

Perceptions of obstetricians and pediatricians about the risk of COVID-19 for pregnant women and newborns

Nail Obeidat¹ | Rami Saadeh² | Maha Obeidat³ | Wasim Khasawneh⁴ |
Yousef Khader² | Mahmoud Alfaqih⁵

¹Department of Obstetrics and Gynecology, Jordan University of Science and Technology, Irbid, Jordan

²Department of Public Health and Community Medicine, Jordan University of Science and Technology, Irbid, Jordan

³Department of Pediatrics, Princes Rahma Children's Hospital, Irbid, Jordan

⁴Department of Pediatrics and Neonatology, Jordan University of Science and Technology, Irbid, Jordan

⁵Department of Physiology and Biochemistry, Jordan University of Science and Technology, Irbid, Jordan

Correspondence

Wasim Khasawneh, Department of Pediatrics, Jordan University of Science and Technology, Irbid, Jordan.
Email: wakhasawneh@just.edu.jo

Abstract

Objective: To assess the perception of obstetricians and pediatricians about risks of COVID-19 to pregnant women and possible complications in newborns.

Methods: A structured 27-item online survey was sent via social media messaging to obstetricians and pediatricians from public, academic, and private sectors in Jordan between March 23–30, 2020. Descriptive statistics were used to represent numbers and percentages of participants' responses to survey items.

Results: A total of 147 physicians participated (107 obstetricians, 40 pediatricians). Participants were well informed about the symptoms, diagnosis, modes of transmission, and methods of prevention. Participants had variable perceptions about COVID-19 risk during pregnancy, including potential vertical transmission, preferred route of delivery, and safety of breastfeeding. Most participants felt that pregnant women should be prioritized for testing and medical care provision.

Conclusion: While evidence-based strategies to reduce the risks of COVID-19 in pregnant women and newborns are evolving, healthcare providers showed excellent knowledge of the infection and were vigilant regarding its complications for mothers and newborns. To ensure safe pregnancy, physicians must keep informed of developing guidance on best and safest prenatal and perinatal health services. Implementing local hospital policies and adequate training in infection control measures is strongly encouraged.

KEYWORDS

Coronavirus; COVID 19; Jordan; Newborn health; Pregnancy; Pregnant women

1 | INTRODUCTION

Since the appearance of severe acute respiratory syndrome coronavirus 2 (SARS CoV-2) infection, the virus causing coronavirus disease 2019 (COVID-19), late in 2019 in Wuhan, China, the infection quickly spread globally and was declared a pandemic by the World Health Organization (WHO) in March 2020.¹ The number of infected individuals is continuing to rise and by the end of April 2020, more than 3 million individuals have been infected, with a mortality rate of about 8%.² Before the onset of the COVID-19 pandemic, little was known about the risk factors and clinical spectrum caused by the virus. Since

then, research is rapidly evolving on its epidemiology, clinical presentation, and complications.

Respiratory droplets and direct contact with infected individuals or infected surfaces are the most common reported methods of transmission between humans.³ Data on the effect of the disease on pregnant women and their offspring, who are considered a major vulnerable group for infectious diseases, continue to evolve based on reports that mostly include a small number of infected women. Because of the novelty of COVID-19 and the many gaps in our knowledge about the nature of the virus, COVID-19 poses a special challenge to obstetricians and pediatricians. Although the existing evidence supports a

minimal risk, it remains undetermined whether the virus can be transmitted to the fetus in utero, during delivery, or via breastfeeding. In addition, considering the changes in immunity that accompany pregnancy, it is still not clear whether contracting COVID-19 infection during pregnancy is associated with more severe illness or a higher risk of complications such as preterm labor, spontaneous abortion, stillbirth, or birth defects.^{1,4,5} Other challenges facing obstetricians relate to choosing mode of delivery.

