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## Search Pack P201 Coronavirus (COVID-19) - vaccination in pregnancy

Updated 8 April 2022

Information on vaccination against COVID-19 for pregnant and breastfeeding women and those considering pregnancy. Includes records on safety, fertility, pregnancy outcome, decision-making, accessibility and take-up of vaccination, exclusion of pregnant women from clinical trials, and parliamentary questions.

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**2022-02215**

**Antibodies Against SARS-CoV-2 in Human Breast Milk After Vaccination: A Systematic Review and Meta-Analysis.** Whited N, Cervantes J (2022), Breastfeeding Medicine 22 March 2022, online

Background: CDC guidelines have recommended coronavirus disease-19 (COVID-19) vaccination for all people 5 years and older, including people who are breastfeeding. Breast milk has shown to be a valuable source of protection for immune-immature neonates. It has been shown that breast milk from mothers who have received vaccinations can transfer antibodies.

Aim/Objective: This systematic review and meta-analysis investigate the presence of antibodies to SARS-CoV-2 in human breast milk after vaccination.

Methods: Studies that evaluated immunoglobulins in breast milk of women receiving a SARS-CoV-2 vaccination were included. PubMed, Embase, Web of Science were searched for articles published between December 1, 2019 and September 30, 2021. Data from relevant articles were extracted manually or by WebPlotDigitizer version 4.1 to obtain the numeric values of antibody levels on peak days and the peak day then condensed into Excel. Additional raw data and information were supplied by corresponding authors.

Results: One hundred ninety-two articles were obtained from the search. After excluding duplicates, screening titles and abstracts, 18 cohort studies were identified. For the rate of SARS-CoV-2 antibodies in breast milk after the first vaccine dose but before the second vaccine dose, we found 64% (95% CI 51–78%) were positive for IgA and 30% (95% CI 13.1–46%) were positive for IgG. For the rate for SARS-CoV-2 antibodies in breast milk after the second vaccine dose, we found 70% (95% CI 55–86%) were positive for IgA and 91% (95% CI 80–103%) were positive for IgG.

Conclusions: Our analysis of the data published worldwide showed high rates of positivity for antibodies in breast milk following COVID-19 immunizations. Further research is necessary to find if the rate of positivity of IgA and IgG against SARS-CoV-2 in breast milk persists months after the full immunization, and their impact on the prevention of SARS-CoV-2 infection in infants. (Author)

**Full URL:** <https://doi.org/10.1089/bfm.2021.0353>

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**2022-02206**

**Evaluation of Adverse Effects in Nursing Mothers and Their Infants After COVID-19 mRNA Vaccination.** Ramírez DSR, Hernández MIS, Vilar AMF, et al (2022), *Breastfeeding Medicine* 9 March 2022, online

**Background and Objectives:** Breastfeeding women are generally excluded from clinical trials with new vaccines. The objective of the study was to explore whether the BNT162b2 mRNA and mRNA-1273 COVID-19 vaccines are safe for breastfeeding mothers and their breastfed infants.

**Methods:** A convenience sample prospective cohort single institution study was performed on breastfeeding health care professionals, who were exposed to second dose of SARS-CoV2 vaccine at the beginning of the study period. They and their breastfed children's symptoms were followed up through online questionnaires for 14 days.

**Results:** Of the 95 finally included participants, only 1 was lost to follow-up on day 7. Mean age of the mothers was  $35.9 \pm 3.9$  years and that of their infants was  $14.6 \pm 12.1$  months. At least one adverse event was reported by 85% (95% confidence interval [CI]: 76–91.5%) of the mothers. The most frequent was injection site pain in 81% of cases. Moreover, 31% (95% CI: 22–41%) observed some event in their breastfed children. Most frequently, 19% (95% CI: 13–30%) of the children were irritable. During the 14 days of follow-up, 36% of the children (95% CI: 27–46%) were diagnosed with respiratory infection.

**Conclusions:** Most mothers' reactions were mild and transitory, generally limited to the first 3 days after vaccination. Many children's events were associated with concomitant infectious processes and we did not detect a notable peak on any particular day of follow-up. Neither mothers nor their infants developed serious adverse events nor were they diagnosed with COVID-19 within the study period. (Author)

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**2022-02128**

**COVID-19 Vaccination among Pregnant People in the U.S.: A Systematic Review.** Pharm SR, Tackett RL, Stone RH, et al (2022), American Journal of Obstetrics & Gynecology MFM 10 March 2022, online

**Objectives:** Pregnant people are at increased risk of COVID-19 related morbidity and mortality, and vaccination presents an important strategy to prevent negative outcomes. However, pregnant people were not included in vaccine trials, and there is limited data on COVID-19 vaccines during pregnancy. The objectives of this systematic review were to identify the safety, immunogenicity, effectiveness, and acceptance of COVID-19 vaccination among pregnant people in the U.S.

**Data Sources:** Four databases (PubMed, Web of Science, CINAHL, and Google Scholar) were used to identify eligible studies published from January 01, 2020, through February 06, 2022.

**Study Eligibility Criteria:** Inclusion criteria were peer-reviewed empirical research conducted in the U.S., published in English, and addressed one of the following topics: safety, immunogenicity, effectiveness, and acceptance of COVID-19 vaccination among pregnant people.

**Study Appraisal and Synthesis Methods:** A narrative synthesis approach was used to synthesize findings. Critical appraisal was done using the Joanna Briggs Institute (JBI) tool.

**Results:** Thirty-two studies were identified. The majority of studies (n = 25) reported the use of Pfizer and Moderna COVID-19 vaccines among pregnant people; only six reported the Janssen vaccine. Of the 32 studies, 11 examined COVID-19 vaccine safety, 10 investigated immunogenicity and effectiveness, and 11 assessed vaccine acceptance among pregnant people.

Injection site pain and fatigue were the most common adverse events. One case study reported immune thrombocytopenia (ITP). COVID-19 vaccination did not increase the risk of adverse pregnancy or neonatal outcomes in comparison to unvaccinated pregnant people. After COVID-19 vaccination, pregnant people elicited a robust immune response, and vaccinations conferred protective immunity to newborns through breast milk and the placental transfer. COVID-19 vaccine acceptance was low among pregnant people in the U.S. African American race, Hispanic ethnicity, younger age, low education, prior refusal of the influenza vaccine, and lack of provider counseling were associated with low vaccine acceptance.

**Conclusions:** Peer-reviewed studies support COVID-19 vaccine safety and protective effects on pregnant people and their newborns. Future studies that use rigorous methodologies and include diverse populations are needed to confirm current findings. In addition, targeted and tailored strategies are needed to improve vaccine acceptance especially among minorities. (Author)

**Full URL:** <https://doi.org/10.1016/j.ajogmf.2022.100616>

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**2022-01922**

**Association of SARS-CoV-2 Vaccination During Pregnancy With Pregnancy Outcomes.** Magnus MC, Örtqvist AK, Dahlqvist E, et al (2022), JAMA (Journal of the American Medical Association) 24 March 2022, online

**Importance** Data about the safety of vaccines against SARS-CoV-2 during pregnancy are limited.

**Objective** To examine the risk of adverse pregnancy outcomes after vaccination against SARS-CoV-2 during pregnancy.

**Design, Setting, and Participants** This registry-based retrospective cohort study included 157 521 singleton pregnancies ending after 22 gestational weeks from January 1, 2021, until January 12, 2022 (Sweden), or January 15, 2022 (Norway). The Pregnancy Register in Sweden and the Medical Birth Registry of Norway were linked to vaccination and other registries for identification of exposure and background characteristics.

**Exposures** Data on mRNA vaccines—BNT162b2 (Pfizer-BioNTech) and mRNA-1273 (Moderna)—and 1 viral vector vaccine—AZD1222 (AstraZeneca)—were collected from national vaccination registries.

**Main Outcomes and Measures** The risk of preterm birth and stillbirth was evaluated using Cox regression models, with gestational day as the time metric and vaccination as a time-dependent exposure variable. The risk of small for gestational age, low Apgar score, and neonatal care admission was evaluated using logistic regression. Random-effects meta-analysis was used to combine results between countries.

**Results** Among the 157 521 singleton births included in the study (103 409 in Sweden and 54 112 in Norway), the mean maternal age at the time of delivery was 31 years, and 28 506 (18%) were vaccinated against SARS-CoV-2 (12.9% with BNT162b2, 4.8% with mRNA-1273, and 0.3% with AZD1222) while pregnant. A total of 0.7%, 8.3%, and 9.1% of individuals delivering were vaccinated during the first, second, and third trimester, respectively. Vaccination against SARS-CoV-2 was not significantly associated with increased risk of preterm birth (6.2 vs 4.9 per 10 000 pregnancy days; adjusted hazard ratio [aHR], 0.98 [95% CI, 0.91 to 1.05]; I<sup>2</sup> = 0%; P for heterogeneity = .60), stillbirth (2.1 vs 2.4 per 100 000 pregnancy days; aHR, 0.86 [95% CI, 0.63 to 1.17]), small for gestational age (7.8% vs 8.5%; difference, -0.6% [95% CI, -1.3% to 0.2%]; adjusted OR [aOR], 0.97 [95% CI, 0.90 to 1.04]), low Apgar score (1.5% vs 1.6%; difference, -0.05% [95% CI, -0.3% to 0.1%]; aOR, 0.97 [95% CI, 0.87 to 1.08]), or neonatal care admission (8.5% vs 8.5%; difference, 0.003% [95% CI, -0.9% to 0.9%]; aOR, 0.97 [95% CI, 0.86 to 1.10]).

**Conclusions and Relevance** In this population-based study conducted in Sweden and Norway, vaccination against SARS-CoV-2 during pregnancy, compared with no SARS-CoV-2 vaccination during pregnancy, was not significantly associated with an increased risk of adverse pregnancy outcomes. The majority of the vaccinations were with mRNA vaccines during the second and third trimesters of pregnancy, which should be considered in interpreting the findings. (Author)

**Full URL:** <https://doi.org/10.1001/jama.2022.3271>

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## 2022-01921

**Association of COVID-19 Vaccination in Pregnancy With Adverse Peripartum Outcomes.** Fell DB, Dhinsa T, Alton GD, et al (2022), JAMA (Journal of the American Medical Association) 24 March 2022, online

**Importance** There is limited comparative epidemiological evidence on outcomes associated with COVID-19 vaccination during pregnancy; monitoring pregnancy outcomes in large populations is required.

**Objective** To evaluate peripartum outcomes following COVID-19 vaccination during pregnancy.

**Design, Setting, and Participants** Population-based retrospective cohort study in Ontario, Canada, using a birth registry linked with the provincial COVID-19 immunization database. All births between December 14, 2020, and September 30, 2021, were included.

**Exposures** COVID-19 vaccination during pregnancy, COVID-19 vaccination after pregnancy, and no vaccination.

**Main Outcomes and Measures** Postpartum hemorrhage, chorioamnionitis, cesarean delivery (overall and emergency cesarean delivery), admission to neonatal intensive care unit (NICU), and low newborn 5-minute Apgar score (<7). Linear and robust Poisson regression was used to generate adjusted risk differences (aRDs) and risk ratios (aRRs), respectively, comparing cumulative incidence of outcomes in those who received COVID-19 vaccination during pregnancy with those vaccinated after pregnancy and those with no record of COVID-19 vaccination at any point. Inverse probability of treatment weights were used to adjust for confounding.

**Results** Among 97 590 individuals (mean [SD] age, 31.9 [4.9] years), 22 660 (23%) received at least 1 dose of COVID-19 vaccine during pregnancy (63.6% received dose 1 in the third trimester; 99.8% received an mRNA vaccine). Comparing those vaccinated during vs after pregnancy (n = 44 815), there were no significantly increased risks of postpartum hemorrhage (incidence: 3.0% vs 3.0%; aRD, -0.28 per 100 individuals [95% CI, -0.59 to 0.03]; aRR, 0.91 [95% CI, 0.82-1.02]), chorioamnionitis (0.5% vs 0.5%; aRD, -0.04 per 100 individuals [95% CI, -0.17 to 0.09]; aRR, 0.92 [95% CI, 0.70-1.21]), cesarean delivery (30.8% vs 32.2%; aRD, -2.73 per 100 individuals [95% CI, -3.59 to -1.88]; aRR, 0.92 [95% CI, 0.89-0.95]), NICU admission (11.0% vs 13.3%; aRD, -1.89 per 100 newborns [95% CI, -2.49 to -1.30]; aRR, 0.85 [95% CI, 0.80-0.90]), or low Apgar score (1.8% vs 2.0%; aRD, -0.31 per 100 newborns [95% CI, -0.56 to -0.06]; aRR, 0.84 [95% CI, 0.73-0.97]). Findings were qualitatively similar when compared with individuals who did not receive COVID-19 vaccination at any point (n = 30 115).

**Conclusions and Relevance** In this population-based cohort study in Ontario, Canada, COVID-19 vaccination during pregnancy, compared with vaccination after pregnancy and with no vaccination, was not significantly associated with increased risk of adverse peripartum outcomes. Study interpretation should consider that the vaccinations received during pregnancy were primarily mRNA vaccines administered in the second and third trimester. (Author)

**Full URL:** <https://doi.org/10.1001/jama.2022.4255>

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## 2022-01885

**Effects of Covid-19 fear on the attitudes toward Covid-19 vaccination in reproductive women.** Tarus HA, Ölmez Yalazı R, Öz T, et al (2022), Health Care for Women International vol 43, no 4, 2022, pp 398-412

This research aimed to determine the effect of Covid-19 fears on attitudes of women of reproductive age toward Covid-19 vaccination. This descriptive cross-sectional study was conducted with 413 women aged 18–49. “Participant Identification Form,” “Fear of Covid-19 Scale (FCV-19S)” and “Attitudes Towards Covid-19 Vaccine Scale (ATV-Covid-19)” were used to collect data. Kruskal Wallis test, Man Whitney U test and Spearman correlation test were used to evaluate the data. The mean FCV-19S total score of the women within the scope of the study was  $18.70 \pm 5.34$ . The mean score of the positive attitude sub-dimension of ATV-Covid-19 of women was  $14.09 \pm 3.80$ , the mean score of the negative attitude sub-dimension was  $16.21 \pm 3.26$ . A positive, weak and statistically significant correlation was found between FCV-19S total score and ATV-Covid-19 positive attitude sub-dimension mean score ( $p < 0.05$ ). It was determined that the women within the scope of the study had a moderate fear of Covid-19. However, more women had positive than negative attitudes toward Covid-19 vaccines. In addition, as the level of fear of Covid-19 increases, positive attitudes toward the Covid-19 vaccines increase. (Author)

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## 2022-01265

**Maternity Services: Coronavirus [written answer].** House of Commons (2022), Hansard Written question 117054, 2 February 2022

Maria Caulfield responds to a written question asked by Annelise Dodds to the Secretary of State for Health and Social Care regarding how many NHS Trust maternity services offer pregnant women vaccinations in their antenatal clinics; and whether the NHS has plans to roll this out to all maternity services. (MB)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2022-02-02/117054>

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## 2022-01134

**COVID-19 vaccine in pregnancy: don't forget pregnant women and people seeking asylum.** Zaidi F (2022), The Practising Midwife vol 25, no 3, March 2022, pp 20-24

Pregnant women and people are at an increased risk of severe disease and pregnancy complications if they contract severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). In April 2021, the Joint Committee on Vaccination and Immunisation (JCVI) advised this group to take the Pfizer/BioNTech or Moderna COVID-19 vaccines; however, recent data from Public Health England (PHE) indicate that this population are vaccine-hesitant. As midwives urge this cohort to get vaccinated, consideration should be given to pregnant women and people seeking asylum so that they are not left out. This population experience significant health and social inequalities, which place them at a higher risk of developing serious illness from COVID-19. This article considers the risk factors for infection, and the barriers and facilitators for COVID-19 vaccines in pregnancy. This article uses the term 'pregnant women and people seeking asylum' as it focuses on the people seeking asylum and not their status. (Author)

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## 2022-01040

### Characteristics and perceptions associated with COVID-19 vaccination hesitancy among pregnant and postpartum

**individuals: A cross-sectional study.** Kiefer MK, Mehl RR, Costantine MM, et al (2022), BJOG: An International Journal of Obstetrics and Gynaecology 1 February 2022, online

#### Objective

To assess the frequency and associated characteristics of COVID-19 vaccine hesitancy among pregnant and postpartum individuals.

#### Design

Cross-sectional study.

#### Setting

Prenatal care at a single academic tertiary care centre.

#### Population

Pregnant and postpartum individuals enrolled in prenatal care at a single academic tertiary care centre from 22 March 2021 to 2 April 2021, concurrent with state guidelines recommending COVID-19 vaccination in pregnancy.

#### Methods

We used logistic regression to identify characteristics associated with COVID-19 vaccine hesitancy, and adjusted for: age, parity, race, trimester of pregnancy, and chronic comorbidities.

#### Main outcome measures

COVID-19 vaccine hesitancy, defined as uncertainty or refusal of the vaccine, despite the availability of vaccine services, in accordance with the World Health Organization (WHO) Strategic Advisory Group of Experts (SAGE) on vaccine hesitancy.

#### Results

Of the 485 individuals screened and approached, 456 (94%) enrolled and completed the survey (435/456, 95% pregnant). The frequency of COVID-19 vaccine hesitancy was 46% (95% CI 41%–51%). Sociodemographic characteristics, including non-Hispanic Black race, younger age, lower education, public health insurance receipt, parity >1, and reported substance use, were associated with a higher odds of COVID-19 vaccine hesitancy, but not clinical risk conditions. Individuals who had a family or friend vaccinated for COVID-19, prior or planned vaccination for tetanus, diphtheria and acellular pertussis (Tdap) and/or influenza, and who perceived that vaccination benefited the baby were less likely to express COVID-19 vaccine hesitancy.

#### Conclusions

COVID-19 vaccine hesitancy was frequent among pregnant and postpartum individuals. Those who may face barriers to accessing healthcare services were more likely to report vaccine hesitancy. These results can inform interventions to increase COVID-19 vaccine uptake in pregnancy. (Author)

**Full URL:** <https://doi.org/10.1111/1471-0528.17110>

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## 2022-01005

**Safety of SARS-CoV-2 vaccination during pregnancy- obstetric outcomes from a large cohort study.** Dick A, Rosenbloom JI, Gutman-Ido E, et al (2022), BMC Pregnancy and Childbirth vol 22, no 166, 28 February 2022

### Background

COVID-19 during pregnancy is associated with adverse outcomes for mother and fetus. SARS-CoV-2 vaccination has significantly reduced the risk of symptomatic disease. Several small studies have reported the safety of SARS-CoV-2 vaccination during pregnancy, with no adverse effect on obstetric outcomes.

### Objective

To examine the association between SARS-CoV-2 vaccination during pregnancy and maternal and neonatal outcomes in a large cohort study. Furthermore, to evaluate if timing of vaccination during pregnancy is related to adverse outcomes.

### Methods

A retrospective cohort study of women who delivered between December 2020 and July 2021 at a large tertiary medical center. Excluded were women with multiple pregnancy, vaccination prior to pregnancy, COVID-19 infection during or before pregnancy, or unknown timing of vaccination. Primary outcomes were the incidence of preterm labor and of small for gestational age. Secondary outcomes were other maternal and neonatal complications. A secondary analysis investigating the association between time of vaccination and outcomes was also performed. Multivariable logistic regression models were used to adjust for potential confounders.

### Results

There were 5618 women who met the inclusion criteria: 2,305 (41%) women were vaccinated and 3,313 (59%) were unvaccinated. There were no differences between vaccinated and non-vaccinated patients with respect to primary outcomes. The rate of preterm birth was 5.5% in the vaccinated group compared to 6.2% in the unvaccinated group ( $p = 0.31$ ). Likewise, the rates of small for gestational age were comparable between the two groups (6.2% vs. 7.0% respectively,  $p = 0.2$ ).

In a secondary analysis focusing on time of vaccination and its relationship with outcomes, patients vaccinated in the second trimester ( $n = 964$ ) and in the third trimester ( $n = 1329$ ) were independently compared to their unvaccinated counterparts. Women who were vaccinated in the second trimester were more likely to have a preterm birth (8.1% vs. 6.2%,  $p < 0.001$ ). This association persisted after adjusting for potential confounders (adjusted odds ratio 1.49, 95%CI 1.11, 2.01).

### Conclusions

SARS-CoV-2 vaccine appears to be safe during pregnancy with no increase in incidence of preterm labor and small for gestational age compared to unvaccinated women. However, in women vaccinated during the second trimester there may be an increase in the rate of preterm birth. (Author)

Full URL: <https://doi.org/10.1186/s12884-022-04505-5>

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## 2022-00907

**Prioritise research on vaccines for pregnant and breastfeeding women.** Manca T, Baylis F, Munoz FM, et al (2022), The Lancet vol 399, no 10328, 5 March 2022, pp 890-893

The authors highlight the importance of including pregnant and breastfeeding women in vaccine research, and discuss the recommendation that pregnant and breastfeeding women receive the COVID-19 vaccine despite the absence of clinical trial data. (LDO)

Full URL: [https://doi.org/10.1016/S0140-6736\(22\)00379-8](https://doi.org/10.1016/S0140-6736(22)00379-8)

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**2022-00799**

**COVID-19 Vaccine in Pregnancy: Vaccine Hesitancy Among Obstetricians and Midwives.** O'Neill AM, O'Riordan SL, Yuddandi V (2022), Irish Medical Journal vol 115, no 2, February 2022, P552

Correspondence piece presenting a study on vaccine hesitancy among obstetricians and midwives in one unit in Ireland. Results show that 71% and 91% of respondents would recommend the COVID-19 vaccine to pregnant women in the first and second surveys respectively. (LDO)

Full URL: <http://imj.ie/covid-19-vaccine-in-pregnancy-vaccine-hesitancy-among-obstetricians-and-midwives/>

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**2022-00639**

**Durability of Anti-Spike Antibodies in Infants After Maternal COVID-19 Vaccination or Natural Infection.** Shook LL, Atyeo CG, Yonker LM, et al (2022), JAMA (Journal of the American Medical Association) vol 327, no 11, 15 March 2022, pp 1087-1089

This study compared the persistence anti-Spike IgG titers in infants of vaccinated mothers vs mothers who had been naturally infected with COVID-19. (Author)

Full URL: <https://doi.org/10.1001/jama.2022.1206>

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**2022-00568**

**Acceptance and willingness to pay for COVID-19 vaccines among pregnant women in Vietnam.** Nguyen LH, Bruyn E, Webster R, et al (2021), Tropical Medicine & International Health vol 26, no 10, October 2021, pp 1303-1313

Objectives

The aim of this study was to assess acceptance of COVID-19 vaccination and the willingness to pay (WTP) for it, and investigate associated factors among pregnant women in Vietnam.

