliveries) was 7.0 in 2019, 6.2 in 2020, and 7.2 in 2021.

Table 2. Results of the national questionnaire survey.

Category	Hospitals ($n = 932$)	Clinics (n = 1044)
Valid responses	513	499
COVID-19 outpatient facilities	348	1
Facilities with restrictions on antenatal checkups	68	49
Facilities with restrictions on family accompaniment during checkups	438	470
Facilities with restrictions on outpatient visits (excluding antenatal checkups)	218	235
Facilities accepting COVID-19-infected pregnant women	437	227
Increased workload on medical personnel due to patient admissions	399	239
Facilities that actually received COVID-19-infected patients	388	189
Facilities that did not receive COVID-19-infected patients	11	50
Psychological burden on healthcare workers due to patient acceptance	443	312

4. Discussion

In April 2020, a state of emergency was declared across Japan, and measures to prevent infection were implemented [5]. However, visits to medical institutions were exempted from these restrictions. According to the survey, 60 facilities reported restrictions on medical examinations by local governments, and 11.6% of all facilities limited the number of antenatal checkups. Many facilities also imposed restrictions on family accompaniment during antenatal checkups. Among respondents, 85.1% of hospitals and 45.8% of clinics accepted pregnant women infected with COVID-19. Of these, 89.0% of hospitals and 83.6% of clinics reported increased workloads due to infection prevention measures and managing infected patients. Some facilities temporarily ceased accepting deliveries due to staff infections, highlighting COVID-19's impact on routine medical care. Even facilities that did not accept infected patients reported increased workloads, often due to coordinating patient transfers and implementing infection precautions. These findings suggest the need for a system that promptly designates core hospitals to handle infectious diseases, potentially reducing the burden on smaller facilities. In free-text responses, some facilities reported reducing the frequency of antenatal checkups for infected mothers by spacing out appointments until after their isolation period. Typically, pregnant women in Japan undergo up to 14 antenatal checkups from 8 to 40 weeks of gestation. However, a downward trend in the number of checkups was observed compared to 2019, likely due to the pandemic.

The COVID-19 Pregnancy Registry of the Japan Society of Obstetrics and Gynecology recorded approximately 500 infected pregnant women by December 2021 and 1,354 by September 2022 [6]. Health checkup visits decreased by approximately 140,000 visits in 2020 compared to the previous year. This decline was likely driven not only by infected mothers avoiding checkups but also by noninfected mothers concerned about infection risks. The registry also reported increased rates of threatened miscarriage and preterm delivery among moderately and severely ill pregnant women requiring oxygen. However, no significant increase was observed in obstetric complications such as fetal growth restriction or gestational hypertension [7]. Additionally, the perinatal mortality ratio remained stable between 2019 and 2021, suggesting that a reduction in antenatal checkups did not directly impact perinatal mortality. While the study observed a decrease in the number of checkups, further investigation into the underlying factorssuch as patient fears, transportation issues, or facility restrictions—is warranted. Assessing whether missed appointments were substantial enough to influence health outcomes could offer deeper insights into the implications of reduced checkups.

5. Limitations

This study has several limitations. First, the survey response rate was only 51.2%, which may not fully represent perinatal care across Japan. The relatively low response rate could introduce selection bias, potentially limiting the generalizability of the findings. Second, the perinatal database includes data from approximately 400 delivery facilities, representing only 20% of all such institutions in Japan, limiting its generalizability. Lastly, other potential effects of decreased antenatal checkups, such as increased rates of preterm delivery or severe gestational hypertension, were not evaluated. Future studies should address these factors to determine the optimal number of antenatal checkups.

6. Conclusion

An increased workload related to the management of COVID-19-infected pregnant and nursing mothers was reported by over 60% of the surveyed medical facilities, including those that did not directly accept infected patients. A declining trend in the number of antenatal checkups was also observed during the pandemic. However, no clear association was identified between the reduction in antenatal checkups and an increase in perinatal deaths. This study did not assess the potential rise in other perinatal complications, such as threatened miscarriage or severe gestational hypertension, associated with fewer checkups. Policymakers and healthcare providers should consider strategies to ensure access to antenatal checkups during public health crises, such as improving telemedicine infrastructure or facilitating transportation options for pregnant women. Future research should investigate the impact of reduced antenatal checkups on perinatal outcomes and establish the optimal number of checkups required.

Author' Statement

There is no conflict of interests, which occurs when the authors remain in a financial or personal relationship which unjustly affects his actions associated with the publication of the manuscript. Any possible relationship(s) of the author(s) with the party/parties interested in the publication of the manuscript is revealed in the text of the article. The manuscript has not been published in or submitted to any other journal. This work was supported by MHLW Research on Emerging and Re-emerging Infectious Diseases and Immunization (Program Grant Number JPMH23HA2011).

Conflicts of Interest

The author declares no conflicts of interest.

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