As more research is conducted, guidance is produced that is modified periodically as our knowledge evolves. According to current WHO guidelines, pregnant women with confirmed or suspected COVID-19 infection warrant special attention to minimize potential complications and protect healthcare personnel from acquiring the infection. Furthermore, pregnant women should receive adequate prenatal care per existing guidelines, and normal vaginal delivery should be the route of delivery unless otherwise indicated for obstetric reasons. Although encouraged by the WHO while applying the standard respiratory and hand hygiene mandated for all patients with COVID-19, there remains no consistent agreement regarding skin-to-skin care, rooming-in, and breastfeeding.⁶

More recently, it has been reported by the Royal College of Obstetricians and Gynaecologists (RCOG) that COVID-19 is not associated with a higher rate of hospitalization, more severe presentation, or higher mortality among pregnant women compared with others.⁷ Despite that, RCOG still recommends applying more conservative precautions following birth by restricting rooming-in and avoiding direct breastfeeding at least immediately after delivery until the COVID-19-positive mother becomes less infectious. For the same reasons, the American Academy of Pediatrics (AAP) recommends temporary separation of newborns from their mothers and advise feeding with expressed breastmilk.⁸ These organizations reinforce the importance of strict adherence to the precautionary infection control measures using personal protective equipment (PPE) during any direct contact between the mother and her newborn baby.

Providing safe care to pregnant women with COVID-19 infection is a cornerstone of healthcare systems.⁹ Establishing local hospital guidelines that regulate services provided to pregnant women and their newborns requires understanding of the current level of knowledge toward COVID-19.¹ The aim of the present study was to design a questionnaire that tested the perceptions of obstetricians and pediatricians about COVID-19 infection and possible complications in pregnant women and newborns.

2 | MATERIALS AND METHODS

This cross-sectional descriptive study was conducted from March 23–30, 2020. Ethical approval was obtained from the Institutional Review Board at Jordan University of Science and Technology. The study population consisted of obstetricians and pediatricians practicing in different health sectors in Jordan. A web-based structured survey using Google forms (Google LLC, Mountain View, CA, USA) was constructed to collect data. Following a critical review of relevant

literature and guidelines, the survey questions were developed by two public health experts (RS and YK) and then reviewed by an obstetrician (NO) to ensure the validity of the questions and their compatibility with the aims of the study.

Obstetricians and pediatricians were invited to participate in the survey via a social media messaging application. Participants were informed that answering the questionnaire was entirely voluntary. Over 300 invitations were sent and 290 were confirmed as received by the target physicians. Participants were asked to answer multiple-choice questions covering four major areas: (1) sociodemographic and professional characteristics of the participants; (2) level of awareness of the clinical features of COVID-19 (diagnosis, symptoms of the disease, and modes of transmission); (3) risk assessment of COVID-19 and measures for preventing COVID-19 transmission; and (4) perception of the risks in pregnant women and newborns including treatment, delivery, and newborn care.

Data were analyzed using SPSS version 24 (IBM, Armonk, NY, USA). Descriptive statistical analysis was used to describe items included in the survey. Numbers and mean percentages were used to describe the categorical data.

3 | RESULTS

A total of 147 physicians responded to the survey, giving a response rate of 50.7% (n=290). Respondents included 107 (72.8%) obstetricians and 40 (27.2%) pediatricians. More than half (n=79; 53.7%) were younger than 40 years and had less than 10 years of experience (n=78; 53.1%). There were 38 (25.9%) working in teaching hospitals, 54 (36.7%) in the Ministry of Health, 45 (30.6%) in the private sector, and 10 (6.8%) in the Royal Medical Services. A total of 37 (25.2%) had received training in infection control, comprising 24 (22.4%) obstetricians and 13 (32.5%) pediatricians. Training for COVID-19 was reported by 14 (9.5%) physicians (n=7, 6.5% obstetricians and 7, 17.5% pediatricians).

Table 1 shows the participants' awareness of the epidemiological aspects of COVID-19. Almost all participants identified fever, cough, and shortness of breath as symptoms of COVID-19, and 116 (78.9%) were aware that COVID-19 might present with no symptoms. The majority reported that COVID-19 can be transmitted via coughing and sneezing, hand shaking, and touching surfaces and 70 (47.6%) identified the fecal-oral route as a possible mode of transmission. Almost all were aware that risk groups include those with history of travel to areas experiencing transmission of COVID-19 and those with history of contact with confirmed or suspected patients.

As shown in Table 2, participants were aware of the main precautions for preventing the transmission of COVID-19, which include using disposable gloves and face masks, proper hand hygiene, frequent cleaning and sterilizing surfaces, avoidance of hand shaking, and direct contact with suspected or confirmed cases.