Methods

Cross-sectional survey of pregnant women in two obstetric hospitals in Hanoi and Ca Mau provinces, Vietnam. Data on acceptance and WTP for COVID-19, demographic characteristics, maternal characteristics, and risk perceptions toward COVID-19 were collected. Multivariate logistic and linear regression models were performed to identify factors associated with the acceptance and WTP for the vaccine.

Results

Of 651 pregnant women, 60.4% accepted to receive the vaccine, and 82.6% of the total pregnant women were willing to pay for a COVID-19 vaccine with the mean amount of WTP of USD 15.2 (SD ± 27.4). The most common reason for refusing vaccination was "Worry about the safety of the vaccine" (66.9%) in Hanoi and "The preventive effect of COVID-19 is low" (45.2%) in Ca Mau. A higher income, having children, self-perceived risk of COVID-19 infection, and perceived risk to friends were associated with a higher likelihood of acceptance and WTP for the vaccine.

Conclusions

Implementing COVID-19 vaccination and resource mobilisation among pregnant women in Vietnam is feasible, although communication programmes to improve risk perception and awareness about vaccine should be developed for facilitating acceptance of the vaccine. (Author)

Full URL: <https://doi.org/10.1111/tmi.13666>

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**2022-00223**

**Covid vaccine: Pregnant women urged not to delay getting jab.** Morton B (2021), BBC News 10 January 2021

Pregnant women are being urged not to delay getting their Covid jab or booster in a government campaign. (Author)

Full URL: [https://www.bbc.co.uk/news/uk-59930786?at\\_medium=RSS&at\\_campaign=KARANGA](https://www.bbc.co.uk/news/uk-59930786?at_medium=RSS&at_campaign=KARANGA)

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2022-00159

**Scientific Evidence Supporting Coronavirus Disease 2019 (COVID-19) Vaccine Efficacy and Safety in People Planning to Conceive or Who Are Pregnant or Lactating.** Girardi G, Bremer AA (2022), *Obstetrics & Gynecology* vol 139, no 1, January 2022, pp 3-8

Three coronavirus disease 2019 (COVID-19) vaccines have been authorized for use in the United States; specifically, the Pfizer–BioNTech, Moderna, and Johnson & Johnson–Janssen COVID-19 vaccines were granted emergency use authorization by the U.S. Food and Drug Administration in late 2020 and early 2021. Vaccination coverage and intent among adults are lowest among those aged 18–39 years and among females in particular. In females of reproductive age, enthusiasm for receiving a COVID-19 vaccine may be negatively affected by claims currently circulating widely on diverse social media platforms regarding the vaccines adversely affecting fertility and pregnancy. Yet it is important to note that these claims are anecdotal in nature and not supported by the available scientific evidence. It is also imperative that the effects of COVID-19 vaccine on reproductive health are clarified. Herein, we discuss the existing scientific data supporting COVID-19 vaccine safety and efficacy in people who are planning to conceive or who are pregnant or lactating and highlight the importance of COVID-19 vaccination in females of reproductive age. (Author)

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2022-00158

**COVID-19 and novel mRNA vaccines in pregnancy: an updated literature review.** Joubert E, Kekeh AC, Amin CN (2022), *BJOG: An International Journal of Obstetrics and Gynaecology* vol 129, no 1, January 2022, pp 21-28

The novel coronavirus, SARS-CoV-2, or COVID-19, has affected the world on a pandemic scale resulting in catastrophic outcomes and deaths. Currently, there is limited safety data specific to mRNA vaccine use in pregnant or lactating individuals and the potential risks to a pregnant individual and the fetus are unknown. We report an updated literature review of current information and evidence available to aid in the decision whether to vaccinate against COVID-19 currently being made by pregnant individuals and their healthcare providers so that they are able to make a well-informed recommendation and decision. (Author)

Full URL: <https://doi.org/10.1111/1471-0528.16973>

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2022-00142

**Maternal Outcomes After Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Infection in Vaccinated Compared With Unvaccinated Pregnant Patients.** Morgan JA, Biggio JR, Martin JK, et al (2022), *Obstetrics & Gynecology* vol 139, no 1, January 2022, pp 107-109

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) vaccination is associated with lower odds of severe or critical coronavirus disease 2019 (COVID-19) or COVID-19 of any severity in pregnant patients during the Delta-predominant fourth SARS-CoV-2 surge. (Author)

Full URL: [https://journals.lww.com/greenjournal/fulltext/9900/maternal\\_outcomes\\_after\\_severe\\_acute\\_respiratory.320.aspx](https://journals.lww.com/greenjournal/fulltext/9900/maternal_outcomes_after_severe_acute_respiratory.320.aspx)

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## 2022-00028

### Monitoring the safety of COVID-19 vaccination in pregnancy in the UK: A national study using the UK Obstetric Surveillance System (UKOSS), UK Teratology Information Service (UKTIS) and Vaccination in Pregnancy (VIP) safety monitoring systems.

Richardson JL, Stephens S, Chappell LC, et al (2022), *Obstetric Medicine* 8 February 2022, online

#### Background

COVID-19 vaccines are protective against disease. Pregnant women benefit from vaccination as they are at higher risk of poor maternal and neonatal outcomes following infection.

#### Methods

Following regulatory approval of two COVID-19 vaccines in the United Kingdom, a rapid national study of vaccination in pregnancy was instituted using three existing safety surveillance platforms: UKOSS, UKTIS and VIP. This preliminary report describes the data collected up to the 15th June 2021.

#### Results

There were 971 reports of COVID-19 vaccination in the UKOSS/UKTIS (n = 493) and VIP (n = 478) monitoring systems describing 908 individual pregnancies. Pfizer-BioNTech mRNA vaccination was most common (n = 501, 55.2%), most women were vaccinated in their second or third trimester (n = 566, 62.3%), and were mainly vaccinated due to occupational infection risk (n = 577, 63.5%).

#### Conclusion

Obstetric outcome data will be obtained by December 2021. However, women should not delay vaccination whilst awaiting further safety data to emerge. (Author)

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**2022-00011**

**In Vitro Fertilization and Early Pregnancy Outcomes After Coronavirus Disease 2019 (COVID-19) Vaccination.** Aharon D, Lederman M, Ghofranian A, et al (2022), *Obstetrics & Gynecology* 25 January 2022, online

**OBJECTIVE:**

To assess whether coronavirus disease 2019 (COVID-19) mRNA vaccination is associated with controlled ovarian hyperstimulation or early pregnancy outcomes.

**METHODS:**

This retrospective cohort study included patients who underwent controlled ovarian hyperstimulation or single euploid frozen-thawed embryo transfer at a single academic center. Patients fully vaccinated with a COVID-19 mRNA vaccine were compared with unvaccinated patients who cycled during the same time period. The primary outcome was the fertilization rate for controlled ovarian hyperstimulation and the clinical pregnancy rate for frozen-thawed embryo transfer. Secondary outcomes for controlled ovarian hyperstimulation included eggs retrieved, mature oocytes retrieved, mature oocytes ratio, blastulation rate, and euploid rate. Secondary outcomes for frozen-thawed embryo transfer included pregnancy rate, ongoing pregnancy rate, biochemical pregnancy loss rate, and clinical pregnancy loss rate.

**RESULTS:**

Among 222 vaccinated patients and 983 unvaccinated patients who underwent controlled ovarian hyperstimulation cycles between February and September 2021, there was no association on adjusted analysis between COVID-19 vaccination and fertilization rate ( $\beta=0.02\pm0.02$ ,  $P=.20$ ) or any of the secondary outcomes assessed: eggs retrieved ( $\beta=0.01\pm0.57$ ,  $P=.99$ ), mature oocytes retrieved ( $\beta=0.26\pm0.47$ ,  $P=.58$ ), mature oocytes ratio ( $\beta=0.02\pm0.01$ ,  $P=.12$ ), blastulation rate ( $\beta=0.02\pm0.02$ ,  $P=.27$ ), or euploid rate ( $\beta=0.05\pm0.03$ ,  $P=.08$ ). Among 214 vaccinated patients and 733 unvaccinated patients undergoing single euploid frozen-thawed embryo transfer, adjusted analysis demonstrated no significant association between vaccination and clinical pregnancy (adjusted odds ratio [aOR] 0.79, 95% CI 0.54–1.16) or any of the secondary outcomes: pregnancy (aOR 0.88, 95% CI 0.58–1.33), ongoing pregnancy (aOR 0.90, 95% CI 0.61–1.31), biochemical pregnancy loss (aOR 1.21, 95% CI 0.69–2.14), or clinical pregnancy loss (aOR 1.02, 95% CI 0.51–2.06).

**CONCLUSION:**

Administration of COVID-19 mRNA vaccines was not associated with an adverse effect on stimulation or early pregnancy outcomes after IVF. Our findings contribute to the growing body of evidence regarding the safety of COVID-19 vaccination in women who are trying to conceive. (Author)

**Full URL:** <https://doi.org/10.1097/AOG.0000000000004713>

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## 2021-14573

**Short-term outcome of pregnant women vaccinated with BNT162b2 mRNA COVID-19 vaccine.** Bookstein Peretz S, Regev N, Novick L, et al (2021), *Ultrasound in Obstetrics and Gynecology* vol 58, no 3, September 2021, pp 450-456

### Objectives

To determine the immunogenicity and reactogenicity of the Pfizer/BioNTech BNT162b2 mRNA coronavirus disease 2019 (COVID-19) vaccine among pregnant women compared with non-pregnant women, and to evaluate obstetric outcome following vaccination.

### Methods

This was an observational case–control study of pregnant women who were vaccinated with a two-dose regimen of the BNT162b2 vaccine during gestation between January and February 2021 (study group) and age-matched non-pregnant women who received the vaccine during the same time period (control group). Participants received a digital questionnaire 1–4 weeks after the second dose and were asked to provide information regarding demographics, medication, medical history, history of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, timing of COVID-19 vaccine doses and side effects after each vaccine dose. A second digital questionnaire, regarding current pregnancy and delivery outcomes, was sent to patients in the study group after the calculated due date. All recruited women were offered a serology blood test for SARS-CoV-2 immunoglobulin G (IgG) following the second vaccination dose and SARS-CoV-2 IgG levels were compared between the two groups.

### Results

Of 539 pregnant women who were recruited after completion of the two-dose regimen of the vaccine, 390 returned the digital questionnaire and were included in the study group and compared to 260 age-matched non-pregnant vaccinated women. The rates of rash, fever and severe fatigue following vaccination among pregnant women were comparable to those in non-pregnant women. Myalgia, arthralgia and headache were significantly less common among pregnant women after each dose, local pain or swelling and axillary lymphadenopathy were significantly less common among pregnant women after the first and second doses, respectively, while paresthesia was significantly more common among the pregnant population after the second dose. Among pregnant women, there were no significant differences in the rates of side effects according to whether the vaccine was administered during the first, second or third trimester of pregnancy, except for local pain/swelling, which was significantly less common after the first dose when administered during the third trimester, and uterine contractions, which were significantly more common after the second dose when administered during the third trimester. The rates of obstetric complications, including uterine contractions (1.3% after the first dose and 6.4% after the second dose), vaginal bleeding (0.3% after the first dose and 1.5% after the second dose) and prelabor rupture of membranes (0% after the first dose and 0.8% after the second dose), were very low following vaccination. All serum samples in both groups were positive for SARS-CoV-2 IgG. However, pregnant women had significantly lower serum SARS-CoV-2 IgG levels compared to non-pregnant women (signal-to-cut-off ratio, 27.03 vs 34.35, respectively;  $P < 0.001$ ). Among the 57 pregnant women who delivered during the study period and who completed the second questionnaire, median gestational age at delivery was 39.5 (interquartile range, 38.7–40.0) weeks, with no cases of preterm birth  $< 37$  weeks, no cases of fetal or neonatal death and two (3.5%) cases of admission to the neonatal intensive care unit for respiratory support.

### Conclusions

The adverse-effect profile and short-term obstetric and neonatal outcomes among pregnant women who were vaccinated with the BNT162b2 vaccine at any stage of pregnancy do not indicate any safety concerns. The vaccine is effective in generating a humoral immune response in pregnant women, although SARS-CoV-2 IgG levels were lower than those observed in non-pregnant vaccinated women. © 2021 International Society of Ultrasound in Obstetrics and Gynecology. (Author)

Full URL: <https://doi.org/10.1002/uog.23729>

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**2021-13932**

**Association of Gestational Age at Coronavirus Disease 2019 (COVID-19) Vaccination, History of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Infection, and a Vaccine Booster Dose With Maternal and Umbilical Cord Antibody Levels at Delivery.** Yang YJ, Murphy EA, Singh S, et al (2022), *Obstetrics & Gynecology* vol 139, no 3, March 2022, pp 373-380

**OBJECTIVE:**

To describe maternal and umbilical cord blood anti-spike immunoglobulin (Ig)G levels at delivery with coronavirus disease 2019 (COVID-19) vaccination before and during pregnancy and to assess the association of prior severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection and a vaccine booster dose with anti-spike maternal and umbilical cord IgG levels.

**METHODS:**

We conducted a retrospective cohort study of women with self-reported COVID-19 vaccination (Pfizer-BioNTech, Moderna, or Johnson & Johnson/Janssen), including a booster dose, during or before pregnancy, who delivered at 34 weeks of gestation or more. Maternal and umbilical cord blood samples at delivery were analyzed for semi-quantitative anti-spike IgG. We examined the association between timing of maternal vaccination and maternal and umbilical cord anti-spike levels using a rank sum test. The relationships between a prior history of SARS-CoV-2 infection and maternal and umbilical cord anti-spike IgG levels, and between a booster dose and maternal and umbilical cord anti-spike levels, were also evaluated using a rank sum test.

**RESULTS:**

We included data from 1,359 vaccinated pregnant women, including 20 women who received a booster dose, and 1,362 umbilical cord samples. Maternal anti-spike IgG levels were detectable at delivery regardless of timing of vaccination throughout pregnancy among fully vaccinated women; however, early third-trimester vaccination was associated with the highest anti-spike IgG levels in maternal and umbilical cord blood. Among women with a history of SARS-CoV-2 infection, maternal and cord blood antibody response achieved with vaccination in early pregnancy was comparable with third-trimester vaccination in pregnant women without a history of SARS-CoV-2 infection. A booster dose in the third trimester was associated with maternal anti-spike IgG levels greater than third-trimester vaccination in women with or without a history of SARS-CoV-2 infection.

**DISCUSSION:**

Vaccination against COVID-19 before and throughout pregnancy was associated with detectable maternal anti-spike IgG levels at delivery. A complete vaccination course, prior history of SARS-CoV-2 infection, and a third-trimester booster dose were associated with the highest maternal and umbilical cord antibody levels. (Author)

**Full URL:** <https://doi.org/10.1097/AOG.0000000000004693>

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**2021-13850**

**Guidance for design and analysis of observational studies of fetal and newborn outcomes following COVID-19 vaccination during pregnancy.** Fell DB, Dimitris MC, Hutcheon JA, et al (2021), Vaccine vol 39, no 14, 1 April 2021, pp 1882-1886

COVID-19 vaccines are now being deployed as essential tools in the public health response to the global SARS-CoV-2 pandemic. Pregnant individuals are a unique subgroup of the population with distinctive considerations regarding risk and benefit that extend beyond themselves to their fetus/newborn. As a complement to traditional pharmacovigilance and clinical studies, evidence to comprehensively assess COVID-19 vaccine safety in pregnancy will need to be generated through observational epidemiologic studies in large populations. However, there are several unique methodological challenges that face observational assessments of vaccination during pregnancy, some of which may be more pronounced for COVID-19 studies. In this contribution, we discuss the most critical study design, data collection, and analytical issues likely to arise. We offer brief guidance to optimize the quality of such studies to ensure their maximum value for informing public health decision-making. (Author)

Full URL: <https://doi.org/10.1016/j.vaccine.2021.02.070>

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**2021-13841**

**Early exploration of COVID-19 vaccination safety and effectiveness during pregnancy: interim descriptive data from a prospective observational study.** Bleicher I, Kadour-Peero E, Sagi-Dain L, et al (2021), Vaccine vol 39, no 44, 22 October 2021, pp 6535-6538

Objective

During December 2020, a massive vaccination program was introduced in our country. The Pfizer-BioNTech, BNT162b2 vaccine was first offered exclusively to high-risk population, such as medical personnel (including pregnant women). In this study we compare short term outcomes in vaccinated vs. non-vaccinated pregnant women.

Methods

In this prospective observational cohort study, vaccinated and non-vaccinated pregnant women were recruited using an online Google forms questionnaire targeting medical groups on Facebook and WhatsApp. A second questionnaire was sent one month after the first one for interim analysis. Our primary outcome was composite complications in vaccinated and non-vaccinated groups, considered any of the following: vaginal bleeding, pregnancy loss, hypertension, gestational diabetes, and preterm birth. Secondary outcomes included: vaccine side effects, diagnosis of COVID-19 since the last questionnaire, prevalence of vaccinated participants, and reasons for refusal to be vaccinated.

Results

Overall, 432 women answered the first questionnaire, of which 326 responses were received to the second questionnaire. Vaccination rate increased from 25.5% to 62% within a month. Maternal age, gestational age at enrollment, nulliparity and number of children were similar in both groups. The rate of composite pregnancy complications was similar between vaccinated and non-vaccinated group (15.8% vs 20.1%,  $p = 0.37$ ), respectively. The risk for COVID-19 infection was significantly lower in the vaccinated group (1.5% vs 6.5%,  $p = 0.024$ , Odds Ratio: 4.5, 95% confidence interval 1.19–17.6).

Conclusions

mRNA vaccine during pregnancy does not seem to increase the rate of pregnancy complications and is effective in prevention of COVID-19 infection. (Author)

Full URL: <https://doi.org/10.1016/j.vaccine.2021.09.043>

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## 2021-13840

**Prenatal maternal COVID-19 vaccination and pregnancy outcomes.** Wainstock T, Yoels I, Sergienko R, et al (2021), Vaccine vol 39, no 41, 1 October 2021, pp 6037-6040

### Background

Prenatal maternal physiological changes may cause severe COVID-19 among pregnant women. The Pfizer-BioNTech COVID-19 vaccine (BNT162b2 mRNA) has been shown to be highly effective and it is recommended for individuals aged  $\geq 16$  years, including pregnant women, although the vaccine has not been tested on the latter.

### Objective

To study the association between prenatal Pfizer-BioNTech COVID-19 vaccination, pregnancy course and outcomes.

### Study design

A retrospective cohort study was performed, including all women who delivered between January and June 2021 at Soroka University Medical Center, the largest birth center in Israel. Excluded were women diagnosed with COVID-19 in the past, multiple gestations or unknown vaccination status. Pregnancy, delivery and newborn complications were compared between women who received 1 or 2-dose vaccines during pregnancy and unvaccinated women. Multivariable models were used to adjust for background characteristics.

### Results

A total of 4,399 women participated in this study, 913 (20.8%) of which were vaccinated during pregnancy. All vaccinations occurred during second or third trimesters. As compared to the unvaccinated women, vaccinated women were older, more likely to conceive following fertility treatments, to have sufficient prenatal care, and of higher socioeconomic position. In both crude and multivariable analyses, no differences were found between the groups in pregnancy, delivery and newborn complications, including gestational age at delivery, incidence of small for gestational age and newborn respiratory complications.

### Conclusions

Prenatal maternal COVID-19 vaccine has no adverse effects on pregnancy course and outcomes. These findings may help pregnant women and health care providers to make informed decision regarding vaccination. (Author)

Full URL: <https://doi.org/10.1016/j.vaccine.2021.09.012>

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## 2021-13710

**NHSE warns of significant variation in pregnant women's vaccination uptake.** Trivedi SS (2022), Health Service Journal 26 January 2022

An NHS England letter has warned of "significant variation" in the uptake of the covid-19 vaccine amongst pregnant women, and called on systems to enable more "spontaneous" antenatal vaccination. (Author)

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## 2021-13698

**Severe COVID-19 in pregnancy is almost exclusively limited to unvaccinated women – time for policies to change.** Engjom H, van den Akker T, Aabakke A, et al (2022), The Lancet Regional Health - Europe 26 January 2022, online

Commentary piece analysing data from the International Network of Obstetric Survey Systems (INOSS) collected in the United Kingdom (UK), the Netherlands, Norway, Denmark, Finland and Italy between May and December 2021. Results show that at least 80% of pregnant women admitted to critical care with COVID-19 were unvaccinated across the six countries, including 98% of pregnant women in the UK. (LDO)

Full URL: <https://doi.org/10.1016/j.lanepe.2022.100313>

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## 2021-13690

**Women's views on accepting COVID-19 vaccination during and after pregnancy, and for their babies: a multi-methods study in the UK.** Skirrow H, Barnett S, Bell S, et al (2022), BMC Pregnancy and Childbirth vol 22, no 33, 14 January 2022

### Background

COVID-19 vaccines are advised for pregnant women in the United Kingdom (UK) however COVID-19 vaccine uptake among pregnant women is inadequate.

### Methods

An online survey and semi-structured interviews were used to investigate pregnant women's views on COVID-19 vaccine acceptability for themselves when pregnant, not pregnant and for their babies. One thousand one hundred eighty-one women, aged over 16 years, who had been pregnant since 23rd March 2020, were surveyed between 3rd August–11th October 2020. Ten women were interviewed.

### Results

The majority of women surveyed (81.2%) reported that they would 'definitely' or were 'leaning towards' accepting a COVID-19 vaccine when not pregnant. COVID-19 vaccine acceptance was significantly lower during pregnancy (62.1%,  $p < 0.005$ ) and for their babies (69.9%,  $p < 0.005$ ). Ethnic minority women were twice as likely to reject a COVID-19 vaccine for themselves when not pregnant, pregnant and for their babies compared to women from White ethnic groups ( $p < 0.005$ ). Women from lower-income households, aged under 25-years, and from some geographic regions were more likely to reject a COVID-19 vaccine when not pregnant, pregnant and for their babies. Multivariate analysis revealed that income and ethnicity were the main drivers of the observed age and regional differences. Women unvaccinated against pertussis in pregnancy were over four times more likely to reject COVID-19 vaccines when not pregnant, pregnant and for their babies. Thematic analysis of the survey freetext responses and interviews found safety concerns about COVID-19 vaccines were common though wider mistrust in vaccines was also expressed. Trust in vaccines and the health system were also reasons women gave for accepting COVID-19 vaccines.