As shown in Table 3, 99 (67.3%) perceived that pregnant women are at a higher risk of COVID-19, 33 (22.4%) believed that a pregnant woman with COVID-19 can pass the virus to her fetus or baby during

TABLE 1 Participants' awareness of the epidemiological aspects of COVID-19.^a

Epidemiological variables	Obstetricians (n=107)	Pediatricians (n=40)	Total (n=147)
	No. (%)	No. (%)	No. (%)
Symptoms			
Fever	106 (99.1)	40 (100.0)	146 (99.3)
Shortness of breath	105 (98.1)	39 (97.5)	144 (98.0)
Cough	104 (97.2)	39 (97.5)	143 (97.3)
May present with no symptoms	82 (76.6)	34 (85.0)	116 (78.9)
Joint/muscle pain	82 (76.6)	31 (77.5)	113 (76.9)
Sore throat	78 (72.9)	34 (85.0)	112 (76.2)
Diarrhea	76 (71.0)	23 (57.5)	99 (67.3)
Runny nose	40 (37.4)	18 (45.0)	58 (39.5)
Red eyes	18 (16.8)	8 (20.0)	26 (17.7)
Rash	10 (9.3)	4 (10.0)	14 (9.5)
Mode of transmission			
Droplets via coughing and sneezing	99 (92.5)	40 (100.0)	139 (94.6)
Hand shaking	97 (90.7)	40 (100.0)	137 (93.2)
Touching surfaces e.g. doorknobs and tables	104 (97.2)	40 (100.0)	144 (98.0)
Fecal-oral	50 (46.7)	20 (50.0)	70 (47.6)
Diagnosis			
Real-time PCR with respiratory material	107 (100.0)	40 (100.0)	147 (100.0)
Real-time PCR with serum sample	40 (37.4)	11 (27.5)	51 (34.7)
Chest X-ray	37 (34.6)	11 (27.5)	48 (32.7)
High risk groups			
Presence of symptoms of diarrhea	16 (15.0)	2 (5.0)	18 (12.2)
Presence of symptoms of a respiratory infection	84 (78.5)	30 (75.0)	114 (77.6)
History of travel to areas experiencing transmission of COVID-19	104 (97.2)	40 (100.0)	144 (98.0)
History of contact with potentially infected patients	105 (98.1)	39 (97.5)	144 (98.0)

Abbreviation: PCR, polymerase chain reaction.

^aParticipants could select more than one answer.

delivery, and 63 (42.9%) indicated that a woman with COVID-19 can pass the virus to her baby during breastfeeding. Almost three out of four participants (n=108, 73.5%) felt that pregnant women with COVID-19 will have more complications than other COVID-19 patients. However, a higher number of participants (n=118, 80.3%) reported that other viral respiratory infections, such as infections

caused by the influenza viruses, will cause more severe illness in pregnant women.

Upon asking the participants of their perception of what complications COVID-19 could pose to the fetus, 58 (39.5%) reported no complications, 14 (9.5%) reported respiratory problems, 4 (2.7%) reported congenital disorders, and 71 (48.3%) said that they did not

TABLE 2 Participants' awareness of preventive measures for COVID-19.^a

Preventive measures	Obstetricians (n=107)	Pediatricians (n=40)	Total (n=147)
	No. (%)	No. (%)	No. (%)
Frequently clean hands by using alcohol-based hand rub or soap and water	105 (98.1)	40 (100.0)	145 (98.6)
Routinely clean and disinfect surfaces in contact with known or suspected patients	99 (92.5)	40 (100.0)	139 (94.6)
Put facemask on known or suspected patients	98 (91.6)	38 (95.0)	136 (92.5)
Place known or suspected patients in adequately ventilated single rooms	82 (76.6)	35 (87.5)	117 (79.6)
All health staff members wear protective clothing	92 (86.0)	33 (82.5)	125 (85.0)
Avoid moving and transporting patients out of their area unless necessary	93 (86.9)	39 (97.5)	132 (89.8)

^aParticipants could select more than one answer.

TABLE 3 Participants' perception of risk of COVID-19 for pregnant women, fetuses, and newborns.