### Conclusion

Safety information on COVID-19 vaccines must be clearly communicated to pregnant women to provide reassurance and facilitate informed pregnancy vaccine decisions. Targeted interventions to promote COVID-19 vaccine uptake among ethnic minority and lower-income women may be needed. (Author)

**Full URL:** <https://doi.org/10.1186/s12884-021-04321-3>

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## 2021-13679

**COVID-19: latest safety data provide reassurance about use of mRNA vaccines during pregnancy.** European Medicines Agency (2022), Amsterdam: European Medicines Agency 18 January 2022

Summarises the findings of a review of approximately 65,000 pregnancies at different stages, conducted by the European Medicines Agency's COVID-19 task force (ETF), which concluded that pregnancy complications are not increased by the administration of mRNA vaccines. Studies also showed that vaccination is as effective at reducing hospitalisation and death in the pregnant population as it is in the non pregnant population, and side effects from COVID-19 vaccines are the same in both groups. These include pain, redness or swelling at the injection site, fatigue, muscle pain and chills, all of which usually subside in a few days. States that most of the information involves mRNA vaccines (Comirnaty and Spikevax) but the EMA intends to review data from other authorised COVID-19 vaccines when they become available. (JSM)

**Full URL:** <https://www.ema.europa.eu/en/news/covid-19-latest-safety-data-provide-reassurance-about-use-mrna-vaccines-during-pregnancy>

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## 2021-13520

**Covid-19: Severe complications during pregnancy are more common in unvaccinated women, study finds.** Mahase E (2022), BMJ vol 376, no 8322, 17 January 2022, o117

Unvaccinated women accounted for 77% of SARS-CoV-2 infections that have occurred during pregnancy in Scotland and 98% of infections that led to a critical care admission, a study has found (1).

1. Stock SJ et al. Nature Medicine, 13 January 2022, online. <https://doi.org/10.1038/s41591-021-01666-2>.

(Author, edited)

Full URL: <https://doi.org/10.1136/bmj.o117>

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## 2021-13519

**Covid-19: Vaccination during pregnancy is safe, finds large US study.** Hopkins Tanne J (2022), BMJ vol 376, 7 January 2022, o27

A US study (1) of 46 079 pregnancies has found that vaccination against covid-19 was safe and did not increase the risk of preterm birth or small for gestational age babies.

1. Lipkind HS et al. Morbidity and Mortality Weekly Report (MMWR), vol 71, no 1, January 2022, pp 26-30.

<https://doi.org/10.15585/mmwr.mm7101e1> pmid:34990445.

(Author, edited)

Full URL: <https://doi.org/10.1136/bmj.o27>

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## 2021-13518

**Receipt of COVID-19 Vaccine During Pregnancy and Preterm or Small-for-Gestational-Age at Birth - Eight Integrated Health Care Organizations, United States, December 15, 2020-July 22, 2021.** Lipkind HS, Vazquez-Benitez G, DeSilva M, et al (2022),

Morbidity and Mortality Weekly Report (MMWR) vol 71, no 1, 7 January 2022, pp 26-30

What is already known about this topic?

Pregnant women with COVID-19 are at increased risk for severe illness and adverse birth outcomes, yet many remain reluctant to be vaccinated.

What is added by this report?

In a retrospective cohort of >40,000 pregnant women, COVID-19 vaccination during pregnancy was not associated with preterm birth or small-for-gestational-age at birth overall, stratified by trimester of vaccination, or number of vaccine doses received during pregnancy, compared with unvaccinated pregnant women.

What are the implications for public health practice?

These data support the safety of COVID-19 vaccination during pregnancy. CDC recommends COVID-19 vaccination for women who are pregnant, recently pregnant, who are trying to become pregnant now, or who might become pregnant in the future.

(Author)

Full URL: <http://dx.doi.org/10.15585/mmwr.mm7101e1>

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## 2021-13460

**Covid coma pregnancy: Wolverhampton mum 'devastated' to lose son.** BBC News (2021), BBC News 15 January 2022

A woman has spoken of her "devastation" after losing a baby delivered while she was in an induced coma with Covid. (Author)

Full URL: [https://www.bbc.co.uk/news/uk-england-birmingham-59996683?at\\_medium=RSS&at\\_campaign=KARANGA](https://www.bbc.co.uk/news/uk-england-birmingham-59996683?at_medium=RSS&at_campaign=KARANGA)

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## 2021-13441

**Covid in pregnancy linked to birth-related complications.** Anon (2022), BBC News 13 January 2022

A new study (1) has linked Covid-19 to complications during pregnancy.

1. Stock SJ. Nature Medicine, 13 January 2022, online. <https://doi.org/10.1038/s41591-021-01666-2>.

(Author, edited)

Full URL: <https://www.bbc.co.uk/news/uk-scotland-59986452>

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## 2021-13440

**SARS-CoV-2 infection and COVID-19 vaccination rates in pregnant women in Scotland.** Stock SJ, Carruthers J, Calvert C, et al (2022), Nature Medicine 13 January 2022, online

Population-level data on COVID-19 vaccine uptake in pregnancy and SARS-CoV-2 infection outcomes are lacking. We describe COVID-19 vaccine uptake and SARS-CoV-2 infection in pregnant women in Scotland, using whole-population data from a national, prospective cohort. Between the start of a COVID-19 vaccine program in Scotland, on 8 December 2020 and 31 October 2021, 25,917 COVID-19 vaccinations were given to 18,457 pregnant women. Vaccine coverage was substantially lower in pregnant women than in the general female population of 18–44 years; 32.3% of women giving birth in October 2021 had two doses of vaccine compared to 77.4% in all women. The extended perinatal mortality rate for women who gave birth within 28 d of a COVID-19 diagnosis was 22.6 per 1,000 births (95% CI 12.9–38.5; pandemic background rate 5.6 per 1,000 births; 452 out of 80,456; 95% CI 5.1–6.2). Overall, 77.4% (3,833 out of 4,950; 95% CI 76.2–78.6) of SARS-CoV-2 infections, 90.9% (748 out of 823; 95% CI 88.7–92.7) of SARS-CoV-2 associated with hospital admission and 98% (102 out of 104; 95% CI 92.5–99.7) of SARS-CoV-2 associated with critical care admission, as well as all baby deaths, occurred in pregnant women who were unvaccinated at the time of COVID-19 diagnosis. Addressing low vaccine uptake rates in pregnant women is imperative to protect the health of women and babies in the ongoing pandemic. (Author)

Full URL: <https://doi.org/10.1038/s41591-021-01666-2>

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## 2021-13208

**Developing a fast-track COVID-19 vaccination clinic for pregnant people.** Cater K, Yazbek J, Morris P, et al (2022), British Journal of Midwifery vol 30, no 1, January 2022, pp 41-46

A pilot fast-track COVID-19 vaccination clinic was created in the east of England to provide expert advice, education and support for pregnant people. As the COVID-19 pandemic has progressed, it is clear that pregnant people are at high risk of becoming seriously unwell with the COVID-19 virus. Establishment of the clinic led to a 20% increase in COVID-19 vaccine uptake in this group, with 211 vaccinations between 28 June and 30 September 2021. Almost two-thirds (59%) of pregnant people reported they would not have taken up the vaccination if they had not discussed it as part of this service. Over half of those attending (50.2%) reside within the index of multiple deprivation levels 1–4, the most severely deprived areas. This article explores the development of the fast-track vaccination service and seeks to support others wishing to replicate its delivery in their areas. (Author)

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## 2021-13167

**Characterizing initial COVID-19 vaccine attitudes among pregnancy-capable healthcare workers.** Perez MJ, Paul R, Raghuraman N, et al (2022), American Journal of Obstetrics & Gynecology MFM vol 4, no 2, March 2022, 100557

### Background

Healthcare workers were prioritized for COVID-19 vaccination roll-out due to high occupational risk. Vaccine trials excluded individuals who were trying to conceive, pregnant, and lactating necessitating vaccine decision-making in the absence of data specific to this population.

### Objective

To determine initial attitudes about COVID-19 vaccination in pregnancy-capable healthcare workers by reproductive status and occupational exposure.

### Study Design

We performed a structured survey distributed via social media of US-based healthcare workers involved in patient care since March 2020 who were pregnancy-capable (biological female sex without history of sterilization or hysterectomy) from January 8th to 31st, 2021. Participants were asked about their desire to receive the COVID-19 vaccine and perceived safety for the COVID-19 vaccine using five-point Likert items with "1" being "I strongly don't want the vaccine"/"very unsafe for me" and "5" being "I strongly want the vaccine"/"very safe for me." We categorized participants into two groups: 1) reproductive intent (preventing pregnancy vs. attempting pregnancy, currently pregnant, or currently lactating), and 2) perceived COVID-19 occupational risk (high vs. low). We used descriptive statistics to characterize the respondents and their attitudes about the vaccine. Comparisons between reproductive and COVID-19 risk groups were conducted using Mann Whitney U.

### Results

Our survey included 11,405 pregnancy-capable healthcare workers: 51.3% were preventing pregnancy (n=5,846) and 48.7% (n=5,559) were attempting pregnancy, currently pregnant, and/or lactating. Most respondents (n=8,394, 73.6%) had received a vaccine dose at the time of survey completion. Most participants strongly desired vaccination (75.3%) and very few were strongly averse (1.5%). While the distribution of responses was significantly different between respondents attempting conception, pregnant, and/or lactating versus those preventing pregnancy and respondents with high versus lower occupational risk of COVID-19, the effect sizes were small and the distribution was the same for each group (median, interquartile range: 5 [4-5]).

### Conclusions

The majority of healthcare workers desired vaccination. Negative feelings toward vaccination were uncommon but were significantly higher in those attempting pregnancy, pregnant, and lactating and with lower perceived occupational risk of acquiring COVID-19, though the effect size was small. Understanding healthcare workers' attitudes toward vaccination may help guide interventions to improve vaccine education and uptake in the general population. (Author)

Full URL: <https://doi.org/10.1016/j.ajogmf.2021.100557>

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## 2021-13065

**Coronavirus: Vaccination [written answer].** House of Commons (2021), Hansard Written question 92886, 14 December 2021  
Maggie Throup responds to a written question from Bob Blackman to the Secretary of State for Health and Social Care, regarding what steps his Department is taking to increase the uptake of the covid-19 vaccine among pregnant women. (JSM)

Full URL: <https://questions-statements.parliament.uk/written-questions/detail/2021-12-14/92886>

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### 2021-13031

**Coronavirus: Vaccination [written answer].** House of Commons (2021), Hansard Written question 90872, 10 December 2021

Maggie Throup responds to a written question from Stella Creasy to the Secretary of State for Health and Social Care, regarding which hospital trusts are providing covid-19 vaccinations at antenatal clinics; and from what date each of those clinics began providing those vaccinations. (MB)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-12-10/90872>

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### 2021-12970

**Coronavirus: Vaccination [written answer].** House of Commons (2021), Hansard Written question 82127, 25 November 2021

Maggie Throup responds to a written question from Kim Leadbeater to the Secretary of State for Health and Social Care, regarding whether he plans to take steps to help ensure that pregnant women of all ages have access to covid-19 booster vaccinations. (JSM)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-11-25/82127>

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### 2021-12793

**Maternity Royal Colleges welcome prioritisation of pregnant women for COVID-19 vaccination.** Royal College of Obstetricians and Gynaecologists (2021), London: RCOG 16 December 2021

Press release stating that the Royal College of Obstetricians and Gynaecologists (RCOG) and the Royal College of Midwives (RCM) has welcomed the decision from the Joint Committee on Vaccination and Immunisation (JCVI) that pregnant women are to be given priority for receiving covid vaccinations.

**Full URL:** <https://www.rcog.org.uk/en/news/maternity-royal-colleges-welcome-prioritisation-of-pregnant-women-for-covid-19-vaccination/>

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### 2021-12792

**Pregnant women put on UK's priority Covid vaccine list.** Anon (2021), BBC News 16 December 2021

Reports that pregnant women are to be given priority status for COVID-19 vaccinations and boosters. States that some women have died in pregnancy after contracting coronavirus and there is evidence of a higher risk of premature birth. (JSM)

**Full URL:** [https://www.bbc.co.uk/news/health-59684926?at\\_medium=RSS&at\\_campaign=KARANGA](https://www.bbc.co.uk/news/health-59684926?at_medium=RSS&at_campaign=KARANGA)

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### 2021-12765

**Coronavirus: Vaccination [written answer].** House of Commons (2021), Hansard Written question 90872, 10 December 2021

Maggie Throup responds to a written question asked by Stella Creasy to the Secretary of State for Health and Social Care, regarding which hospital trusts are providing COVID-19 vaccinations at antenatal clinics; and from what date each of those clinics began providing those vaccinations. (LDO)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-12-10/90872>

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## 2021-12757

### **The association of maternal SARS-CoV-2 vaccination-to-delivery interval and the levels of maternal and cord blood**

**antibodies.** Bashi TB-M, Amikam U, Ashwal E, et al (2022), International Journal of Gynecology & Obstetrics vol 156, no 3, March 2022, pp 436-443

#### Objective

To evaluate the correlation of maternal and cord blood levels of SARS-CoV-2 antibodies in pregnant women immunized against COVID-19.

#### Methods

A prospective cohort study was performed of pregnant women who delivered at a single university affiliated tertiary medical center. Women who received the COVID-19 vaccine (BNT162b2 Pfizer©) were approached. The correlation between levels of maternal sera and umbilical cord SARS-CoV-2 specific IgG was assessed.

#### Results

Overall, 58 women were included; of them, 19 had received a single dose and 39 received two doses of the COVID-19 vaccine. Positive levels of umbilical cord IgG were found in 13/19 (68.4%) and 38/39 (97.4%) women after the administration of a single dose and two doses of the vaccine, respectively. The levels of SARS-CoV-2 IgG antibodies in the maternal sera of vaccinated women were positively correlated to their respective concentrations in cord blood sera ( $\rho = 0.857$ ;  $R^2$  linear = 0.719;  $P < 0.001$ ). Thirteen days after vaccination, the ratio of maternal-to-umbilical cord anti Spike IgG antibodies was approximately 1, indicating relatively similar levels in maternal and cord sera.

#### Conclusion

After the SARS-CoV-2 vaccine, levels of maternal and cord blood antibodies were positively correlated, especially when tested after 13 days following administration of the first dose of the vaccine. (Author)

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## 2021-12704

**Worldwide beliefs among pregnant women on SARS-CoV-2 vaccine: a systematic review.** Carbone L, Di Girolamo R, Mappa I, et al (2022), European Journal of Obstetrics & Gynecology and Reproductive Biology vol 268, January 2022, pp 144-164

#### Background

SARS-CoV-2 vaccine has been recommended to pregnant women, but survey studies showed contrasting findings worldwide in relation to the willingness to accept vaccination during pregnancy.

#### Objective

To evaluate the evidence from the literature regarding the acceptance rate of the SARS-CoV-2 vaccine in pregnant and breastfeeding women.

#### Study design

We performed a systematic review on the main databases (MEDLINE (PubMed), Scopus, ISI Web of Science) searching for all the peer-reviewed survey studies analyzing the eventual acceptance rate of the SARS-CoV-2 vaccine among pregnant and breastfeeding women. To combine data meta-analyses of proportions and pooled proportions with their 95% confidence intervals (CI) were calculated.

#### Results

15 studies including 25,839 women were included in the analysis. The proportion of women actually willing to be vaccinated during pregnancy is 49.1% (95% CI, 42.3–56.0), and the proportion of breastfeeding women is 61.6% (95% CI, 50.0–75.0).

#### Conclusion

The cumulative SARS-CoV-2 vaccine acceptance rate among pregnant women appears still low. Vaccinal campaign are urgently needed to drive more confidence into the vaccine to help reducing the spread of the infection and the possible consequences during pregnancy. (Author)

**Full URL:** <https://doi.org/10.1016/j.ejogrb.2021.12.003>

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### 2021-12655

**Coronavirus: Vaccination [written answer].** House of Commons (2021), Hansard Written question 84387, 30 November 2021  
Maggie Throup responds to a written question from Thangam Debbonaire to the Secretary of State for Health and Social Care, regarding what steps the Government is taking to prioritise pregnant women for the covid-19 booster vaccine. (MB)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-11-30/84387>

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### 2021-12653

**Coronavirus: Vaccination [written answer].** House of Commons (2021), Hansard Written question 84388, 30 November 2021  
Maggie Throup responds to a written question from Thangam Debbonaire to the Secretary of State for Health and Social Care, regarding what steps the Government is taking to encourage uptake of the covid-19 vaccine among pregnant women. (MB)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-11-30/84388>

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### 2021-12638

**COVID-19 and Pregnancy.** Walter K (2021), JAMA (Journal of the American Medical Association) 10 December 2021, online  
This JAMA Patient Page describes characteristics of COVID-19 among pregnant people and vaccination recommendations for people who are pregnant or breastfeeding. (Author)

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### 2021-12613

**Trust's midwives hosting drop-in sessions on Covid-19 vaccination.** Howarth G (2021), Nursing Times 2 December 2021  
Midwives will be on-hand during special drop-in sessions to answer people's questions about Covid-19 vaccination, in a partnership between North Tees and Hartlepool NHS Foundation Trust and Hartlepool Borough Council. (Author)

**Full URL:** <https://www.nursingtimes.net/roles/midwives-and-neonatal-nurses/trusts-midwives-hosting-drop-in-sessions-on-covid-19-vaccination-02-12-2021/>

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### 2021-12598

**Unvaccinated mothers urge pregnant women to get jabbed.** Department of Health and Social Care (2021), London: DHSC 4 December 2021

Powerful new video shows their experiences of severe COVID-19 during pregnancy. (Author)

**Full URL:** <https://www.gov.uk/government/news/unvaccinated-mothers-urge-pregnant-women-to-get-jabbed>

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## 2021-12534

**Coronavirus (COVID-19) Infection in Pregnancy: Information for healthcare professionals [Version 14.2].** Royal College of Obstetricians and Gynaecologists, Royal College of Midwives, Royal College of Paediatrics and Child Health, et al (2021), London: RCOG 6 December 2021, 131 pages

NB: This document supersedes Version 14, 25 August 2021.

This document aims to provide guidance to healthcare professionals who care for pregnant women during the COVID-19 pandemic. It is not intended to replace existing clinical guidelines, but to act as a supplement with additional advice on how to implement standard practice during this time.

The advice in this document is provided as a resource for UK healthcare professionals based on a combination of available evidence, good practice and expert consensus opinion. The guidance may also be relevant to other healthcare systems but may need to be adapted for the local environment. The priorities are:

- (i) The reduction of transmission of SARS-CoV-2 to pregnant women, their family members and healthcare workers.
- (ii) The provision of safe, personalised and woman-centred care during pregnancy, birth and the early postnatal period, during the COVID-19 pandemic.
- (iii) The provision of safe, personalised and woman-centred care to pregnant and postnatal women with suspected or confirmed COVID-19.

This guidance is under regular review and updated as new information and evidence emerges.

Owing to the changing prevalence of COVID-19 infections in the UK, changes in care should be proportionate to the background prevalence at a given time. Decision-making around care and discussions about risks and benefits will depend on the background prevalence of the COVID-19 viral infection and the vaccination status of the woman. Updated advice and information will be published in the Coronavirus (COVID-19), pregnancy and women's health section of the Royal College of Obstetricians and Gynaecologists (RCOG) website.

Information for pregnant women and their families is available in question and answer format, with accompanying videos in some cases, on the RCOG and Royal College of Midwives (RCM) COVID-19 hubs.

This guidance uses the terms 'woman' or 'mother' throughout, and 'female' where this has been specifically stated in the published study. These should be taken to include people who do not identify as women but are pregnant or have given birth. (Author)

**Full URL:** <https://www.rcog.org.uk/globalassets/documents/guidelines/2021-12-06-coronavirus-covid-19-infection-in-pregnancy-v14.2.pdf>

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## 2021-12445

**Covid-19: Mums who were severely ill urge pregnant women to get jabs.** Meierhans J (2021), BBC News 7 May 2021

Unvaccinated women who gave birth while severely ill with Covid-19 have shared their stories to encourage pregnant women to get jabbed. (Author)

**Full URL:** [https://www.bbc.co.uk/news/uk-59530976?at\\_medium=RSS&at\\_campaign=KARANGA](https://www.bbc.co.uk/news/uk-59530976?at_medium=RSS&at_campaign=KARANGA)

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## 2021-12354

**Covid-19: Vaccine uptake during pregnancy has increased but deprived areas lag behind, data show.** Mahase E (2021), BMJ vol 375, 26 November 2021, n2932

No fully vaccinated pregnant women were admitted to intensive care with covid-19 in England between February and the end of September 2021, the UK Health Security Agency (UKHSA) has reported (1).

1. UK Health Security Agency (UKHSA) (2021). COVID-19 vaccine surveillance report: week 47. London: UKHSA.

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1036047/Vaccine\\_surveillance\\_report\\_-\\_week\\_47.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1036047/Vaccine_surveillance_report_-_week_47.pdf).