Risk variable	Obstetricians (n=107)	Pediatricians (n=40)	Total (n=147)
	No. (%)	No. (%)	No. (%)
Pregnant women are at a higher risk of COVID-19 than other women			
I don't know	12 (11.2)	11 (27.5)	23 (15.6)
No	20 (18.7)	5 (12.5)	25 (17.1)
Yes	75 (70.1)	24 (60.0)	99 (67.3)
A pregnant woman with COVID-19 can pass the virus to her fetus or baby during delivery			
I don't know	27 (25.2)	15 (37.5)	42 (28.6)
No	57 (53.3)	15 (37.5)	72 (49.0)
Yes	23 (21.5)	10 (25.0)	33 (22.4)
A woman with COVID-19 can pass the virus to her baby during breastfeeding			
I don't know	27 (25.2)	8 (20.0)	35 (23.8)
No	36 (33.6)	13 (32.5)	49 (33.3)
Yes	44 (41.1)	19 (47.5)	63 (42.9)
Coronavirus can be detected in breast milk			
I don't know	41 (38.3)	18 (45.0)	59 (40.1)
No	53 (49.5)	18 (45.0)	71 (48.3)
Yes	13 (12.1)	4 (10.0)	17 (11.6)
Pregnant women with COVID-19 will have more complications than other COVID-19 patients			
I don't know	7 (6.5)	10 (25.0)	17 (11.5)
No	17 (15.9)	5 (12.5)	22 (15.0)
Yes	83 (77.6)	25 (62.5)	108 (73.5)
Pregnant women with viruses from the same family as COVID-19, and other viral respiratory infections, such as influenza are at a higher risk of developing severe illness			
No response	1 (0.9)	0 (0.0)	1 (0.7)
I don't know	9 (8.4)	3 (7.5)	12 (8.1)
No	13 (12.1)	3 (7.5)	16 (10.9)
Yes	84 (78.5)	34 (85.0)	118 (80.3)
Complications COVID-19 could have on an unborn baby			
Congenital disorders	2 (1.9)	2 (5.0)	4 (2.7)
I don't know	49 (45.8)	22 (55.0)	71 (48.3)
No complications	45 (42.1)	13 (32.5)	58 (39.5)
Problems with lungs	11 (10.3)	3 (7.5)	14 (9.5)
Women who have children are at a higher risk of COVID-19 than married women who don't have children			
I don't know	22 (20.6)	11 (27.5)	33 (22.4)
No	42 (39.3)	13 (32.5)	55 (37.4)
Yes	43 (40.2)	16 (40.0)	59 (40.2)
Compared to adults, children's risk of COVID-19 is			
Higher than adults	13 (12.2)	1 (2.5)	14 (9.6)
Lower than adults	68 (63.6)	27 (67.5)	95 (64.6)
Similar to adults	26 (24.3)	12 (30.0)	38 (25.8)

know. Further, about two-thirds (n=95, 64.6%) reported that children are at a lower risk of COVID-19 than adults.

A total of 106 (72.1%) participants felt that pregnant women should take additional precautions compared to others. Eighty (54.4%) believed that pregnant women should be given priority for COVID-19 testing and 121 (82.3%) perceived that pregnant women confirmed to have COVID-19 should be given priority in medical treatment and health care (Table 4). A total of 11 (7.5%) physicians (n=5, 4.7% obstetricians and n=6, 15.0% pediatricians) felt that pregnant women with suspected or confirmed COVID-19 should give birth by cesarean delivery, and 50 (34.0%) (n=33, 30.8% obstetricians and n=17, 42.5% pediatricians) believed that women with COVID-19 can safely breast-feed their babies. Interestingly, 51 (34.7%) indicated that women with COVID-19 could breastfeed their baby but it is advisable that they do not.

4 | DISCUSSION

This cross-sectional study involving Jordanian obstetricians and pediatricians indicated that participating physicians are highly knowledgeable about COVID-19 clinical presentation, routes of transmission, and protective measures. It also highlighted variable perceptions about the proper perinatal care of infected pregnant women including the risk of maternal–fetal transmission, mode of delivery, and safety of breastfeeding. This perception might affect the standard of care provided for this group of patients, and so necessitates implementing special training and educational programs to keep healthcare providers up to date with the emerging guidelines established by WHO and other international organizations.

One explanation for the variation of responses is the lack of well-established guidelines and the limited number of available studies in the literature about the risks and complications of COVID-19 during pregnancy, which might be attributed to the relatively recent emergence of this pandemic.¹⁰ Studies from China found that COVID-19 was not isolated from the studied samples of amniotic fluid, cord blood, neonatal throat swabs, placenta swabs, and breastmilk of mothers infected with COVID-19.^{10,11} While some studies that reported COVID-19 infection in neonates showed no severe neonatal complications,^{5,12} others observed some complications in the examined neonates mainly involving respiratory illnesses.⁵

The real connection between these complications and transmission of COVID-19 from an infected mother is not yet known. This was reflected by the perception of participants who did not establish a consensus on routes of transmission between mothers and neonates, but they could agree on possible complications in the newborn. However, their previous knowledge about transmission routes of other viruses and the transmission modes of this virus (Table 4) concluded in their responses that it is better if a mother does not, or even shouldn't, touch or hold her baby (66.7%). Moreover, the severe illness of pregnant women caused by the influenza virus

TABLE 4 Participants' perception of healthcare management provided for pregnant women and newborns infected with COVID-19.