(Author, edited)

Full URL: <https://doi.org/10.1136/bmj.n2932>

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## 2021-12342

**Covid-19 and pregnancy: vaccine hesitancy and how to overcome it.** Iacobucci G (2021), BMJ vol 375, no 8316, 22 November 2021, n2862

News item discussing COVID-19 vaccine hesitancy among pregnant women in the United Kingdom. Highlights the impact of vaccine hesitancy on hospital admissions and the role of clinicians in emphasising the benefits of vaccination. (LDO)

Full URL: <https://doi.org/10.1136/bmj.n2862>

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## 2021-12260

**Clinical briefing: Vaccinations for members [Reviewed April 2021].** Royal College of Midwives (2021), London: RCM April 2021

Briefing paper from the Royal College of Midwives (RCM) summarising current guidelines on coronavirus vaccination and outlining the RCM's advice to its members. (MB)

Full URL: <https://www.rcm.org.uk/media/5406/cb-vaccines-for-members.pdf>

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## 2021-12247

**Examining the relationship between pregnant women more likely to be affected by severe COVID-19 and uptake of vaccination in pregnancy in the United Kingdom.** Allen A (2021), MIDIRS Midwifery Digest vol 31, no 4, December 2021, pp 443-453

This paper examines the relationship between pregnant women being more likely to be affected by severe COVID-19 and their attitude to, and uptake of, the COVID-19 vaccination in the United Kingdom (UK). (Author, edited)

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## 2021-12188

**Pregnant women urged to get COVID-19 vaccine following new UK safety data.** Department of Health and Social Care (2021), London: DHSC 25 November 2021

Press release from the Department of Health and Social Care warning that catching COVID-19 carries far higher risk than having the vaccine, and raising concern that only 22% of women who gave birth in August had been vaccinated. (JSM)

Full URL: <https://www.gov.uk/government/news/pregnant-women-urged-to-get-covid-19-vaccine-following-new-uk-safety-data>

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## 2021-12187

**Covid vaccines safe in pregnancy, data shows.** Mundasad S (2021), BBC News 25 November 2021

Reports that the UK's Health Security Agency has declared covid vaccines safe for use in pregnancy, following an analysis of English data. States that similar rates of stillbirth and preterm birth were recorded for vaccinated and unvaccinated mothers. Researchers are encouraging women to get vaccinated and they say they should feel confident of the protection the vaccines will give them. (JSM)

Full URL: [https://www.bbc.co.uk/news/health-59417509?at\\_medium=RSS&at\\_campaign=KARANGA](https://www.bbc.co.uk/news/health-59417509?at_medium=RSS&at_campaign=KARANGA)

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## 2021-12147

**Covid-19 Vaccination during Pregnancy and First-Trimester Miscarriage.** Magnus MC, Gjessing HK, Eide HN, et al (2021), The New England Journal of Medicine vol 385, no 21, 18 November 2021, pp 2008-2010

Correspondence piece using a case control study to examine first trimester miscarriage among those receiving the COVID-19 vaccine. Results indicate that there is no evidence of increased risk of early pregnancy loss after vaccination. (LDO)

Full URL: <https://doi.org/10.1056/NEJMc2114466>

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## 2021-11922

**Systematic review of the safety, immunogenicity, and effectiveness of COVID-19 vaccines in pregnant and lactating individuals and their infants.** Fu W, Sivajohan B, McClymont E, et al (2022), International Journal of Gynecology & Obstetrics vol 156, no 3, March 2022, pp 406-417

### Background

There is significant risk of complications and vulnerability to severe COVID-19 disease in pregnancy, yet hesitancy exists around COVID-19 vaccination during pregnancy and lactation.

### Objective

To summarize the safety, immunogenicity, and effectiveness of COVID-19 vaccines in pregnancy and lactation.

### Search strategy

A systematic search of MEDLINE, Embase, PubMed, medRxiv, and bioRxiv.

### Selection criteria

Identified original studies published on pregnant and/or lactating individuals who received one or more doses of a COVID-19 vaccine.

### Data collection and analysis

A descriptive summary organized by safety, immunogenicity, and effectiveness outcomes of COVID-19 vaccination in pregnancy and lactation.

### Main results

In total, 23 studies were identified. Humoral response and functional immunity were interrogated and found. Increasing placental transfer ratios in cord blood were associated with increasing time from the first vaccine dose to delivery. Safety data indicated that pregnant and lactating populations experienced vaccine-related reactions at similar rates to the general population. No increased risk of adverse obstetrical or neonatal outcomes were reported. One study demonstrated that pregnant individuals were less likely to experience COVID-19 when vaccinated.

### Conclusion

COVID-19 vaccination in pregnant and lactating individuals is immunogenic, does not cause significant vaccine-related adverse events or obstetrical and neonatal outcomes, and is effective in preventing COVID-19 disease.

### Synopsis

The present systematic review found that COVID-19 vaccines are safe, immunogenic, and effective during pregnancy and lactation. (Author)

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## 2021-11893

**Coronavirus: Vaccination in Pregnancy [written answer].** Scottish Parliament (2021), Official Report Written question S6W-04224, 8 November 2021

Humza Yousaf responds to a written question from Sandesh Gulhane to the Scottish Government, regarding what percentage of pregnant women have been fully vaccinated against COVID-19. (JSM)

**Full URL:** <https://archive2021.parliament.scot/parliamentarybusiness/28877.aspx?SearchType=Advance&ReferenceNumbers=S6W-04224>

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## 2021-11892

**Coronavirus: Vaccination in Pregnancy [written answer].** Scottish Parliament (2021), Official Report Written question S6W-04229

Humza Yousaf responds to a written question from Sandesh Gulhane to the Scottish Government, regarding what steps it will take to increase the uptake of the COVID-19 vaccination by pregnant women. (JSM)

**Full URL:** <https://archive2021.parliament.scot/parliamentarybusiness/28877.aspx?SearchType=Advance&ReferenceNumbers=S6W-04229>

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## 2021-11685

**Covid-19 treatments and vaccines must be evaluated in pregnancy.** Abbas-Hanif A, Modi N, Smith SK, et al (2021), BMJ vol 375, no 8313, 14 October 2021, n2377

Pregnant women should be included in drug and vaccine development from the outset. (Author)

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## 2021-11581

**Pregnant and breastfeeding women's attitudes and fears regarding the COVID-19 vaccination.** Schaal NK, Zöllkau J, Hepp P, et al (2021), Archives of Gynecology and Obstetrics 27 October 2021, online

Purpose

The COVID-19 vaccination is probably the most important source to fight the COVID-19 pandemic. However, recommendations and possibilities for vaccination for pregnant and breastfeeding women are inconsistent and dynamically changing.

Methods

An anonymous, online, cross-sectional survey was conducted among pregnant and breastfeeding women in Germany between 30th March and 19th April 2021 addressing COVID-19 vaccination attitudes including the underlying reasons for their decision. Additionally, anxiety regarding a SARS-CoV-2 infection and a symptomatic course of the infection were evaluated.

Results

In total, 2339 women (n = 1043 pregnant and n = 1296 breastfeeding) completed the survey. During pregnancy the majority (57.4%) are not in favour of receiving the vaccine, 28.8% are unsure and only 13.8% would get vaccinated at the time of the survey. In contrast, 47.2% would be in favour to receive the vaccine, if more scientific evidence on the safety of the vaccination during pregnancy would be available. Breastfeeding women show higher vaccination willingness (39.5% are in favour, 28.1% are unsure and 32.5% not in favour). The willingness to be vaccinated is significantly related to the women's anxiety levels of getting infected and to develop disease symptoms. Main reasons for vaccination hesitancy are the women's perception of limited vaccination-specific information, limited scientific evidence on vaccination safety and the fear to harm the fetus or infant.

Conclusions

The results provide important implications for obstetrical care during the pandemic as well as for official recommendations and information strategies regarding the COVID-19 vaccination. (Author)

**Full URL:** <https://doi.org/10.1007/s00404-021-06297-z>

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**2021-11527**

**Coronavirus: Vaccination [written answer].** House of Lords (2021), Hansard Written question HL3504, 27 October 2021

Lord Kamall responds to a written question asked by Lord Taylor of Warwick to Her Majesty's Government, regarding what steps they are taking to provide clearer messaging on the safety of COVID-19 vaccines for pregnant women. (LDO)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-10-27/hl3504>

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**2021-11522**

**Reversing Physician Hesitancy to Recommend COVID-19 Vaccination for Pregnant Patients.** Chervenak FA, McCullough LB, Grünebaum A (2021), American Journal of Obstetrics & Gynecology (AJOG) 7 November 2021, online

Obstetricians and those in leadership positions must end physician hesitancy about COVID-19 vaccination of pregnant women by reversing three root causes of physician hesitancy. (Author)

**Full URL:** <https://doi.org/10.1016/j.ajog.2021.11.017>

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## 2021-11361

**Covid-19 vaccination during the third trimester of pregnancy: rate of vaccination and maternal and neonatal outcomes, a multicentre retrospective cohort study.** Rottenstreich M, Sela HY, Rotem R, et al (2022), *BJOG: An International Journal of Obstetrics and Gynaecology* vol 129, no 2, January 2022, pp 248-255

### Objective

To evaluate the impact of Covid-19 vaccination (Pfizer–BioNTech BNT162b2) during the third trimester of pregnancy on maternal and neonatal outcomes.

### Design

A multicentre, retrospective computerised database.

### Population

Women who gave birth at >24 weeks of gestation in Israel, between January and April 2021, with full records of Covid-19 disease and vaccination status.

### Methods

Women who received two doses of the vaccine were compared with unvaccinated women. Women who were recorded as having disease or a positive Covid-19 polymerase chain reaction (PCR) swab during pregnancy or delivery were excluded from both study groups. Univariate analysis was followed by multivariate logistic regression.

### Main outcome measures

Composite adverse maternal outcomes. Secondary outcomes were vaccination rate and composite adverse neonatal outcomes.

### Results

The overall uptake of one or both vaccines was 40.2%; 712 women who received two doses of the Covid-19 vaccine were compared with 1063 unvaccinated women. Maternal composite outcomes were comparable between the groups; however, women who received the vaccine had higher rates of elective caesarean deliveries (CDs) and lower rates of vacuum deliveries. An adjusted multivariable logistic regression analysis demonstrated that Covid-19 vaccination was not associated with maternal composite adverse outcome (aOR 0.8, 95% CI 0.61–1.03); a significant reduction in the risk for neonatal composite adverse outcomes was observed (aOR 0.5, 95% CI 0.36–0.74).

### Conclusions

In a motivated population covered by a National Health Insurance Plan, we found a 40.2% rate of vaccination for the Covid-19 vaccine during the third trimester of pregnancy, which was not associated with adverse maternal outcomes and, moreover, decreased the risk for neonatal adverse outcomes.

### Tweetable abstract

Covid-19 vaccine during pregnancy is safe for both mother and fetus. (Author)

**Full URL:** <https://doi.org/10.1111/1471-0528.16941>

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### 2021-11203

**Alignment of national COVID-19 vaccine recommendations for pregnant and lactating women.** Giles ML, Gunatilaka A, Palmer K, et al (2021), Bulletin of the World Health Organization vol 99, no 10, October 2021, pp 739-746

The rapid development and roll-out of coronavirus disease 2019 (COVID-19) vaccines is providing hope for a way to control the pandemic. As pregnant and lactating women are generally excluded from clinical trials, the vaccination programme was launched without adequate safety and efficacy data for pregnant women. Yet many professional organizations have recognized the need for administration of COVID-19 vaccines in pregnancy and have issued their own set of recommendations. The lack of evidence, however, has often led to confused messaging, inconsistent language and differing recommendations across organizations, potentially contributing to delay or refusal to accept vaccination by pregnant women. We summarize those differences and recommend that leaders collaborate at a country level to produce joint recommendations. We use the example of Australia, where two professional authorities along with the government and partners in New Zealand worked towards one message, consistent language and a unified recommendation. The aim was to help health professionals and women who are planning pregnancy or who are currently pregnant or breastfeeding to make an informed decision about COVID-19 vaccination. National advisory groups for immunization, professional obstetric organizations and government bodies should be encouraged to coordinate their statements on COVID-19 vaccination for pregnant and lactating women and to use similar language and phrasing for greater clarity. (Author)

Full URL: <https://dx.doi.org/10.2471%2FBLT.21.286644>

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### 2021-11117

**Fertility rates and birth outcomes after ChAdOx1 nCoV-19 (AZD1222) vaccination.** Hillson K, Clemens SC, Madhi SA, et al (2021), The Lancet vol 398, no 10312, 6 November 2021, pp 1683-1684

Correspondence piece discussing fertility rates and birth outcomes after ChAdOx1 nCoV-19 vaccination. The authors find no evidence between vaccination and reduced fertility or increased risk of miscarriage or stillbirth. (LDO)

Full URL: [https://doi.org/10.1016/S0140-6736\(21\)02282-0](https://doi.org/10.1016/S0140-6736(21)02282-0)

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## 2021-11050

**Breastfeeding Mother and Child Clinical Outcomes After COVID-19 Vaccination.** Low JM, Lee LY, Ng YPM, et al (2022), Journal of Human Lactation vol 38, no 1, February 2022, pp 37-42

### Background:

Pre-approval clinical trials of the Pfizer/BioNTech messenger RNA COVID-19 vaccine, BNT162b2 did not include participants who were breastfeeding. Therefore, there is limited evidence about outcomes of breastfeeding mother–child dyads and effects on breastfeeding after vaccination.

### Research Aims:

To determine: (1) solicited adverse effects (e.g., axillary lymphadenopathy, mastitis, and breast engorgement), which are unique to lactating individuals; and (2) systemic and local adverse effects of COVID-19 mRNA vaccine on mothers and potential effects on their breastfed infants.

### Method:

This was a prospective cohort study of lactating healthcare workers (N = 88) in Singapore who received two doses of BNT162b2 vaccination (Pfizer/BioNTech). The outcomes of mother–child dyads within 28 days after the second vaccine dose were determined through a participant-completed questionnaire.

### Results:

Minimal effects related to breastfeeding were reported by this cohort; three of 88 (3.4%) participants had mastitis, one (1.1%) participant experienced breast engorgement, five of 88 (5.7%) participants reported cervical or axillary lymphadenopathy. There was no change in human milk supply after vaccination. The most common side effect was pain/redness/swelling at the injection site, which was experienced by 57 (64.8%) participants. There were no serious adverse events of anaphylaxis or hospital admissions. There were no short-term adverse effects reported in the infants of 67 lactating participants who breastfed within 72 hr after BNT162b2 vaccination.

### Conclusions:

BNT162b2 vaccination was well tolerated in lactating participants and was not associated with short-term adverse effects in their breastfed infants.

### Study Protocol Registration:

The study protocol was registered at [clinicaltrials.gov](https://clinicaltrials.gov) (NCT04802278). (Author)

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## 2021-10850

**Pregnancy: Coronavirus [written answer].** House of Commons (2021), Hansard Written question 60412, 21 October 2021

Maggie Throup responds to a written question from Jim Shannon to the Secretary of State for Health and Social Care, regarding whether he has made a recent assessment of the impact of covid-19 on pregnant women; and if he will make a statement on pregnancy and the covid-19 vaccine. (JSM)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-10-21/60412>

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## 2021-10840

**The historical aspects of vaccination in pregnancy.** Mackin DW, Walker SP (2021), Best Practice & Research: Clinical Obstetrics and Gynaecology vol 76, October 2021, pp 13-22

As we live through the history-making pandemic of coronavirus disease 2019 (COVID-19), it is timely to consider the lessons that history has taught us about vaccine-preventable disease in pregnancy. Vaccinations have earned an established place in pregnancy care to prevent communicable disease in the mother, fetus and newborn. The improvements in maternal and perinatal outcome have been achieved through the evolution and application of new knowledge in many areas. These include recognition of the unique pathogenic consequences of diseases in pregnancy; improved understanding of the maternal immune system and its interplay with the fetus; optimizing safe vaccine development; ensuring pregnant women are included in appropriately designed trials of efficacy, and public health engagement to optimize uptake. As the world eagerly awaits an effective vaccine for COVID 19, these lessons of history help signpost the way, to ensure the potential of vaccinations to reduce morbidity for pregnant women and their newborns is fully realized. (Author)

Full URL: <https://doi.org/10.1016/j.bpobgyn.2020.09.005>

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## 2021-10627

**Maternity Colleges urge pregnant women to have flu vaccine and COVID-19 vaccine this winter.** Royal College of Obstetricians and Gynaecologists (2021), London: RCOG 22 October 2021

The Royal College of Obstetricians and Gynaecologists (RCOG) and the Royal College of Midwives (RCM) are urging pregnant women to have the flu vaccine alongside the COVID-19 vaccine this winter to protect themselves and their babies from complications caused by the viruses. (Author)

Full URL: <https://www.rcog.org.uk/en/news/maternity-colleges-urge-pregnant-women-to-have-flu-vaccine-and-covid-19-vaccine-this-winter/>

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## 2021-10586

**Newborns' passive humoral SARS-CoV-2 immunity following heterologous vaccination of the mother during pregnancy.**

Gloeckner S, Hornung F, Heimann Y, et al (2022), American Journal of Obstetrics & Gynecology (AJOG) vol 226, no 2, February 2022, pp 261-262

Research letter aiming to evaluate cord blood and antibody kinetics following a heterologous vaccination regimen in pregnant women. Results show vaccine-induced SARS-CoV-2 Spike Immunoglobulin (IgG) antibodies in all participants. (LDO)

Full URL: <https://doi.org/10.1016/j.ajog.2021.10.006>

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## 2021-10517

**COVID-19 Vaccination Patterns and Attitudes Among American Pregnant Individuals.** Huddleston HG, Jaswa EG, Lindquist KJ, et al (2022), American Journal of Obstetrics & Gynecology MFM vol 4, no 1, January 2022, 100507

Research letter utilising a nationwide prospective study of pregnant persons to examine vaccination rates and acceptance during the first six months of COVID-19 vaccine rollout. Results show vaccine hesitancy among respondents, with race, education, and living in a metropolitan area being strong predictors of vaccination status. (LDO)

Full URL: <https://doi.org/10.1016/j.ajogmf.2021.100507>

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### 2021-09953

**Key information on COVID-19 in pregnancy.** National Perinatal Epidemiology Unit (2021), Oxford: NPEU 11 October 2021

The latest information from the UKOSS study of COVID-19 in pregnancy, released as part of an infographic summary, shows clear evidence of the real world effectiveness of vaccination against covid in pregnancy. More than 98% of women admitted with symptomatic covid-19 in pregnancy were unvaccinated. Of 235 women admitted to intensive care, only 3 had received a single dose of vaccine, and none had received both doses. Data from MBRRACE-UK also shows that maternal deaths from COVID-19 continue to occur, with more deaths in the third (Delta) wave of infection than either of the two previous waves, again with most women unvaccinated. All pregnant women are recommended to have a covid vaccine by the Royal College of Midwives and the Royal College of Obstetricians and Gynaecologists. (Author)

**Full URL:** <https://www.npeu.ox.ac.uk/news/2171-covid-19-in-pregnancy-2>

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### 2021-09952

**NHS encourages pregnant women to get COVID-19 vaccine.** NHS England London: NHS England 11 October 2021, online

The NHS is encouraging pregnant women to get the COVID-19 vaccine as new data shows that nearly 20 per cent of the most critically ill COVID patients are pregnant women who have not been vaccinated. (Author)

**Full URL:** <https://www.england.nhs.uk/2021/10/nhs-encourages-pregnant-women-to-get-covid-19-vaccine/>

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### 2021-09951

**RCOG supports calls from NHS to pregnant women to get vaccinated against COVID-19.** Royal College of Obstetricians and Gynaecologists London: RCOG 11 October 2021, online

The Royal College of Obstetricians and Gynaecologists (RCOG) supports calls from the NHS, encouraging pregnant women to get the COVID-19 vaccine as new data shows that nearly 20% of the most critically ill COVID-19 patients are pregnant women who have not been vaccinated. (Author)

**Full URL:** <https://www.rcog.org.uk/en/news/rcog-supports-calls-from-nhs-to-pregnant-women-to-get-vaccinated-against-covid-19/>

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### 2021-09950

**Pregnant women urged to get Covid vaccine by NHS England.** Anon BBC News 11 October 2021, online

Pregnant women are being urged to get the Covid vaccine, following concerns about the growing number with the virus needing the most serious treatment in critical care.

The call has come from NHS England and the Royal College of Obstetricians and Gynaecologists.

Sultana Ashiq caught Covid-19 when she was nearly 31 weeks pregnant and was in intensive care for 46 days battling the disease. Sultana was treated at the Royal Papworth Hospital in Cambridge and Luton and Dunstable University Hospital. Her twins were born by Caesarean section while she was in a coma.

She was ineligible for the vaccine at the time, but is calling on expectant mothers to get vaccinated against coronavirus. (Author)

**Full URL:** <https://www.bbc.co.uk/news/av/health-58834524>

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### 2021-09916

**Vaccination of pregnant women against COVID-19 in India and Indonesia: Moving beyond the opt-in to the opt-out option.**

Sarwal Y, Sarwal T, Sarwal R (2021), International Journal of Gynecology & Obstetrics vol 155, no 3, December 2021, pp 549-550

In view of the continued threat of COVID-19, and to synergize with routine antenatal care, COVID-19 vaccination should become a default part of routine antenatal care with an opt-out option. (Author)

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**2021-09872**

**Attitudes Toward COVID-19 Illness and COVID-19 Vaccination among Pregnant Women: A Cross-Sectional Multicenter Study during August–December 2020.** Battarbee AN, Stockwell MS, Varner M, et al (2022), American Journal of Perinatology vol 39, no 1, January 2022, pp 75-83

**Objective** The aim of the study was to evaluate pregnant women's attitudes toward COVID-19 illness and vaccination and identify factors associated with vaccine acceptability.

**Study Design** This was a cross-sectional survey among pregnant women enrolled in a prospective COVID-19 cohort study in Salt Lake City, UT, Birmingham, AL, and New York, NY, from August 9 to December 10, 2020. Women were eligible if they were 18 to 50 years old and <28 weeks of gestation. Upon enrollment, women completed surveys regarding concerns about COVID-19 illness and likelihood of getting COVID-19 vaccine if one were available during pregnancy. Vaccine acceptability was defined as a response of “very likely” or “somewhat likely” on a 4-point Likert scale. Factors associated with vaccine acceptability were assessed with multivariable logistic regression.

**Results** Of 939 pregnant women eligible for the main cohort study, 915 (97%) consented to participate. Among these 915 women, 39% self-identified as White, 23% Black, 33% Hispanic, and 4% Other. Sixty-two percent received an influenza vaccine last season. Seventy-two percent worried about getting sick with COVID-19. If they were to get sick, 92% worried about harm to their pregnancy and 80% about harm to themselves. Only 41% reported they would get a vaccine. Of women who were unlikely to get vaccinated, the most frequently cited concern was vaccine safety for their pregnancy (82%). Non-Hispanic Black and Hispanic women had lower odds of accepting a vaccine compared with non-Hispanic White women (adjusted odds ratios [aOR] 0.4, 95% CI 0.2–0.6 for both). Receipt of influenza vaccine during the previous season was associated with higher odds of vaccine acceptability (aOR 2.1, 95% CI 1.5–3.0).