Management	Obstetricians (n=107)	Pediatricians (n=40)	Total (n=147)
	No. (%)	No. (%)	No. (%)
Pregnant women should take extra precautions, other than what others do, to protect themselves from COVID-19			
No response	1 (0.9)	0 (0.0)	1 (0.7)
I don't know	2 (1.9)	1 (2.5)	3 (2.0)
No	23 (21.5)	14 (35.0)	37 (25.2)
Yes	81 (75.7)	25 (62.5)	106 (72.1)
Pregnant women should be prioritized for COVID-19 testing			
No response	2 (1.9)	0 (0.0)	2 (1.4)
I don't know	9 (8.4)	7 (17.5)	16 (10.9)
No	35 (32.7)	14 (35.0)	49 (33.3)
Yes	61 (57.0)	19 (47.5)	80 (54.4)
Pregnant women, who are confirmed cases of COVID-19, should be prioritized in the medical treatment and quality of care they receive			
No response	2 (1.9)	0 (0.0)	2 (1.4)
I don't know	8 (7.5)	2 (5.0)	10 (6.8)
No	10 (9.3)	4 (10.0)	14 (9.5)
Yes	87 (81.3)	34 (85.0)	121 (82.3)
Pregnant women with suspected or confirmed COVID-19 should give birth by cesarean delivery			
I don't know	15 (14.0)	15 (37.5)	30 (20.4)
No	86 (80.4)	19 (47.5)	105 (71.4)
Yes	5 (4.7)	6 (15.0)	11 (7.5)
Women can breastfeed their babies			
No response	1 (0.9)	0 (0.0)	1 (0.7)
I don't know	21 (19.6)	7 (17.5)	28 (19.0)
No	13 (12.1)	4 (10.0)	17 (11.6)
They could, but it is better that they do not	39 (36.4)	12 (30.0)	51 (34.7)
Yes	33 (30.8)	17 (42.5)	50 (34.0)
A woman with COVID-19 can touch and hold her newborn baby			
No response	1 (0.9)	0 (0.0)	1 (0.7)
I don't know	8 (7.5)	6 (15.0)	14 (9.5)
No	34 (31.8)	12 (30.0)	46 (31.3)
They could, but it is better if they do not	40 (37.4)	12 (30.0)	52 (35.4)
Yes	24 (22.4)	10 (25.0)	34 (23.1)

infection contributed to participants' agreement, by over 80%, that viruses other than COVID-19, like influenza, could cause severe illness in the mother.¹³ Participants, therefore, perceived the risk in pregnant women to be higher than others (67.3%) and concluded that pregnant women should take extra precautions; more than what others do (72.1%). While this perception might seem compatible with guidelines and more protective to women, the Centers for Disease Control and Prevention and WHO have not recommended

any extra precautions over what other COVID-19 patients should do.^{6,9,11} Precautionary measures are equally recommended to all individuals because of the virus' fast spread, its wide range of transmission modes, and the unpredictability of complications including the high mortality rate, especially among high-risk groups including complicated pregnancies.¹⁴

Although the transmission of certain infections such as HIV is significantly minimized by elective cesarean delivery,¹⁵ there is no evidence yet on whether cesarean delivery could reduce the risk of COVID-19. Thus, elective cesarean should not be recommended for delivery if normal birth is possible.⁴ That is what most respondents agreed in this survey (71.4%).

The present study showed that most responses were similar between obstetricians and pediatricians. This is most likely explained by the national guidance established by the Jordanian Committee of Epidemiology and Infection Control whose members frequently meet to review the current local and global COVID-19 situation, continuously discuss the developing guidelines by WHO, and update the recommendations about the best and safest healthcare services provided in the country. These recommendations are distributed to all healthcare institutions and strict adherence to the regulations is always monitored to ensure consistency among healthcare providers.

Our study is not without limitations. Despite the relatively adequate sample size, generalizability of data is not possible because the sample was collected among those who were part of the social media groups of the survey distributors and were actively checking their accounts at the time of data collection. However, participants of this study provided an insight into how some Jordanian physicians, obstetricians and pediatricians, perceived the risk of COVID-19 for pregnant women and newborns.