**Conclusion** Although most pregnant women worried about COVID-19 illness, <50% were willing to get vaccinated during pregnancy. Racial and ethnic disparities in plans to accept COVID-19 vaccine highlight the need to prioritize strategies to address perceived barriers among groups at high risk for COVID-19. (Author)

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**2021-09584**

**Maternal and Child Outcomes Reported by Breastfeeding Women Following Messenger RNA COVID-19 Vaccination.** Bertrand K, Honerkamp-Smith G, Chambers CD (2021), Breastfeeding Medicine vol 16, no 9, September 2021, pp 697-701

Background: In December 2020, two novel messenger RNA (mRNA) vaccines for severe acute respiratory syndrome coronavirus-2 received emergency use authorization from the U.S. Food and Drug Administration; however, the early trials excluded lactating women.

Methods: Breastfeeding women residing in the United States who received either of the two mRNA vaccines were enrolled into the Mommy's Milk Human Milk Research Biorepository at the University of California, San Diego. From December 14, 2020 to February 1, 2021, 180 women who received two doses of either mRNA vaccine were recruited into the study.

Results: Similar proportions of women reported any one or more symptoms following vaccination with either mRNA vaccine. In addition, the frequency by specific type of symptom did not differ by brand. However, following the second dose of vaccine, women who received the Moderna brand were significantly more likely to report symptoms. A small proportion of women following the first dose of either vaccine brand reported a reduction in milk supply, and significantly, more women reported a reduction in milk supply following the second dose of Moderna. Few infant events were reported for either vaccine brand following either dose, and no serious adverse events were reported.

Conclusions: These data are reassuring regarding the safety of vaccination in breastfeeding women and their breastfed children with either of the mRNA COVID-19 vaccines. (Author)

Full URL: <https://doi.org/10.1089/bfm.2021.0169>

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## 2021-09570

**Maternal-neonatal transfer of SARS-CoV-2 immunoglobulin G antibodies among parturient women treated with BNT162b2 messenger RNA vaccine during pregnancy.** Nir O, Schwartz A, Toussia-Cohen S, et al (2022), American Journal of Obstetrics & Gynecology MFM vol 4, no 1, January 2022, 100492

### Background

The exclusion of pregnant women from COVID-19 mRNA vaccine trials raised hesitancy regarding the benefit of vaccination of pregnant women, hence little is known about the vaccine's efficacy in this population.

### Objective

To determine the maternal-neonatal transplacental transfer of SARS CoV-2 antibodies among vaccinated parturient women. A control group of COVID 19 recovered patients was included in order to compare IgG levels between vaccinated and recovered patients.

### Study Design

A prospective cohort study in a single tertiary medical center in Israel between February and March 2021; parturient women who had been vaccinated with BNT162B2 mRNA vaccine during pregnancy were included and compared to COVID-19 recovered parturient women. SARS CoV-2 IgG antibodies were measured in maternal and cord sera, dried blood spot samples taken from newborns, and breast-milk samples. The primary outcome was to determine whether neonatal cord and dried blood spot samples were positive for SARS CoV-2 antibodies and to evaluate transfer ratio defined as cord blood IgG divided by maternal IgG levels.

### Results

The study included 64 vaccinated parturient women and 11 parturient women who had COVID-19 disease during pregnancy. All maternal blood sera samples and 98.3% of cord blood sera samples were positive for SARS Cov-2 IgG with median concentrations of 26.1 (IQR 22.0;39.7) and 20.2 (IQR 12.7;29.0) respectively. Similarly, 96.4% of neonatal blood spot samples and all breast milk samples were positive for SARS CoV-2 IgG with median concentrations of 11.0 (IQR 7.2;12.8) and 4.9 (IQR 3.8;6.0), respectively. There was a significant positive correlation between maternal serum levels of SARS Cov-2 IgG and cord blood ( $R=0.483$ ,  $p=0.0001$ ), neonatal blood spot ( $R=0.515$ ,  $p=0.004$ ), and breast milk levels ( $R=0.396$ ,  $p=0.005$ ) of SARS CoV-2 IgG. The median placental transfer ratio of SARS-COV-2 IgG was 0.77. Comparison of vaccinated with recovered COVID-19 patients revealed significantly higher SARS CoV-2 IgG levels in maternal serum and cord blood among vaccinated women ( $p<0.0001$ ).

### Conclusion(s)

Our study demonstrated efficient transfer of SARS CoV-2 IgG across the placenta from women vaccinated with BNT162b2 mRNA vaccine during pregnancy to their neonates with positive correlation between maternal serum and cord blood antibody concentrations. In addition to maternal protection against COVID-19, the vaccine may also provide neonatal humoral immunity. (Author)

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## 2021-09569

**High antibody levels in cord blood from pregnant women vaccinated against COVID-19.** Trostle ME, Aguerro-Rosenfeld ME, Roman AS (2021), American Journal of Obstetrics & Gynecology MFM vol 3, no 6, November 2021, 100481

This study aimed to determine the presence of transplacental antibody transmission and the levels of detectable antibodies in cord blood in women vaccinated against COVID-19 during pregnancy. (Author, edited)

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## 2021-09407

**COVID-19 mRNA vaccine and antibody response in lactating women: a prospective cohort study.** Charepe N, Gonçalves JL, Juliano AM, et al (2021), BMC Pregnancy and Childbirth vol 21, no 632, 17 September 2021

### Background

Immunological protection via breastfeeding is well known. The immunological profile of human milk changes during lactation. No clinical trials have been conducted in lactating women with the newest mRNA vaccines against SARS-CoV-2. A few studies have shown the presence of antibodies in breastmilk after vaccination. The aim of this work is to study possible antibodies transfer via breastmilk and also the immunological characteristics of lactating women compared to non-lactating women, after using the BNT162b2 Pfizer vaccine.

### Methods

This is a prospective cohort study with a convenience homogenous sample of 24 healthcare workers (14 lactating and 10 non-lactating women) enrolled at the time of COVID-19 vaccination. Clinical data was registered in a questionnaire. Titers of SARS-CoV-2 spike IgG, IgA and IgM were quantified in post vaccination blood and human milk. Antibody quantification was performed by an in-house ELISA to SARS-CoV-2 trimeric spike protein.

### Results

All women showed immunity after vaccination with positive antibodies for IgM, IgA and IgG antibodies. The dominant serum antibody response was IgG. Modest levels of antibodies in breastmilk of lactating mothers were observed in this study, especially IgG in 42.9%. There was a moderate association between higher titers of IgG and a longer duration of breastfeeding ( $R=0.55$ ,  $p=0.041$ ).

### Conclusions

Evidence of antibody transfer in human milk after COVID-19 vaccination is scarce. The presence of antibodies in human milk is reported, but immunization through breastfeeding is still to be established. (Author)

Full URL: <https://doi.org/10.1186/s12884-021-04051-6>

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## 2021-09398

**Increasing severity of COVID-19 in pregnancy with Delta (B.1.617.2) variant surge.** Adhikari EH, SoRelle JA, McIntire DD, et al (2022), American Journal of Obstetrics & Gynecology (AJOG) vol 226, no 1, January 2022, pp 149-151

Research letter reporting trends in illness severity among obstetric patients with COVID-19 in the context of the Delta variant. Results indicate increasing rates of hospitalisation and morbidity and highlight the need for prevention measures such as vaccination. (LDO)

Full URL: <https://doi.org/10.1016/j.ajog.2021.09.008>

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## 2021-09379

**Offering onsite COVID-19 vaccination to high-risk obstetrical patients: initial findings.** Hirshberg JS, Huysman BC, Oakes MC, et al (2021), American Journal of Obstetrics & Gynecology MFM vol 3, no 6, November 2021, 100478

Research report detailing a quality improvement project to offer onsite COVID-19 vaccination to high-risk obstetric patients. Results show that 3% of eligible women who had been seen and counselled prior to vaccine availability proceeded with offsite vaccination. Among those who had been seen and counselled after onsite vaccine availability, a further 3% proceeded with onsite vaccination and 7% proceeded with offsite vaccination. Research suggests that vaccine hesitancy, rather than availability, is the main driver of low uptake. (LDO)

Full URL: <https://doi.org/10.1016/j.ajogmf.2021.100478>

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**2021-09375**

**Perspectives on administration of COVID-19 vaccine to pregnant and lactating women: a challenge for low- and middle-income countries.** Duarte G, Coutinho CM, Rolnik DL, et al (2021), AJOG Global Reports vol 1, no 4, November 2021, 100020

Women in the pregnancy-puerperal cycle or those who are lactating have been deliberately excluded from participating in COVID-19 vaccine clinical trials that aimed to evaluate either the efficacy in inducing the formation of neutralizing antibodies or the investigational products' safety profile. Exclusion of pregnant and lactating women from such studies still certainly inequitably deny these women access to COVID-19 vaccines since these products' availability became increasingly available to non-pregnant people and even during pregnancy in high-income settings. In this clinical opinion article, we discuss aspects of the prolonged pandemic, the emergence of viral variants, the risks of severe complications of COVID-19 in pregnant women, and the disproportionate impact on low- and middle-income countries. We argue that the decision to receive the COVID-19 vaccine should be a joint decision between the pregnant or lactating women and the healthcare providers while considering the available data on vaccine efficacy, safety, the risks of SARS-CoV-2 infection in pregnant women, and the woman's individual risk for infection and serious illness. The various types of vaccines already in use and their safety and effectiveness, and the potential risks and benefits of their administration to pregnant or lactating women are reviewed. (Author)

**Full URL:** <https://doi.org/10.1016/j.xagr.2021.100020>

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**2021-09225**

**Administration of the Coronavirus Disease 2019 (COVID-19) Vaccine to Hospitalized Postpartum Patients.** Perez MJ, Paul R, Hirshberg JS, et al (2021), Obstetrics & Gynecology vol 138, no 6, December 2021, pp 885-887

Inpatient administration of coronavirus disease 2019 (COVID-19) vaccines during obstetric hospitalization is feasible and an opportunity to increase health equity. (Author)

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**2021-09210**

**Pregnancy: Coronavirus [written answer].** House of Commons (2021), Hansard Written question 44412, on 7 September 2021

Nadhim Zahawi responds to a written question from Helen Hayes to the Secretary of State for Health and Social Care, regarding what assessment his Department has made of the potential merits of bringing forward pregnant women's second doses of the covid-19 vaccine before their third trimester. (MB)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-09-07/44412>

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**2021-09033**

**Pregnant women eligible for the COVID-19 booster vaccine urged to take up offer.** Royal College of Obstetricians and Gynaecologists (2021), London: RCOG 16 September 2021

The Royal College of Obstetricians and Gynaecologists (RCOG) is urging all pregnant women eligible for the COVID-19 booster vaccine to take up the offer. It comes as Public Health England announce a further 20,000 pregnant women have been vaccinated against COVID-19. (Author)

**Full URL:** <https://www.rcog.org.uk/en/news/pregnant-women-eligible-for-the-covid-19-booster-vaccine-urged-to-take-up-offer/>

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**2021-08970**

**Short-term Reactions Among Pregnant and Lactating Individuals in the First Wave of the COVID-19 Vaccine Rollout.** Kachikis A, Englund JA, Singleton M, et al (2021), JAMA Network Open vol 4, no 8, August 2021, e2121310

This cohort study investigates short-term reactions associated with COVID-19 vaccines among pregnant and lactating individuals vs individuals neither pregnant nor lactating but planning pregnancy. (Author)

**Full URL:** <https://doi.org/10.1001/jamanetworkopen.2021.21310>

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2021-08969

**Quantification of Specific Antibodies Against SARS-CoV-2 in Breast Milk of Lactating Women Vaccinated With an mRNA**

**Vaccine.** Esteve-Palau E, Gonzalez-Cuevas A, Guerrero ME, et al (2021), JAMA Network Open vol 4, no 8, August 2021, e2120575

This cohort study assesses the concentration of SARS-CoV-2 antibodies in the breast milk of women who received vaccines for COVID-19 and their correlation with serum antibody levels. (Author) (Author)

Full URL: <https://doi.org/10.1001/jamanetworkopen.2021.20575>

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2021-08876

**Ethnic differences in SARS-CoV-2 vaccine hesitancy in United Kingdom healthcare workers.** Woolf K, McManus IC, Martin CA, et al (2021), The Lancet Regional Health - Europe 19 July 2021, online

**Background**

In most countries, healthcare workers (HCWs) represent a priority group for vaccination against severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) due to their elevated risk of COVID-19 and potential contribution to nosocomial SARS-CoV-2 transmission. Concerns have been raised that HCWs from ethnic minority groups are more likely to be vaccine hesitant (defined by the World Health Organisation as refusing or delaying a vaccination) than those of White ethnicity, but there are limited data on SARS-CoV-2 vaccine hesitancy and its predictors in UK HCWs.

**Methods**

Nationwide prospective cohort study and qualitative study in a multi-ethnic cohort of clinical and non-clinical UK HCWs. We analysed ethnic differences in SARS-CoV-2 vaccine hesitancy adjusting for demographics, vaccine trust, and perceived risk of COVID-19. We explored reasons for hesitancy in qualitative data using a framework analysis.

**Findings**

11,584 HCWs were included in the cohort analysis. 23% (2704) reported vaccine hesitancy. Compared to White British HCWs (21.3% hesitant), HCWs from Black Caribbean (54.2%), Mixed White and Black Caribbean (38.1%), Black African (34.4%), Chinese (33.1%), Pakistani (30.4%), and White Other (28.7%) ethnic groups were significantly more likely to be hesitant. In adjusted analysis, Black Caribbean (aOR 3.37, 95% CI 2.11 - 5.37), Black African (aOR 2.05, 95% CI 1.49 - 2.82), White Other ethnic groups (aOR 1.48, 95% CI 1.19 - 1.84) were significantly more likely to be hesitant. Other independent predictors of hesitancy were younger age, female sex, higher score on a COVID-19 conspiracy beliefs scale, lower trust in employer, lack of influenza vaccine uptake in the previous season, previous COVID-19, and pregnancy. Qualitative data from 99 participants identified the following contributors to hesitancy: lack of trust in government and employers, safety concerns due to the speed of vaccine development, lack of ethnic diversity in vaccine studies, and confusing and conflicting information. Participants felt uptake in ethnic minority communities might be improved through inclusive communication, involving HCWs in the vaccine rollout, and promoting vaccination through trusted networks.

**Interpretation**

Despite increased risk of COVID-19, HCWs from some ethnic minority groups are more likely to be vaccine hesitant than their White British colleagues. Strategies to build trust and dispel myths surrounding the COVID-19 vaccine in these communities are urgently required. Emphasis should be placed on the safety and benefit of SARS-CoV-2 vaccination in pregnancy and in those with previous COVID-19. Public health communications should be inclusive, non-stigmatising and utilise trusted networks.

**Funding**

UKRI-MRC and NIHR. (Author)

Full URL: <https://www.sciencedirect.com/science/article/pii/S2666776221001575>

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**2021-08788**

**Spontaneous Abortion Following COVID-19 Vaccination During Pregnancy.** Kharbanda EO, Haapala J, DeSilva M, et al (2021), JAMA (Journal of the American Medical Association) vol 326, no 16, 26 October 2021, pp 1629-1631

This study presents findings from case-control surveillance of COVID-19 vaccination during pregnancy and spontaneous abortion. (Author) [Erratum: JAMA, vol 326, no 13, 5 October 2021, p 1331. <https://doi.org/10.1001/jama.2021.16235>]

Full URL: <https://doi.org/10.1001/jama.2021.15494>

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**2021-08787**

**Association Between BNT162b2 Vaccination and Incidence of SARS-CoV-2 Infection in Pregnant Women.** Goldshtein I, Nevo D, Steinberg DM, et al (2021), JAMA (Journal of the American Medical Association) vol 326, no 8, 24 August 2021, pp 728-735

Importance: Data on BNT162b2 messenger RNA (mRNA) vaccine (Pfizer-BioNTech) effectiveness and safety in pregnancy are currently lacking because pregnant women were excluded from the phase 3 trial.

Objective: To assess the association between receipt of BNT162b2 mRNA vaccine and risk of SARS-CoV-2 infection among pregnant women.

Design, Setting, and Participants: This was a retrospective cohort study within the pregnancy registry of a large state-mandated health care organization in Israel. Pregnant women vaccinated with a first dose from December 19, 2020, through February 28, 2021, were 1:1 matched to unvaccinated women by age, gestational age, residential area, population subgroup, parity, and influenza immunization status. Follow-up ended on April 11, 2021.

Exposures: Exposure was defined by receipt of the BNT162b2 mRNA vaccine. To maintain comparability, nonexposed women who were subsequently vaccinated were censored 10 days after their exposure, along with their matched pair.

Main Outcomes and Measures: The primary outcome was polymerase chain reaction–validated SARS-CoV-2 infection at 28 days or more after the first vaccine dose.

Results: The cohort included 7530 vaccinated and 7530 matched unvaccinated women, 46% and 33% in the second and third trimester, respectively, with a mean age of 31.1 years (SD, 4.9 years). The median follow-up for the primary outcome was 37 days (interquartile range, 21-54 days; range, 0-70). There were 118 SARS-CoV-2 infections in the vaccinated group and 202 in the unvaccinated group. Among infected women, 88 of 105 (83.8%) were symptomatic in the vaccinated group vs 149 of 179 (83.2%) in the unvaccinated group ( $P \geq .99$ ). During 28 to 70 days of follow-up, there were 10 infections in the vaccinated group and 46 in the unvaccinated group. The hazards of infection were 0.33% vs 1.64% in the vaccinated and unvaccinated groups, respectively, representing an absolute difference of 1.31% (95% CI, 0.89%-1.74%), with an adjusted hazard ratio of 0.22 (95% CI, 0.11-0.43). Vaccine-related adverse events were reported by 68 patients; none was severe. The most commonly reported symptoms were headache ( $n = 10$ , 0.1%), general weakness ( $n = 8$ , 0.1%), nonspecified pain ( $n = 6$ , <0.1%), and stomachache ( $n = 5$ , <0.1%).

Conclusions and Relevance: In this retrospective cohort study of pregnant women, BNT162b2 mRNA vaccination compared with no vaccination was associated with a significantly lower risk of SARS-CoV-2 infection. Interpretation of study findings is limited by the observational design. (Author)

Full URL: <https://doi.org/10.1001/jama.2021.11035>

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**2021-08777**

**Pregnancy: Coronavirus [written answer].** House of Commons (2021), Hansard Written question 44411, on 7 September 2021  
Nadhim Zahawi responds to a written question from Helen Hayes to the Secretary of State for Health and Social Care, regarding what assessment he has made of the risk covid-19 poses to unvaccinated pregnant women; and what steps he is taking to ensure pregnant women receive both doses of the vaccine before their third trimester. (JSM)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-09-07/44411>

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**2021-08701**

**Presence of SARS-CoV-2 antibodies in lactating women and their infants following BNT162b2 messenger RNA vaccine.**

Schwartz A, Nir O, Toussia-Cohen S, et al (2021), American Journal of Obstetrics & Gynecology (AJOG) vol 225, no 5, November 2021, pp 577-579

Research letter aiming to assess whether SARS-CoV-2 immunoglobulins can be detected in breast milk samples of lactating women and in the serum and oral mucosal secretions of breastfed infants following maternal vaccination. Results show that SARS-CoV-2 immunoglobulins were found in breast milk samples, and antibodies were found in the oral mucosa in 60% of the infant samples, but were not found in their circulation. (LDO)

**Full URL:** <https://doi.org/10.1016/j.ajog.2021.07.016>

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**2021-08686**

**COVID-19 Vaccine Hesitancy: A Midwifery Survey Into Attitudes Towards the COVID-19 Vaccine.** Odejinmi F, Mallick R, Neophytou C, et al (2021), BMC Public Health 3 September 2021, online

Background: Ethnic minority populations have been disproportionately affected by the COVID-19 pandemic. Emerging evidence suggests a lower uptake of the vaccine in ethnic minority populations, particularly Black females of reproductive age. Midwives are the principal healthcare professionals responsible for counselling the pregnant population on decisions relating to vaccine uptake. The aim of this study was to explore midwifery uptake of and attitudes towards the COVID-19 vaccine in two ethnically diverse areas.

Methods: A 45-point questionnaire was circulated over a six-week period to midwives employed in two teaching hospitals in England; London (Barts Health NHS Trust) and Sussex (Brighton and Sussex University Hospitals NHS Trust (BSUH)). A total of 278 out of 868 midwives responded. Results were analysed to determine vaccine uptake as well as factors influencing vaccine hesitancy and decision-making between the two trusts and ethnic groups. Thematic analysis was also undertaken.

Results: Midwives of black ethnicity were over 4-times less likely to have received a COVID-19 vaccine compared to white ethnicity midwives (52% vs 85%, OR=0.22, p<0.001). Overall, there were no significant differences between trusts in receipt of the COVID-19 vaccine (p=0.13). Midwives at Barts Health were significantly more likely to have tested positive for COVID-19 compared to midwives at BSUH (OR=2.47, p=0.01). There was no statistical difference between ethnicities in testing positive for COVID-19 (p=0.86). Midwives at Barts Health had a higher occurrence of concerns relating to the vaccine being developed too fast (OR=2.06, p=0.01), allowing the government to track individuals (OR=9.13, p=0.001), interfering with fertility (OR=2.02, p=0.03), or transmitting the virus (OR=7.22, p=0.006), compared to BSUH. Black midwives had a higher occurrence of all concerns examined compared to white midwives; the most pronounced difference was in concerns relating to the long-term effects of the vaccine (adjusted OR=4.97, p<0.001), concerns relating to the speed in which the vaccine was developed (adjusted OR=5.59, p<0.001) and concerns regarding the vaccine containing meat products (adjusted OR=6.31, p<0.001).

Conclusion: This study highlights the significantly higher level of vaccine hesitancy amongst black ethnicity midwives and offer insights into midwives' views and concerns to facilitate future targeted public health interventions for the COVID-19 pandemic. (Author)

**Full URL:** <https://www.researchsquare.com/article/rs-646142/v1>

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## 2021-08374

**Pregnancy and birth outcomes after SARS-CoV-2 vaccination in pregnancy.** Theiler RN, Wick M, Mehta R, et al (2021), American Journal of Obstetrics & Gynecology MFM vol 3, no 6, November 2021, 100467

### Background

: SARS-CoV-2 infection during pregnancy is associated with significant maternal morbidity and increased rates of preterm birth. For this reason, COVID-19 vaccine administration in pregnancy has been endorsed by multiple professional societies including ACOG and SMFM despite exclusion of pregnant women from initial clinical trials of vaccine safety and efficacy. However, to date little data exists regarding outcomes after COVID-19 vaccination of pregnant patients.