In conclusion, physicians in this study were well informed about COVID-19 in terms of clinical presentation, transmission modes, diagnosis, and recommended preventive measures. Besides the inconsistent perception about the best perinatal care, the major identified gap was related to the inadequacy of training received by our participants regarding COVID-19 disease and infection control measures. The protective protocols mandated by each healthcare system and the widely known infection control measures should be followed to ensure that physicians provide the best care in order to achieve the best possible outcome of pregnancy.

As evidence-based strategies to reduce the risk for pregnant women and newborns are continuously developing, healthcare institutions are strongly encouraged to implement local policies that comply with developing guidelines established by the WHO and other international organizations.

AUTHOR CONTRIBUTIONS

NO substantially contributed to the study design and drafted and reviewed the manuscript. RS contributed to data collection and analysis, manuscript writing, and revision. MO contributed to study design, manuscript writing, and revision. WK contributed to literature

review, manuscript writing, and revision. YK contributed to data collection and analysis. MA contributed to study design, data analysis, and literature review.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

REFERENCES

- Dong L, Tian J, He S, et al. Possible vertical transmission of SARS-CoV-2 from an infected mother to her newborn. *JAMA*. 2020;323:1846–1848.
- Worldometer [website]. COVID-19 Virus Pandemic. <https://www.worldometers.info/coronavirus/>. Accessed May 23, 2020.
- Ibrahim NK, Alwafi HA, Sangoof SO, Turkistani AK, Alattas BM. Cross-infection and infection control in dentistry: Knowledge, attitude and practice of patients attended dental clinics in King Abdulaziz University Hospital, Jeddah, Saudi Arabia. *J Infect Public Health*. 2017;10:438–445.
- World Health Organization. Q&A on pregnancy, childbirth and COVID-19. <https://www.who.int/news-room/q-a-detail/q-a-on-covid-19-pregnancy-childbirth-and-breastfeeding>. Accessed April 6, 2020.
- Zhu H, Wang L, Fang C, et al. Clinical analysis of 10 neonates born to mothers with 2019-nCoV pneumonia. *Transl Pediatr*. 2020;1:51–60.
- World Health Organization. Sexual and reproductive health. Pregnancy, Childbirth, breastfeeding and COVID-19. <https://www.who.int/reproductivehealth/publications/emergencies/COVID-19-pregnancy-ipc-breastfeeding-infographics/en/>. Accessed May 23, 2020.
- Royal College of Obstetricians and Gynaecologists. Coronavirus (COVID-19) infection and pregnancy. <https://www.rcog.org.uk/coronavirus-pregnancy>. Accessed May 23, 2020.
- Wyckoff AS. AAP updates guidance on newborns whose mothers have suspected or confirmed COVID-19. AAP News. May 21, 2020. <https://www.aappublications.org/news/2020/05/21/covid19newborn052120>. Accessed May 23, 2020.
- Centers for Disease Control and Prevention. Coronavirus Disease (COVID-19) and Breastfeeding. <https://www.cdc.gov/breastfeeding/breastfeeding-special-circumstances/maternal-or-infant-illnesses/covid-19-and-breastfeeding.html>. Accessed April 5, 2020.
- Chen S, Huang B, Luo DJ, et al. Pregnant women with new coronavirus infection: A clinical characteristics and placental pathological analysis of three cases. [in Chinese] *Zhonghua Bing Li Xue Za Zhi*. 2020;49:418–423.
- Chen H, Guo J, Wang C, et al. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. *Lancet*. 2020;395:809–815.
- Liu J, Liao X, Qian S, et al. Community transmission of severe acute respiratory syndrome coronavirus 2, Shenzhen, China, 2020. *Emerg Infect Dis*. 2020;26:1320–1323.
- Kourtis AP, Read JS, Jamieson DJ. Pregnancy and infection. *New Engl J Med*. 2014;370:2211–2218.
- Centers for Disease Control and Prevention. People Who Need to Take Extra Precautions. <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/index.html>. Accessed May 23, 2020.
- International Perinatal HIV Group; Andiman W, Bryson Y, et al. The mode of delivery and the risk of vertical transmission of human immunodeficiency virus type 1—a meta-analysis of 15 prospective cohort studies. *N Engl J Med*. 1999;340:977–987.