### Study Design

: A comprehensive vaccine registry was combined with a delivery database for an integrated healthcare system to create a delivery cohort including vaccinated patients. Maternal sociodemographic data were examined to identify factors associated with COVID-19 vaccination. Pregnancy and birth outcomes were analyzed, including a composite measure of maternal and neonatal pregnancy complications, the Adverse Outcome Index.

### Results

: Of 2002 patients in the delivery cohort, 140 (7.0%) received a COVID-19 vaccination during pregnancy and 212 (10.6%) experienced a COVID-19 infection during pregnancy. The median gestational age at first vaccination was 32 weeks (range 13 6/7-40 4/7), and patients vaccinated during pregnancy were less likely than unvaccinated patients to experience COVID-19 infection prior to delivery (1.4% (2/140) vs. 11.3% (210/1862),  $P < 0.001$ ). No maternal COVID-19 infections occurred after vaccination during pregnancy. Factors significantly associated with increased likelihood of vaccination in a multivariable logistic regression model included older age, higher level of maternal education, being a non-smoker, use of infertility treatment for the current pregnancy, and lower gravidity. No significant difference in the composite adverse outcome (5.0% (7/140) vs. 4.9% (91/1862),  $P = 0.95$ ) or other maternal or neonatal complications, including thromboembolic events and preterm birth, was observed in vaccinated compared to unvaccinated patients.

### Conclusions

: Vaccinated pregnant women in this birth cohort were less likely to experience COVID-19 infection compared to unvaccinated pregnant patients, and COVID-19 vaccination during pregnancy was not associated with increased pregnancy or delivery complications. The cohort was skewed toward late pregnancy vaccination, and thus findings may not be generalizable to vaccination during early pregnancy. (Author)

**Full URL:** <https://doi.org/10.1016/j.ajogmf.2021.100467>

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**2021-08265**

**Impact of SARS-CoV-2 variant on the severity of maternal infection and perinatal outcomes: Data from the UK Obstetric Surveillance System national cohort.** Vousden N, Ramakrishnan R, Bunch K, et al (2021), MedRxiv 25 July 2021, online

[This article is a preprint and has not been peer-reviewed. It reports new medical research that has yet to be evaluated and so should not be used to guide clinical practice]

**Background** In the UK, the Alpha variant of SARS-CoV-2 became dominant in late 2020, rapidly succeeded by the Delta variant in May 2021. The aim of this study was to compare the impact of these variants on severity of maternal infection and perinatal outcomes within the time-periods in which they predominated.

**Methods** This national, prospective cohort study collated data on hospitalised pregnant women with symptoms of confirmed SARS-CoV-2 infection and compared the severity of infection and perinatal outcomes across the Wildtype (01/03/20-30/11/20), Alpha (01/12/20-15/05/21) and Delta dominant periods (16/05/21-11/07/21), using multivariable logistic regression.

**Findings** Of 3371 pregnant women, the proportion that experienced moderate to severe infection significantly increased between Wildtype and Alpha periods (24.4% vs. 35.8%; aOR1.75 95%CI 1.48-2.06), and between Alpha and Delta periods (35.8% vs. 45.0%; aOR1.53, 95%CI 1.07-2.17). Compared to the Wildtype period, symptomatic women admitted in the Alpha period were more likely to require respiratory support (27.2% vs. 20.3%, aOR1.39, 95%CI 1.13-1.78), have pneumonia (27.5% vs. 19.1%, aOR1.65, 95%CI 1.38-1.98) and be admitted to intensive care (11.3% vs. 7.7%, aOR1.61, 95%CI 1.24-2.10). Women admitted during the Delta period had further increased risk of pneumonia (36.8% vs. 27.5%, aOR1.64 95%CI 1.14-2.35). No fully vaccinated pregnant women were admitted between 01/02/2021 when vaccination data collection commenced and 11/07/2021. The proportion of women receiving pharmacological therapies for SARS-CoV-2 management was low, even in those critically ill.

**Interpretation** SARS-CoV-2 infection during Alpha and Delta dominant periods was associated with more severe infection and worse pregnancy outcomes compared to the Wildtype infection, which itself increased risk compared to women without SARS-CoV-2 infection.<sup>1</sup> Clinicians need to be aware and implement COVID-specific therapies in keeping with national guidance. Urgent action to tackle vaccine misinformation and policy change to prioritise uptake in pregnancy is essential. (Author)

**Full URL:** <https://doi.org/10.1101/2021.07.22.21261000>

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2021-08186

**COVID-19 Vaccination During Pregnancy: Coverage and Safety.** Blakeway H, Prasad S, Kalafat E, et al (2022), American Journal of Obstetrics & Gynecology (AJOG) vol 226, no 2, February 2022, pp 236.e1-236.e14

#### Background

Concerns have been raised regarding a potential surge of COVID-19 in pregnancy, secondary to rising numbers of COVID-19 in the community, easing of societal restrictions, and vaccine hesitancy. Even though COVID-19 vaccination is now offered to all pregnant women in the UK, there are limited data on its uptake and safety.

#### Objectives and study design

: This was a cohort study of pregnant women who gave birth at St George's University Hospitals NHS Foundation Trust, London, UK, between March 1st and July 4th 2021. The primary outcome was uptake of COVID-19 vaccination and its determinants. The secondary outcomes were perinatal safety outcomes. Data were collected on COVID-19 vaccination uptake, vaccination type, gestational age at vaccination, as well as maternal characteristics including age, parity, ethnicity, index of multiple deprivation score and co-morbidities. Further data were collected on perinatal outcomes including stillbirth (fetal death  $\geq 24$  weeks' gestation), preterm birth, fetal/congenital abnormalities and intrapartum complications. Pregnant women who received the vaccine were compared with a matched cohort of propensity balanced pregnant women to compare outcomes. Effect magnitudes of vaccination on perinatal outcomes were reported as mean differences or odds ratios with 95% confidence intervals. Factors associated with antenatal vaccination were assessed with logistic regression analysis.

#### Results

Data were available for 1328 pregnant women of whom 141 received at least one dose of vaccine before giving birth and 1187 women who did not; 85.8% of those vaccinated received their vaccine in the third trimester and 14.2% in the second trimester. Of those vaccinated, 128 (90.8%) received an mRNA vaccine and 13 (9.2%) a viral vector vaccine. There was evidence of reduced vaccine uptake in younger women ( $P=0.002$ ), those with high levels of deprivation (i.e., fifth quintile of Index of Multiple Deprivation,  $P=0.008$ ) and women of Afro-Caribbean or Asian ethnicity, compared to Caucasian ethnicity ( $P<0.001$ ). Women with pre-pregnancy diabetes had increased vaccine uptake ( $P=0.008$ ). In the multivariable model adjusting for variables that had a significant effect according to the univariable analysis, fifth deprivation quintile (most deprived) was significantly associated with lower antenatal vaccine uptake (adjusted OR 0.09, 95% CI 0.02–0.39,  $P=0.002$ ), while pre-pregnancy diabetes was significantly associated with higher antenatal vaccine uptake (adjusted OR 11.1, 95% CI 2.01–81.6,  $P=0.008$ ). In a propensity score matched cohort, compared with non-vaccinated pregnant women, 133 women who received at least one dose of the COVID-19 vaccine in pregnancy (vs. those unvaccinated) had similar rates of adverse pregnancy outcomes ( $P>0.05$  for all): stillbirth (0.0% vs 0.3%), fetal abnormalities (2.2% vs 2.7%), intrapartum pyrexia (3.7% vs 1.5%), postpartum hemorrhage (9.8% vs 9.5%), cesarean section (30.8% vs. 30.6%), small for gestational age (12.0% vs 15.8%), maternal high dependency unit or intensive care admission (6.0% vs 3.5%) or neonatal intensive care unit admission (5.3% vs 5.4%). Mixed-effects Cox regression showed that vaccination was not significantly associated with birth  $<40$  weeks' gestation (hazard ratio 0.93, 95% CI 0.71–1.23,  $P=0.630$ ).

#### Conclusions

Of pregnant women eligible for COVID-19 vaccination, less than one third accepted COVID-19 vaccination during pregnancy and they experienced similar pregnancy outcomes. There was lower uptake among younger women, non-white ethnicity, and lower socioeconomic background. This study contributes to the body of evidence that having COVID-19 vaccination in pregnancy does not alter perinatal outcomes. Clear communication to improve awareness among pregnant women and healthcare professionals on vaccine safety is needed, alongside strategies to address vaccine hesitancy. This includes post-vaccination surveillance to gather further data on pregnancy outcomes, particularly after first trimester vaccination, as well as long-term infant follow-up. (Author)

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## 2021-08125

**Detection of SARS-CoV-2-Specific IgA in the Human Milk of COVID-19 Vaccinated Lactating Health Care Workers.** Valcarce V, Stewart Stafford L, Neu J, et al (2021), *Breastfeeding Medicine* vol 16, no 12, December 2021, pp 1004-1009

Background: In 2019, a deadly virus known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), responsible for coronavirus disease 2019 (COVID-19), emerged. In December 2020, two mRNA-based COVID-19 vaccines were approved for use in the United States, which provide immunity to those receiving the vaccine. Maternally derived antibodies are a key element of infants' immunity. Certain vaccines given to pregnant and lactating mothers provide immunity to infants through transmission across the placenta, umbilical cord (IgG), and human milk (IgA). Human milk produced by mothers with a history of COVID-19 infection contains SARS-CoV-2 IgA and IgG. The purpose of this study is to determine whether SARS-CoV-2-specific immunoglobulins are found in human milk after the COVID-19 vaccination, and to characterize the types of immunoglobulins present.

Methods: This is a prospective observational study conducted at Shands Hospital, University of Florida, from December 2020 to March 2021. Twenty-two lactating health care workers who received the SARS-CoV-2 mRNA vaccine (Pfizer/BioNTech or Moderna) made up the sample group. Plasma and human milk were collected at three time points (prevaccination, post-first vaccine dose, and post-second vaccine dose). SARS-CoV-2-specific IgA and IgG in human milk and in plasma were measured by enzyme-linked immunosorbent assay (ELISA). Maternal demographics were compiled.

Results: We found significant secretion of SARS-CoV-2-specific IgA and IgG in human milk and plasma after SARS-CoV-2 vaccination.

Conclusions: Our results show that the mRNA-based COVID-19 vaccines induce SARS-CoV-2-specific IgA and IgG secretion in human milk. Further studies are needed to determine the duration of this immune response, its capacity to neutralize the COVID-19 virus, the transfer of passive immunity to breastfeeding infants, and the potential therapeutic use of human milk IgA to combat SARS-CoV-2 infections and COVID-19. (Author)

Full URL: <https://doi.org/10.1089/bfm.2021.0122>

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## 2021-08033

**Prioritizing pregnant women for COVID-19 vaccination.** Sarwal Y, Sarwal T, Sarwal R (2021), *International Journal of Gynecology & Obstetrics* vol 155, no 1, October 2021, pp 57-63

Despite emerging evidence on safety and efficacy, most countries do not offer COVID-19 vaccines to pregnant women even though they are at higher risk of complications from COVID-19. We performed a web search of COVID-19 vaccination policies for pregnant women under two categories: countries bearing a high burden of COVID-19 cases and countries with a high burden of maternal and under-five mortality. Of the top 20 countries affected by COVID-19, 11 allow vaccination of pregnant women, of which two have deemed it safe to vaccinate pregnant women as a high-risk group. In contrast, only five of the 20 countries with high under-five mortality and maternal mortality allow vaccination of pregnant women and none of these countries has included them as part of a high-risk group that should be vaccinated. India and Indonesia, with one-fifth of the world's population, fall under both categories but do not include pregnant women as a priority group for COVID-19 vaccination. To prevent COVID-19 from further aggravating the already heavy burden of maternal and under-five mortality, there is a strong case for including pregnant women as a high-priority group for COVID-19 vaccination. We recommend including COVID-19 vaccination in routine antenatal care in all countries, particularly India and Indonesia in view of their high dual burden. (Author)

Full URL: <https://doi.org/10.1002/ijgo.13816>

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### 2021-08030

**The COVID-19 vaccination for women who are pregnant, planning pregnancy or breastfeeding.** Royal College of Midwives (2021), London: RCM June 2021. 4 pages

This clinical briefing provides information about the coronavirus vaccine for those who are planning a pregnancy, are pregnant and/or breastfeeding. (Author)

**Full URL:** <https://www.rcm.org.uk/media/5090/covid-19-vaccination-clinical-briefing-publisehd-2021.pdf>

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### 2021-08028

**Pregnancy, breastfeeding, fertility and coronavirus (COVID-19) vaccination [Last updated 27 January 2022].** NHS (2021), London: NHS 19 August 2021

Consumer information from the NHS on vaccination against coronavirus (COVID-19), for pregnant and breastfeeding women and those considering pregnancy. (JSM)

**Full URL:** <https://www.nhs.uk/conditions/coronavirus-covid-19/coronavirus-vaccination/pregnancy-breastfeeding-fertility-and-coronavirus-covid-19-vaccination/>

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### 2021-08015

**Successful vertical transmission of SARS-CoV-2 antibodies after maternal vaccination.** Mehaffey JH, Arnold M, Huffstetler E, et al (2021), Birth vol 48, no 4, December 2021, pp 451-452

Letter to the editor presenting a case of vertical transmission of Immunoglobulin G SARS-CoV-2 antibodies from a vaccinated mother to her son with no evidence of prior infection. (LDO)

**Full URL:** <https://doi.org/10.1111/birt.12582>

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### 2021-08005

**JCVI issues new advice on COVID-19 vaccination for pregnant women.** Public Health England (2021), London: PHE 16 April 2021

The JCVI has advised that pregnant women should be offered the COVID-19 vaccine at the same time as the rest of the population, based on their age and clinical risk group. (Author)

**Full URL:** <https://www.gov.uk/government/news/jcvi-issues-new-advice-on-covid-19-vaccination-for-pregnant-women>

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### 2021-08004

**COVID-19 vaccination in pregnancy: early experience from a single institution.** Trostle ME, Limaye MA, Avtushka V, et al (2021), American Journal of Obstetrics & Gynecology MFM vol 3, no 6, November 2021, 100464

Research letter exploring maternal, neonatal and obstetrical outcomes of pregnant women who received an mRNA COVID-19 vaccine in the first four months of its availability. Results indicate no concerning trends and rates of miscarriage and premature birth were within the normal ranges. (LDO)

**Full URL:** <https://doi.org/10.1016/j.ajogmf.2021.100464>

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## 2021-07970

**Covid: 'I'm pregnant, should I have the vaccine?'**. Various (2021), BBC News 18 August 2021

Vaccine uptake by pregnant women is causing concern among doctors and midwives, as 98% of pregnant women in hospital with Covid-19 are unvaccinated, according to NHS England.

BBC London reporter Victoria Cook is pregnant and has reservations about getting the Covid vaccination.

She met other expectant mums who say mixed messaging from doctors and politicians has left them feeling unsure about how best to protect their babies.

Victoria also spoke to experts who told her why pregnant women are now being encouraged to have the jab.

During the course of filming, Victoria contracted Covid-19. (Author)

**Full URL:** <https://www.bbc.co.uk/news/av/uk-england-london-58089039>

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## 2021-07922

**COVID-19 vaccines, pregnancy and breastfeeding [Last updated 19 July 2021]**. Royal College of Obstetricians and Gynaecologists (2021), London: RCOG 2021

These Q&As were updated on 19 July 2021 and will be reviewed as new information and advice emerges. For general information on pregnancy and COVID-19 visit our main Q&A page. (Author)

**Full URL:** <https://www.rcog.org.uk/en/guidelines-research-services/coronavirus-covid-19-pregnancy-and-womens-health/covid-19-vaccines-and-pregnancy/covid-19-vaccines-pregnancy-and-breastfeeding>

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## 2021-07914

**Should I get a vaccine?**. Royal College of Midwives (2021), London: RCM August 2021, 1 page

A downloadable information sheet for women that answers the most frequently asked questions concerning the COVID-19 vaccination in pregnancy. (JSM)

**Full URL:** <https://www.rcm.org.uk/media/5225/should-i-get-a-vaccine.pdf>

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## 2021-07913

**Association Between BNT162b2 Vaccination and Incidence of SARS-CoV-2 Infection in Pregnant Women.** Goldshtein I, Nevo D, Steinberg DM, et al (2021), JAMA (Journal of the American Medical Association) 12 July 2021, online

**Importance** Data on BNT162b2 messenger RNA (mRNA) vaccine (Pfizer-BioNTech) effectiveness and safety in pregnancy are currently lacking because pregnant women were excluded from the phase 3 trial.

**Objective** To assess the association between receipt of BNT162b2 mRNA vaccine and risk of SARS-CoV-2 infection among pregnant women.

**Design, Setting, and Participants** This was a retrospective cohort study within the pregnancy registry of a large state-mandated health care organization in Israel. Pregnant women vaccinated with a first dose from December 19, 2020, through February 28, 2021, were 1:1 matched to unvaccinated women by age, gestational age, residential area, population subgroup, parity, and influenza immunization status. Follow-up ended on April 11, 2021.

**Exposures** Exposure was defined by receipt of the BNT162b2 mRNA vaccine. To maintain comparability, nonexposed women who were subsequently vaccinated were censored 10 days after their exposure, along with their matched pair.

**Main Outcomes and Measures** The primary outcome was polymerase chain reaction–validated SARS-CoV-2 infection at 28 days or more after the first vaccine dose.

**Results** The cohort included 7530 vaccinated and 7530 matched unvaccinated women, 46% and 33% in the second and third trimester, respectively, with a mean age of 31.1 years (SD, 4.9 years). The median follow-up for the primary outcome was 37 days (interquartile range, 21-54 days; range, 0-70). There were 118 SARS-CoV-2 infections in the vaccinated group and 202 in the unvaccinated group. Among infected women, 88 of 105 (83.8%) were symptomatic in the vaccinated group vs 149 of 179 (83.2%) in the unvaccinated group ( $P \geq .99$ ). During 28 to 70 days of follow-up, there were 10 infections in the vaccinated group and 46 in the unvaccinated group. The hazards of infection were 0.33% vs 1.64% in the vaccinated and unvaccinated groups, respectively, representing an absolute difference of 1.31% (95% CI, 0.89%-1.74%), with an adjusted hazard ratio of 0.22 (95% CI, 0.11-0.43). Vaccine-related adverse events were reported by 68 patients; none was severe. The most commonly reported symptoms were headache ( $n = 10$ , 0.1%), general weakness ( $n = 8$ , 0.1%), nonspecified pain ( $n = 6$ , <0.1%), and stomachache ( $n = 5$ , <0.1%).

**Conclusions and Relevance** In this retrospective cohort study of pregnant women, BNT162b2 mRNA vaccination compared with no vaccination was associated with a significantly lower risk of SARS-CoV-2 infection. Interpretation of study findings is limited by the observational design. (Author)

**Full URL:** <https://doi.org/10.1001/jama.2021.11035>

## 2021-07911

**COVID-19 vaccine webinar.** Royal College of Midwives (2021), London: RCM 11 June 2021: 1hr, 17 mins

Webinar recorded on 11 June 2021 to assist midwives advising women on whether or not to have the COVID-19 vaccine in pregnancy. Dr. Mary Ross Davie, Director for Professional Midwifery at the Royal College of Midwives (RCM) introduces presentations from Pat O'Brien, Consultant Obstetrician with the Royal College of Obstetricians and Gynaecologists (RCOG); Jenny Hall from NHS England; Clare Livingstone, RCM Professional Advisor; Consultant midwife, Dr. Angela Kerrigan and MVP Chair Victoria Walsh from the Wirral. (JSM)

**Full URL:** [https://www.rcm.org.uk/vaccines-maternity-staff-pregnant-women/?dm\\_i=4YCH,JWOO,3PNLW0,2DN10,1](https://www.rcm.org.uk/vaccines-maternity-staff-pregnant-women/?dm_i=4YCH,JWOO,3PNLW0,2DN10,1)

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**2021-07897**

**Talking to women about the COVID-19 vaccine.** Royal College of Midwives (2021), London: RCM August 2021

An information sheet for midwives, to help guide a conversation with women around vaccination against coronavirus (COVID-19) in pregnancy. (JSM)

**Full URL:** <https://www.rcm.org.uk/media/5228/talking-to-women-about-the-vaccine.pdf>

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**2021-07889**

**Midwives urged to encourage pregnant women to get Covid-19 jab.** Ford M (2021), Nursing Times 30 July 2021

Midwives and primary care nurses have been urged to ramp up efforts to encourage pregnant women to have the Covid-19 vaccine, following the release of concerning new data. (Author)

**Full URL:** <https://www.nursingtimes.net/news/coronavirus/midwives-urged-to-encourage-pregnant-women-to-get-covid-19-jab-30-07-2021/>

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**2021-07863**

**COVID-19 vaccines: updates for August 2021.** Medicines and Healthcare Products Regulatory Agency (2021), Drug Safety Update vol 15, no 1, August 2021

Recent information relating to COVID-19 vaccines that has been published since the July 2021 issue of Drug Safety Update. Includes a section on vaccination in pregnancy. (Author, edited)

**Full URL:** <https://www.gov.uk/drug-safety-update/covid-19-vaccines-updates-for-august-2021>

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**2021-07739**

**Covid vaccine: Fertility and miscarriage claims fact-checked.** Schraer R (2021), BBC News 11 August 2021

False and misleading claims that Covid-19 vaccines harm fertility and cause miscarriages are still circulating online, against all the evidence. (Author)

**Full URL:** <https://www.bbc.co.uk/news/health-57552527>

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## 2021-07733

**SARS-CoV-2 Antibodies Detected in Mother's Milk Post-Vaccination.** Baird JK, Jensen SM, Urba WJ, et al (2021), Journal of Human Lactation vol 37, no 3, August 2021, pp 492-498

### Background

The Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) pandemic has infected over 127 million people worldwide, with almost 2.8 million deaths at the time of writing. Since no lactating individuals were included in initial trials of vaccine safety and efficacy, research on SARS-CoV-2 vaccination in lactating women and the potential transmission of passive immunity to the infant through mother's milk is needed to guide patients, clinicians, and policy makers on whether to recommend immunization during the worldwide effort to curb the spread of this virus.

### Research Aims

(1) To determine whether SARS-CoV-2 specific immunoglobins are found in human milk after vaccination, and (2) to characterize the time course and types of immunoglobulins present.

### Methods

A longitudinal cohort study of lactating women (N = 7) who planned to receive both doses of the Pfizer-BioNTech or Moderna SARS-CoV-2 vaccine between December 2020 and January 2021 provided milk samples. These were collected pre-vaccination and at 11 additional timepoints, with the last sample at 14 days after the second dose of vaccine. Samples were analyzed for levels of SARS-CoV-2 specific immunoglobulins A and G (IgA and IgG).

### Results

We observed significantly elevated levels of SARS-CoV-2 specific IgG and IgA antibodies in human milk beginning approximately 7 days after the initial vaccine dose, with an IgG-dominant response.

### Conclusions

Maternal vaccination results in SARS-CoV-2 specific immunoglobulins in human milk that may be protective for infants. (Author)

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## 2021-07462

**Acceptance of COVID-19 vaccination in pregnancy: a survey study.** Levy AT, Singh S, Riley LE, et al (2021), American Journal of Obstetrics & Gynecology MFM vol 3, no 5, September 2021, 100399

No abstract available.

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## 2021-07459

**Anti-severe acute respiratory syndrome coronavirus 2 antibodies induced in breast milk after Pfizer-BioNTech/BNT162b2 vaccination.** Kelly JC, Carter EB, Raghuraman N, et al (2021), American Journal of Obstetrics & Gynecology (AJOG) vol 225, no 1, July 2021, pp 101-103

Research letter exploring levels of SARS-CoV-2 antibodies in breast milk in lactating people undergoing COVID-19 vaccination. Results indicate sustained elevation of immunoglobulin G/immunoglobulin A levels in breast milk after Pfizer-BioNTech/BNT162b2 vaccination. (LDO)

**Full URL:** <https://doi.org/10.1016/j.ajog.2021.03.031>

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### 2021-07458

**Prioritization of pregnant individuals in state plans for coronavirus disease 2019 vaccination.** Crane MA, Jaffe E, Beigi RH, et al (2021), American Journal of Obstetrics & Gynecology (AJOG) vol 225, no 1, July 2021, pp 95-99

Research letter exploring the number of states that prioritise pregnant women for COVID-19 vaccination and assessing the overall current eligibility of pregnant women to receive COVID-19 vaccinations across the United States. Results show that most states classify pregnant women as a priority group and pregnant women are eligible to receive vaccines in 50% of the country. (LDO)

Full URL: <https://doi.org/10.1016/j.ajog.2021.03.015>

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### 2021-07456

**Adverse effects of COVID-19 messenger RNA vaccines among pregnant women: a cross-sectional study on healthcare workers with detailed self-reported symptoms.** Kadali RAK, Janagama R, Peruru SR, et al (2021), American Journal of Obstetrics & Gynecology (AJOG) vol 225, no 4, October 2021, pp 458-460

Research letter comparing the detailed side-effect profile of COVID-19 mRNA vaccines among pregnant and non-pregnant healthcare workers. Results indicate that side-effect profiles are similar between both groups and are non-life-threatening. (LDO)

Full URL: <https://doi.org/10.1016/j.ajog.2021.06.007>

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### 2021-07388

**NMC statement on new vaccination advice for pregnant women.** Nursing and Midwifery Council (2021), London: NMC 3 August 2021

Statement from the Chief Executive and Registrar for the Nursing and Midwifery Council (NMC) on current COVID-19 vaccination advice for pregnant women. (LDO)

Full URL: <https://www.nmc.org.uk/news/news-and-updates/nmc-statement-vaccine-midwifery/>

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### 2021-07385

**Cord blood antibodies following maternal coronavirus disease 2019 vaccination during pregnancy.** Mithal LB, Otero S, Shanes ED, et al (2021), American Journal of Obstetrics & Gynecology (AJOG) vol 225, no 2, August 2021, pp 192-194

Research letter investigating SARS-CoV-2 immunoglobulin G transfer from mothers to infants following COVID-19 vaccination during pregnancy. Results demonstrate that most pregnant women who received the vaccine in the third trimester had transplacental transfer of immunoglobulin G and antibody levels in the infant are equal to the mother. (LDO)

Full URL: <https://doi.org/10.1016/j.ajog.2021.03.035>

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### 2021-07327

**RCOG welcomes Chief Midwife's campaign encouraging pregnant women to get vaccinated.** Royal College of Obstetricians and Gynaecologists (2021), London: RCOG 30 July 2021

England's chief midwife is encouraging pregnant women to get vaccinated, as new data shows that the overwhelming majority of pregnant woman who are being hospitalised with COVID-19 have not been vaccinated. (Author)

Full URL: <https://www.rcog.org.uk/en/news/rcog-welcomes-chief-midwives-campaign-encouraging-pregnant-women-to-get-vaccinated/>

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### 2021-07324

**Pregnant women urged to get jab as majority unvaccinated.** Mundasad S (2021), BBC News 30 July 2021

England's chief midwife has stepped up her call for pregnant women to get the Covid jab as soon as possible. (Author)

Full URL: <https://www.bbc.co.uk/news/health-58014779>

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**2021-07097**

**Brazil: Why are so many pregnant women dying from Covid?.** BBC News (2021), BBC News 27 July 2021

Covid-19 has critically affected pregnant women in Brazil, with more than 1,000 deaths. One in five women that died from the virus didn't have access to an intensive care unit and one in three didn't have access to a ventilator.

So far Brazil has recorded more than 530,000 coronavirus related deaths and only 45% of the population has received at least one dose of the vaccine. (Author)

**Full URL:** <https://www.bbc.co.uk/news/av/world-latin-america-57974754>

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**2021-06976**

**Coronavirus: Vaccination [written answer].** House of Commons (2021), Hansard Written question 35835, 19 July 2021

Nadhim Zahawi responds to a written question from Sarah Olney to the Secretary of State for Health and Social Care, regarding what the Government's guidance is on the number of weeks that should elapse between receipt of the first and second dose of the covid-19 vaccine for pregnant women; and what the evidence is behind that guidance. (JSM)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-07-19/35835>

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**2021-06974**

**Pregnancy: Coronavirus [written answer].** House of Commons (2021), Hansard Written question 34581, 16 July 2021

Nadhim Zahawi responds to a written question from Marsha De Cordova to the Secretary of State for Health and Social Care, with reference to the number of pregnant women yet to receive a single dose of the covid-19 vaccine, what steps he is taking to help ensure that pregnant women are kept safe as covid-19 (a) infection rates increase and (b) restrictions lift. (Author, edited)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-07-16/34581>

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**2021-06957**

**Health chiefs encourage more pregnant women to get their COVID-19 vaccine.** Public Health England (2021), London: PHE 22 July 2021

News item reporting that Health chiefs are encouraging more pregnant women to get their COVID-19 vaccine, as new data shows that 51,724 pregnant women in England have received at least one dose. (Author, edited)

**Full URL:** <https://www.gov.uk/government/news/health-chiefs-encourage-more-pregnant-women-to-get-their-covid-19-vaccine>

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**2021-06952**

**Pregnancy: Coronavirus [written answer].** House of Commons (2021), Hansard Written question 34580, 16 July 2021

Nadhim Zahawi responds to a written question from Marsha De Cordova to the Secretary of State for Health and Social Care, regarding the process for ensuring health professionals (a) are discussing with pregnant women the risks and benefits of the covid-19 vaccine and (b) have up to date information on the risks and benefits of the vaccine. (JSM)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-07-16/34580>

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**2021-06946**

**Pregnancy: Coronavirus [written answer].** House of Commons (2021), Hansard Written question 32510, 13 July 2021

Nadhim Zahawi responds to a written question from Marsha De Cordova to the Secretary of State for Health and Social Care, regarding whether he is collecting data on the number of pregnant women and new mothers being vaccinated against covid-19. (JSM)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-07-13/32510>

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## 2021-06837

**Pregnancy: Coronavirus [written answer].** House of Commons (2021), Hansard Written question 32512, 13 July 2021

Nadhim Zahawi responds to a written question from Marsha De Cordova to the Secretary of State for Health and Social Care, regarding what steps he is taking to (a) assess and (b) reduce covid-19 vaccine hesitancy among pregnant women. (JSM)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-07-13/32512>

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## 2021-06554

**COVID unlocking will create 'perfect storm' for pregnant women, say maternity Colleges.** Royal College of Obstetricians and Gynaecologists (2021), London: RCOG 15 July 2021

The Royal College of Obstetricians and Gynaecologists (RCOG) and the Royal College of Midwives (RCM) are warning that the easing of COVID-19 restrictions, due to take place on 19th July 2021, could be very detrimental to pregnant women, who tend to experience very severe symptoms of the disease, especially during the late stages of pregnancy, and also suffer poorer pregnancy outcomes such as premature labour, emergency caesarean section, pre-eclampsia and stillbirth. Both colleges are urging women to get vaccinated against the disease. Includes comments from Dr Edward Morris, President at the Royal College of Obstetricians and Gynaecologists, Professor Marian Knight, Professor of Maternal and Child Population Health at the University of Oxford, and Gill Walton, Chief Executive of the Royal College of Midwives. (JSM)

**Full URL:** <https://www.rcog.org.uk/en/news/covid-unlocking-will-create-perfect-storm-for-pregnant-women-say-maternity-colleges/>

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## 2021-06521

**Covid unlocking risk for pregnant women, say doctors.** Price E (2021), BBC News 15 July 2021

News item reporting that the lifting of restrictions put in place by the UK government because of the COVID-19 pandemic is causing concern among doctors and midwives, who fear there will be an increase in infection among pregnant women. States that the Royal College of Obstetricians and Gynaecologists (RCOG) and the Royal College of Midwives (RCM) have urged pregnant women to take up the offer of the vaccine, which is known to be safe in pregnancy, as the virus can be severe in the third trimester, owing partly to the increased pressure on the lungs by the growing fetus. Also states that the need for an emergency caesarean section is increased in women who give birth while infected, and the stillbirth rate, while still remaining low, is increased in this population group. (JSM)

**Full URL:** <https://www.bbc.co.uk/news/health-57840159>

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## 2021-06399

**Pregnancy: Coronavirus [written answer].** House of Commons (2021), Hansard Written question 29137, 7 July 2021

Nadhim Zahawi responds to a written question asked by Marsha de Cordova, regarding whether he will publish data on the number of pregnant and breastfeeding women who have had covid-19 vaccinations. (MB)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-07-07/29137>

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## 2021-06255

**The Levels of SARS-CoV-2 Specific Antibodies in Human Milk Following Vaccination.** Juncker HG, Mulleners SJ, van Gils MJ, et al (2021), Journal of Human Lactation vol 37, no 3, August 2021, pp 477-484

### Background

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) vaccines are being administered around the world; however, lactating women were excluded from SARS-CoV-2 vaccine trials. Therefore, knowledge about the effect of vaccination in this specific group is limited. This information is essential to empower lactating women to make a well-informed decision on their choice for vaccination. After natural infection, SARS-CoV-2 specific antibodies are present in human milk, which might offer protection for her newborn. The dynamics of these antibodies in human milk following vaccination remain to be elucidated.

### Research Aim

To determine the effect of vaccination with BNT162b2 on the levels of SARS-CoV-2 specific IgA in human milk.

### Methods

In this prospective longitudinal study, we included lactating women who received the BNT162b2 vaccine. Human milk samples were collected prior to vaccination and 3, 5, 7, 9, 11, 13, and 15 days after both vaccine doses. Samples were analyzed using enzyme-linked immunosorbent assay against the spike protein of SARS-CoV-2.

### Results

In total, 366 human milk samples from 26 lactating women were analyzed. A biphasic response was observed, with SARS-CoV-2 specific immunoglobulin A (IgA) starting to increase between day 5 and 7 after the first dose of the vaccine. After the second dose, an accelerated IgA antibody response was observed.

### Conclusion

After vaccination with the mRNA-based BNT162b2 vaccine, a SARS-CoV-2 specific antibody response was observed in human milk. The presence of SARS-CoV-2 specific IgA after vaccination is important as antibodies are transferred via human milk, and thereby might provide protection to infants against COVID-19. (Author)

Full URL: <https://doi.org/10.1177/08903344211027112>

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## 2021-06194

**COVID-19 Vaccination in Pregnancy: The Benefits Outweigh the Risks.** Chavan M, Qureshi H, Karnati S, et al (2021), JOGC [Journal of Obstetrics and Gynaecology Canada] vol 43, no 7, July 2021, pp 814-816

The rapid development of a vaccine to protect against SARS-CoV-2 infection and prevent coronavirus disease 2019 (COVID-19) has been a historic scientific achievement but has also raised many questions in the health care community about vaccine safety for patients who were not included in clinical trials. As mass immunization efforts have rapidly expanded, obstetricians across the globe now face the challenge of advising pregnant patients on whether they should receive the vaccine. (Author)

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## 2021-06147

### **Coronavirus disease and vaccination during pregnancy and childbirth: a review of the Israeli perspective and experience.**

Hadar E, Dollinger S, Wiznitzer A, et al (2021), Journal of Maternal-Fetal and Neonatal Medicine 15 June 2021, online

Purpose of the study: To discuss selected aspects of our local and national experience in treating and vaccinating pregnant women with SARS-CoV-2 infection and COVID-19 disease.

Materials and methods: A comprehensive, retrospective review of COVID-19 parturients in our center as well as a detailed literature review of several aspects from the groundbreaking research done in Israel to investigate the direct obstetrical impact of COVID-19, indirect effect of the lockdown measures and the vaccination effort among pregnant women.

Results: The study shows our local and national experience in treating COVID-19 in pregnancy and the maternal and neonatal impact of vaccination in nationwide scale. We treated our first COVID-19 pregnant patient on April 4th, 2020 reaching a total of 193 pregnant women, with PCR-positive SARS-CoV-2 by 8th March 2021. Several studies from Israel have evaluated pregnancy-related outcomes of COVID-19, be it maternal, obstetrical or neonatal complications. We suggest that only in a small subset of severely ill mothers, intubated and otherwise respiratory or hemodynamically unstable, an emergency cesarean delivery should be considered, factoring gestational age, in order to assist maternal ventilation and circulation, as well as to avoid possible secondary fetal compromise due the maternal deterioration.

In addition, there is conflicting evidence as to the price of lockdown on obstetrical outcomes, i.e., not the direct medical impact of the virus, but rather the impact of the measures to contain its spread - mainly lockdowns, which has been a major tool in Israel to combat COVID-19.

Finally, we demonstrate to overall safety and efficacy of vaccination pregnant women and the beneficial impact on pregnancy outcome and neonatal gain of protecting antibodies.

Conclusion: The data emerging from Israel is overall reassuring, as for the association of COVID-19 with adverse pregnancy outcome and the possible protective effect of the vaccinations. Further, long term studies, should be conducted to answer the long-term maternal outcomes, as well and neonatal prognosis. (Author)

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## 2021-06128

### **COVID-19 vaccination in pregnancy and postpartum.** Brillo E, Tosto V, Gerli S, et al (2021), Journal of Maternal-Fetal and Neonatal Medicine 21 June 2021, online

Pregnant women were excluded from the initial phase 3 clinical trials of COVID-19 vaccines resulting in limited data on their efficacy and safety during pregnancy and postpartum. As a result, since December 2020, there has been conflicting advice from public health, governmental, and professional authorities on this matter. From the end of 2020 up to now, some consensus guidance has been published with a prevalent precautionary approach on the administration of vaccines in pregnant women, in breastfeeding ones, or for those who are planning a pregnancy (either spontaneously or with assisted technologies). After the first few months of vaccine administration in some countries, more permissiveness seems to prevail, although with inconsistencies. Some little indicative advice, their inconsistency around the world and their changes in a short time have probably disoriented both women and their health care providers and placed the burden of decision making upon women and their health care providers without information to assist in making an informed choice. We reviewed the COVID-19 vaccination guidance for pregnant and breastfeeding women published to date and evidence from cases of unplanned pregnancy during the course of vaccine trials, preclinical experimental and observational clinical studies, and discuss their implications. In this way, we have tried to identify the safety of COVID-19 vaccines for pregnant or breastfeeding women, and their offspring. (Author)

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**2021-05952**

**Immunogenicity of COVID-19 mRNA Vaccines in Pregnant and Lactating Women.** Collier AY, McMahan K, Yu J, et al (2021), JAMA (Journal of the American Medical Association) vol 325, no 23, 15 June 2021, pp 2370-2380

**Importance** Pregnant women are at increased risk of morbidity and mortality from COVID-19 but have been excluded from the phase 3 COVID-19 vaccine trials. Data on vaccine safety and immunogenicity in these populations are therefore limited.

**Objective** To evaluate the immunogenicity of COVID-19 messenger RNA (mRNA) vaccines in pregnant and lactating women, including against emerging SARS-CoV-2 variants of concern.

**Design, Setting, and Participants** An exploratory, descriptive, prospective cohort study enrolled 103 women who received a COVID-19 vaccine from December 2020 through March 2021 and 28 women who had confirmed SARS-CoV-2 infection from April 2020 through March 2021 (the last follow-up date was March 26, 2021). This study enrolled 30 pregnant, 16 lactating, and 57 neither pregnant nor lactating women who received either the mRNA-1273 (Moderna) or BNT162b2 (Pfizer-BioNTech) COVID-19 vaccines and 22 pregnant and 6 nonpregnant unvaccinated women with SARS-CoV-2 infection.

**Main Outcomes and Measures** SARS-CoV-2 receptor binding domain binding, neutralizing, and functional nonneutralizing antibody responses from pregnant, lactating, and nonpregnant women were assessed following vaccination. Spike-specific T-cell responses were evaluated using IFN- $\gamma$  enzyme-linked immunospot and multiparameter intracellular cytokine-staining assays. Humoral and cellular immune responses were determined against the original SARS-CoV-2 USA-WA1/2020 strain as well as against the B.1.1.7 and B.1.351 variants.

**Results** This study enrolled 103 women aged 18 to 45 years (66% non-Hispanic White) who received a COVID-19 mRNA vaccine. After the second vaccine dose, fever was reported in 4 pregnant women (14%; SD, 6%), 7 lactating women (44%; SD, 12%), and 27 nonpregnant women (52%; SD, 7%). Binding, neutralizing, and functional nonneutralizing antibody responses as well as CD4 and CD8 T-cell responses were present in pregnant, lactating, and nonpregnant women following vaccination. Binding and neutralizing antibodies were also observed in infant cord blood and breast milk. Binding and neutralizing antibody titers against the SARS-CoV-2 B.1.1.7 and B.1.351 variants of concern were reduced, but T-cell responses were preserved against viral variants.

**Conclusion and Relevance** In this exploratory analysis of a convenience sample, receipt of a COVID-19 mRNA vaccine was immunogenic in pregnant women, and vaccine-elicited antibodies were transported to infant cord blood and breast milk. Pregnant and nonpregnant women who were vaccinated developed cross-reactive antibody responses and T-cell responses against SARS-CoV-2 variants of concern. (Author)

**Full URL:** <https://doi.org/10.1001/jama.2021.7563>

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**2021-05897**

**Maternal and neonatal SARS-CoV-2 antibodies assessment after mRNA maternal vaccination in the third trimester of pregnancy.** Riviello C, Pontello V (2021), International Journal of Gynecology & Obstetrics vol 154, no 3, September 2021, pp 565-566

Brief report presenting the case of a healthy 42-year-old pregnant health care worker who received doses of the Pfizer vaccine at 31 and 34 weeks of gestation. The ratio between cord and maternal antibodies was 0.38 which may imply that placental transfer after vaccination is less efficient than in natural infection. (LDO)

**Full URL:** <https://doi.org/10.1002/ijgo.13783>

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## 2021-05896

### **A forecast of maternal deaths with and without vaccination of pregnant women against COVID-19 in Mexico.**

Lumbreras-Marquez MI, Fields KG, Campos-Zamora M, et al (2021), International Journal of Gynecology & Obstetrics vol 154, no 3, September 2021, pp 566-567

Brief report forecasting excess maternal deaths for the second half of 2021 with and without vaccination of all pregnant women during May and June 2021. The authors predict that a 100% vaccination rate would result in the number of deaths falling from 993 to 885. (LDO)

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## 2021-05804

### **Maternal and Child Symptoms Following COVID-19 Vaccination Among Breastfeeding Mothers.** McLaurin-Jiang S, Garner CD, Krusch K, et al (2021), Breastfeeding Medicine vol 16, no 9, September 2021, pp 702-709

Background: The impact of COVID-19 vaccination on breastfeeding is unknown. The primary aim of this study was to determine whether vaccine-related side effects following COVID-19 vaccination were associated with an adverse impact on breastfeeding. Secondly, we sought to determine perceived symptoms in breastfed children and maternal opinion about COVID-19 vaccination.

Materials and Methods: We conducted a cross-sectional survey of breastfeeding mothers who underwent COVID-19 vaccination >2 days before the survey. Subjects were recruited through social media and websites. Data included sociodemographic information, vaccine history, maternal and child symptoms, and impact on lactation/breastfeeding. Bivariate statistics (chi-square, Wilcoxon rank sum, and t tests) and multivariable logistic regression models examined the association of vaccine side effects with lactation, symptoms in breastfed children, and maternal opinion on vaccination.

Results: Analysis included 4,455 breastfeeding mothers. Maternal postvaccination symptoms were more common after the second dose ( $p < 0.001$ ). Overall, 77 (1.7%) respondents reported a negative impact on breastfeeding postvaccination, and these mothers were more likely to have experienced fatigue, headache, muscle pain, injection site pain, chills, fever, or allergic reactions. After adjusting for confounding variables, higher odds of an adverse impact on lactation were associated with lower breastfeeding intensity, dose of vaccine, and child symptoms. Even among mothers who reported an adverse impact on breastfeeding, maternal opinion about vaccination and confidence in their decision to receive the COVID-19 vaccine were high.

Conclusions: COVID-19 vaccination among breastfeeding mothers resulted in minimal disruption of lactation or adverse impact on the breastfed child. These findings may be considered in vaccination decision-making. (Author)

Full URL: <https://doi.org/10.1089/bfm.2021.0079>

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## 2021-05751

### **Coronavirus (COVID-19) Vaccination in Pregnancy. Information for healthcare professionals. Version 1.0.** Royal College of Obstetricians and Gynaecologists (2021), London: RCOG 30 June 2021, 19 pages

This document is intended as temporary guidance on COVID-19 vaccination in pregnancy. It aims to summarise, in a format useful for maternity care, the evidence presented in existing COVID-19 vaccination guidance from the Public Health England/Department of Health Green Book,<sup>1</sup> as well as leaflets and information from Public Health England and the NHS. The document will be incorporated into the next version of the Royal College of Obstetricians and Gynaecologists (RCOG) Coronavirus (COVID-19) Infection in Pregnancy guidance expected to be published in autumn 2021. (Author)

Full URL: <https://www.rcog.org.uk/globalassets/documents/guidelines/2021-06-30-coronavirus-covid-19-vaccination-in-pregnancy.pdf>

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## 2021-05747

**Vaccine Update.** Public Health England (2021), London: PHE no 322, June 2021

This special edition of Vaccine Update focuses on the COVID-19 vaccination programme and includes information on vaccine uptake, mortality rates and side effects. (LDO)

**Full URL:** <https://www.gov.uk/government/publications/vaccine-update-issue-322-june-2021-covid-19-phase-2-special-edition/vaccine-update-issue-322-june-2021-covid-19-phase-2-special-edition>

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## 2021-05702

**Pregnancy: Coronavirus [written answer].** House of Commons (2021), Hansard Written question 22032, 24 June 2021

Nadhim Zahawi responds to a written question asked by Fleur Anderson to the Secretary of State for Health and Social Care, regarding the assessment he has made of the potential merits of reducing the time between COVID-19 vaccine doses for pregnant women in line with priority groups 1 to 9. (LDO)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-06-24/22032>

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## 2021-05661

**EBCOG position statement on COVID-19 vaccination for pregnant and breastfeeding women.** Martins I, Louwen F, Ayres-de-Campos D, et al (2021), European Journal of Obstetrics & Gynecology and Reproductive Biology vol 262, July 2021, pp 256-258

Covid 19 pandemic has led to significant mortality and long term morbidity globally. Pregnant women are at increased risk of severe illness from COVID 19 infection. There is an urgent need for all health authorities and Governments to offer vaccination to all pregnant women especially those with high risk pregnancy. (Author)

**Full URL:** <https://doi.org/10.1016/j.ejogrb.2021.05.021>

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## 2021-05365

**Pregnancy: Coronavirus [written answer].** House of Lords (2021), Hansard Written question HL832, 8 June 2021

Lord Bethell responds to a written question from Lord Balfe to Her Majesty's Government, regarding what plans they have (1) to increase the opportunity for pregnant women to have two doses of vaccinations by the time their pregnancy is full term by ensuring that that the NHS vaccination booking system allows them to book a second dose of vaccine eight weeks after their first, and (2) to ensure that any NHS-supported applications used to enable such bookings reflect that opportunity. (JSM)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-06-08/HL832>

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## 2021-05348

**COVID-19 vaccine acceptance among pregnant, breastfeeding, and nonpregnant reproductive-aged women.** Sutton D, D'Alton M, Zhang Y, et al (2021), American Journal of Obstetrics & Gynecology MFM vol 3, no 5, September 2021, 100403

### Background

Although mass vaccination against COVID-19 may prove to be the most efficacious end to this deadly pandemic, there remains concern and indecision among the public towards vaccination. As pregnant and reproductive-aged women account for a large proportion of the population with particular concerns regarding vaccination against COVID-19, this survey aims at investigating their current attitudes and beliefs within our own institution.

### Objective

To understand vaccine acceptability among pregnant, non-pregnant and breastfeeding respondents and elucidate factors associated with COVID-19 vaccine acceptance.

### Methods

We administered an anonymous online survey to all women (including patients, providers and staff) at our institution assessing rates of acceptance of COVID-19 vaccination. Respondents were contacted in one of three ways: by email, advertisement flyers and distribution of QR codes at virtual townhalls regarding the COVID-19 vaccine. Based on their responses, respondents were divided into three mutually exclusive groups: (1) non-pregnant respondents (2) pregnant respondents and (3) breastfeeding respondents. The primary outcome was acceptance of vaccination. Prevalence ratios were calculated to ascertain the independent effects of multiple patient-level factors on vaccine acceptability.

### Results

The survey was administered from January 7, 2021 to January 29, 2021 with 1,012 respondents of whom 466 (46.9%) identified as Non-Hispanic White, 108 (10.9%) as Non-Hispanic Black, 286 (28.8%) as Hispanic, and 82 (8.2) as Non-Hispanic Asian. The median age was 36 (IQR 25-47) years. Of all the respondents, 656 respondents (64.8%) were non-pregnant, 216 (21.3%) were pregnant and 122 (12.1%) were breastfeeding. There was no difference in chronic comorbidities when evaluated as a composite variable (Table 1). 390 respondents (39.2%) reported working in healthcare. Non-pregnant respondents were most likely to accept vaccination (457 respondents, 76.2%,  $p < 0.001$ ) with breastfeeding respondents the second most likely (55.2%). Pregnant respondents had the lowest rate of vaccine acceptance (44.3%,  $p < 0.001$ ). Prevalence ratios revealed all non-White races except for non-Hispanic Asian respondents and Spanish speaking respondents were less likely to accept vaccination (Table 3). Working in healthcare was not found to be associated with vaccine acceptance among our cohort.

### Conclusions and Relevance

In this survey study of only women at a single institution, pregnant respondents of non-White or non-asian races were more likely to decline vaccination compared to non-pregnant and breast-feeding respondents. Working in healthcare was not associated with vaccine acceptance. (Author)

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## 2021-05317

**COVID-19 Vaccine Considerations during Pregnancy and Lactation.** Blumberg D, Sridhar A, Lakshminrusimha S, et al (2021), American Journal of Perinatology vol 38, no 6, June 2021, pp 523-528

Editorial reviewing the published data and theoretical considerations of COVID-19 vaccination in pregnant and lactating women. Discusses the safety of mRNA and adenovirus DNA vaccines manufactured by Pfizer-BioNTech, Moderna and Janssen. (LDO)

Full URL: <https://doi.org/10.1055/s-0041-1726390>

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**2021-05276**

**Coronavirus disease 2019 vaccine response in pregnant and lactating women: a cohort study.** Gray KJ, Bordt EA, Atyeo C, et al (2021), American Journal of Obstetrics & Gynecology (AJOG) vol 225, no 3, September 2021, pp 303.e1-303.e17

#### Background

Pregnant and lactating women were excluded from initial coronavirus disease 2019 vaccine trials; thus, data to guide vaccine decision making are lacking.

#### Objective

This study aimed to evaluate the immunogenicity and reactogenicity of coronavirus disease 2019 messenger RNA vaccination in pregnant and lactating women compared with: (1) nonpregnant controls and (2) natural coronavirus disease 2019 infection in pregnancy.

#### Study Design

A total of 131 reproductive-age vaccine recipients (84 pregnant, 31 lactating, and 16 nonpregnant women) were enrolled in a prospective cohort study at 2 academic medical centers. Titers of severe acute respiratory syndrome coronavirus 2 spike and receptor-binding domain immunoglobulin G, immunoglobulin A, and immunoglobulin M were quantified in participant sera (n=131) and breastmilk (n=31) at baseline, at the second vaccine dose, at 2 to 6 weeks after the second vaccine, and at delivery by Luminex. Umbilical cord sera (n=10) titers were assessed at delivery. Titers were compared with those of pregnant women 4 to 12 weeks from the natural infection (n=37) by enzyme-linked immunosorbent assay. A pseudovirus neutralization assay was used to quantify neutralizing antibody titers for the subset of women who delivered during the study period. Postvaccination symptoms were assessed via questionnaire. Kruskal-Wallis tests and a mixed-effects model, with correction for multiple comparisons, were used to assess differences among groups.

#### Results

Vaccine-induced antibody titers were equivalent in pregnant and lactating compared with nonpregnant women (pregnant, median, 5.59; interquartile range, 4.68–5.89; lactating, median, 5.74; interquartile range, 5.06–6.22; nonpregnant, median, 5.62; interquartile range, 4.77–5.98,  $P=.24$ ). All titers were significantly higher than those induced by severe acute respiratory syndrome coronavirus 2 infection during pregnancy ( $P<.0001$ ). Vaccine-generated antibodies were present in all umbilical cord blood and breastmilk samples. Neutralizing antibody titers were lower in umbilical cord than maternal sera, although this finding did not achieve statistical significance (maternal sera, median, 104.7; interquartile range, 61.2–188.2; cord sera, median, 52.3; interquartile range, 11.7–69.6;  $P=.05$ ). The second vaccine dose (boost dose) increased severe acute respiratory syndrome coronavirus 2–specific immunoglobulin G, but not immunoglobulin A, in maternal blood and breastmilk. No differences were noted in reactogenicity across the groups.

#### Conclusion

Coronavirus disease 2019 messenger RNA vaccines generated robust humoral immunity in pregnant and lactating women, with immunogenicity and reactogenicity similar to that observed in nonpregnant women. Vaccine-induced immune responses were statistically significantly greater than the response to natural infection. Immune transfer to neonates occurred via placenta and breastmilk. (Author)

**Full URL:** <https://doi.org/10.1016/j.ajog.2021.03.023>

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## 2021-05252

**Care strategies before entering pregnant mothers to the operating room and after birth during COVID-19.** Moghadam MY, Beigi-khoozani A, Merajikhah A (2021), British Journal of Midwifery vol 29, no 6, June 2021, pp 348-351

Provides an overview of care strategies for pregnant women in the perinatal period during the COVID-19 pandemic. Discusses vaccination and testing during pregnancy, isolation of the newborn baby and hygiene while breastfeeding. (LDO)

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## 2021-05211

**Preliminary Findings of mRNA Covid-19 Vaccine Safety in Pregnant Persons.** Shimabukuro TT, Kim SY, Myers TR, et al (2021), The New England Journal of Medicine vol 384, no 24, 17 June 2021, pp 2273-2282

### BACKGROUND

Many pregnant persons in the United States are receiving messenger RNA (mRNA) coronavirus disease 2019 (Covid-19) vaccines, but data are limited on their safety in pregnancy.

### METHODS

From December 14, 2020, to February 28, 2021, we used data from the “v-safe after vaccination health checker” surveillance system, the v-safe pregnancy registry, and the Vaccine Adverse Event Reporting System (VAERS) to characterize the initial safety of mRNA Covid-19 vaccines in pregnant persons.

### RESULTS

A total of 35,691 v-safe participants 16 to 54 years of age identified as pregnant. Injection-site pain was reported more frequently among pregnant persons than among nonpregnant women, whereas headache, myalgia, chills, and fever were reported less frequently. Among 3958 participants enrolled in the v-safe pregnancy registry, 827 had a completed pregnancy, of which 115 (13.9%) resulted in a pregnancy loss and 712 (86.1%) resulted in a live birth (mostly among participants with vaccination in the third trimester). Adverse neonatal outcomes included preterm birth (in 9.4%) and small size for gestational age (in 3.2%); no neonatal deaths were reported. Although not directly comparable, calculated proportions of adverse pregnancy and neonatal outcomes in persons vaccinated against Covid-19 who had a completed pregnancy were similar to incidences reported in studies involving pregnant women that were conducted before the Covid-19 pandemic. Among 221 pregnancy-related adverse events reported to the VAERS, the most frequently reported event was spontaneous abortion (46 cases).

### CONCLUSIONS

Preliminary findings did not show obvious safety signals among pregnant persons who received mRNA Covid-19 vaccines. However, more longitudinal follow-up, including follow-up of large numbers of women vaccinated earlier in pregnancy, is necessary to inform maternal, pregnancy, and infant outcomes. (Author) [Erratum: The New England Journal of Medicine, vol 385, no 16, 14 October 2021, p 1536. <https://doi.org/10.1056/NEJMx210016>]

**Full URL:** <https://doi.org/10.1056/NEJMoa2104983>

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## 2021-05210

**COVID-19 vaccination in pregnancy and postpartum.** Brillo E, Tosto V, Gerli S, et al (2021), Journal of Maternal-Fetal and Neonatal Medicine 19 May 2021, online

### Aim

To identify whether COVID-19 vaccines should be administered in pregnant and breastfeeding women by reviewing the guidance and other evidence.

### Methods

We reviewed the COVID-19 vaccination guidance for pregnant and breastfeeding women published to date and evidence from preclinical experimental and observational clinical studies, and discuss their implications.

### Results

Pregnant women were excluded from the initial phase 3 clinical trials of COVID-19 vaccines resulting in limited data on their efficacy and safety during pregnancy and postpartum. As a result, since December 2020, there has been conflicting advice from public health, governmental, and professional authorities on this matter. From the end of 2020 up to now, some consensus guidance has been published with a prevalent precautionary approach on the administration of vaccines in pregnant women, in breastfeeding ones, or for those who are planning a pregnancy (either spontaneously or with assisted technologies). After the first few months of vaccine administration in some countries, more permissiveness seems to prevail, although with inconsistencies. At the moment, the results obtained by preclinical experimental and observational clinical studies suggest that the risks of the maternal COVID-19 outweigh the undocumented and hypothetical risks of the COVID-19 vaccines in pregnancy. Also, until two viral vector COVID-19 vaccines were associated with very rare thromboembolic events, all guidance had agreed that all approved COVID-19 vaccines could be administered in pregnancy. Actually, some concern has been expressed.

### Conclusion

COVID-19 vaccines administered in pregnancy can reduce the risk of severe COVID-19 and their serious consequences for mothers and their offspring. However, many aspects remain to be clarified. (Author)

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## 2021-05204

**SARS CoV-2 (COVID-19) Current Pharmacotherapy for Mother and Infant.** Thigpen J (2021), Neonatal Network: the Journal of Neonatal Nursing vol 40, no 3, May/June 2021, pp 175-182

The novel coronavirus disease 2019 (COVID-19), appeared in the United States over 1 year ago. This virus has a wide range of presentations, from being asymptomatic to causing severe acute respiratory syndrome, which can lead to death. It has led to a worldwide effort to find effective treatments, from repurposed medications to new discoveries, as well as the push to develop effective vaccines. As the race to fight this pandemic unfolds, this column provides what is currently available to combat this virus, how it has been utilized in the pregnant population, and what data have been made available about how these treatments affect fetal development and the neonate. (Author)

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## 2021-05023

**Expecto Patronum! Leveraging the Positive Force of COVID-19 Vaccines for Pregnant and Lactating Individuals.** Malinowski AK, Whittle W, Murphy K, et al (2021), JOGC (Journal of Obstetrics and Gynaecology Canada) vol 43, no 10, October 2021, pp 1184-1187

For over a year, the world has been gripped by the coronavirus disease 2019 (COVID-19) pandemic, which has had far-reaching effects on society. The integrity of national health care systems has also been challenged, owing to shifts in guidance and misinformation. Although initial reports suggested that pregnant people were not at increased risk of severe COVID-19, current data arising from the “third wave” paint a much more concerning picture. In addition, pregnant and lactating people were excluded from vaccine trials, which has hindered the ability of health care professionals to provide evidence-based counselling regarding the safety and efficacy of the available vaccines in these populations. This commentary reviews the current data on the safety of COVID-19 vaccines in pregnancy. The evidence is clear that the risks of hospitalization and severe maternal and potentially fetal morbidity from COVID-19 in pregnancy far outweigh the very minimal risks of COVID-19 vaccination in pregnancy. (Author)

**Full URL:** <https://doi.org/10.1016/j.jogc.2021.04.015>

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## 2021-04956

**Maternal vaccines during the Covid-19 pandemic: A qualitative interview study with UK pregnant women.** Brigden A, Davies A, Shepherd E, et al (2021), Midwifery vol 100, September 2021, 103062

### Background

There is suboptimal uptake of recommended maternal vaccines (pertussis and influenza) during pregnancy in the UK. The Covid-19 pandemic has impacted healthcare services, and potentially vaccine coverage, and brought the need for new vaccines to be tested and rolled out.

### Objectives

To explore: i) the impact of the Covid-19 pandemic on pregnant women's access to, and attitudes towards, routine maternal vaccines and; ii) women's attitudes towards testing Covid-19 vaccines on pregnant women and their personal willingness to take part in such a trial.

### Design

Qualitative interview study with pregnant women in the Bristol and surrounding area (UK).

### Methods

Semi-structured telephone/videoconference interviews were conducted (following a topic guide), transcribed verbatim and subjected to thematic analysis.

### Results

Thirty-one pregnant women (selected for demographic range) were interviewed in April/May 2020. Participants felt the pandemic had elevated the importance of routine maternal vaccines, though women were concerned about safety management around appointment attendance. Women were wary of receiving a new Covid-19 vaccine, with most perceiving it as riskier than Covid-19 itself.

### Conclusions

It is important to maximise the safety and efficiency of maternity appointments to encourage uptake of routine maternal vaccines, and to communicate this well. For pregnant women to gain a new vaccine or participate in a vaccine trial, they need to be convinced that the risk posed by the virus is greater than any risk of receiving a new vaccine. (Author)

**Full URL:** <https://doi.org/10.1016/j.midw.2021.103062>

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**2021-04866**

**Pregnant women's perspectives on severe acute respiratory syndrome coronavirus 2 vaccine.** Carbone L, Mappa I, Sirico A, et al (2021), American Journal of Obstetrics & Gynecology MFM vol 3, no 4, July 2021, 100352

#### BACKGROUND

Since coronavirus disease 2019 vaccines have been distributed, a debate has raised on whether pregnant women should get the vaccine. No available data exist so far regarding the safety, efficacy, and toxicology of these vaccines when administered during pregnancy. Most of the Obstetrics and Gynecology societies suggested that pregnant could agree to be vaccinated, after a thorough counseling of risks and benefits with their gynecologists, thus leading to an autonomous decision.

#### OBJECTIVE

This study aimed to evaluate the attitude to coronavirus disease 2019 vaccination in pregnant and breastfeeding women in Italy.

#### STUDY DESIGN

A survey was made at the University of Naples Federico II and the Ospedale Cristo Re, Tor Vergata University of Rome, on pregnant and breastfeeding women asking their perspectives on the available vaccines after reading the recommendations issued by our national Obstetrics, Gynecology, and Neonatology societies. The questionnaire included 12 items finalized to evaluate general features of the women and 6 items specifically correlated to their attitudes toward the severe acute respiratory syndrome coronavirus 2 vaccination. Chi-square or Fisher's exact tests were used to compare group differences of categorical variables and Wilcoxon signed rank or Mann-Whitney U test for continuous variables. The study was approved by the institutional review boards of the University of Naples Federico II (ref. no. 409/2020) and the Ospedale Cristo Re, Tor Vergata University of Rome (ref. #Ost4-2020).

#### RESULTS

Most of the included women did not agree to eventually receive severe acute respiratory syndrome coronavirus 2 vaccine during pregnancy (40 [28.2%] vs 102 [71.8%]). Being pregnant was considered a determinant factor to refuse the vaccine prophylaxis (99 [69.7%] vs 43 [30.3%]; chi-square test=24.187;  $P<.001$ ), even if a very large percentage declared to be generally in favor of vaccines (128 [90.1%] vs 14 [9.9%]; chi-square test=6.091;  $P=.014$ ) and most of them confirmed they received or would receive other recommended vaccines during pregnancy (75 [52.8%] vs 67 [47.2%]; chi-square test=10.996;  $P=.001$ ).

#### CONCLUSION

Urgent data are needed on the safety, efficacy, and toxicology of severe acute respiratory syndrome coronavirus 2 vaccines during pregnancy to modify this trend and to help obstetricians during the counseling. Furthermore, pregnant women should be included in future vaccine development trials to not incur again in such uncertainty. (Author)

**Full URL:** <https://doi.org/10.1016/j.ajogmf.2021.100352>

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**2021-04599**

**Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Antibodies in Neonatal Cord Blood After Vaccination in Pregnancy.** Gill L, Jones CW (2021), *Obstetrics & Gynecology* vol 137, no 6, June 2021, pp 894-896

BACKGROUND:

Studies evaluating the safety and efficacy of currently available vaccines for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) do not include pregnant participants. No data are available to counsel on vaccine safety and potential for neonatal passive immunity.

CASE:

A 34-year-old multigravid patient working in health care received the Pfizer-BioNTech (BNT162b2) mRNA vaccine for SARS-CoV-2 in the third trimester of pregnancy. Uncomplicated spontaneous vaginal delivery of a female neonate with Apgar scores of 9 and 9 occurred at term. The patient's blood as well as neonatal cord blood were evaluated for SARS-CoV-2-specific antibodies. Both the patient and the neonate were positive for antibodies at a titer of 1:25,600.

CONCLUSION:

In this case, passage of transplacental antibodies for SARS-CoV-2 was shown after vaccination in the third trimester of pregnancy. (Author)

Full URL: <https://doi.org/10.1097/AOG.0000000000004367>

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**2021-04580**

**Vaccination: Children [written answer].** House of Commons (2021), Hansard Written question 5192, 21 May 2021

Jo Churchill responds to a written question from Mr Jonathan Lord to the Secretary of State for Health and Social Care, regarding what lessons he has learned from the covid-19 vaccine deployment that can be applied to the routine childhood immunisation programme. (JSM)

Full URL: <https://questions-statements.parliament.uk/written-questions/detail/2021-05-21/5192>

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**2021-04500**

**Maternity Colleges express concern over vaccine hesitancy in pregnant women.** Royal College of Obstetricians & Gynaecologists (2021), London: RCOG 10 June 2021

Reports that the Royal College of Obstetricians and Gynaecologists (RCOG) and the Royal College of Midwives (RCM) are urging pregnant women to seek advice from their health care professional about getting vaccinated against COVID-19, after the results of a recent survey conducted on social media revealed the majority of pregnant women declined the vaccine when it was offered to them. Concerns have been raised by the RCOG and the RCM following research which has shown pregnant women, particularly those in the third trimester, are at risk of becoming severely ill if they contract COVID-19, and this then increases the chances of prematurity and stillbirth. (JSM)

Full URL: <https://www.rcog.org.uk/en/news/maternity-colleges-express-concern-over-vaccine-hesitancy-in-pregnant-women/>

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**2021-04498**

**US college covid-19 vaccine mandates don't consider immunity or pregnancy, and may run foul of the law.** Block J (2021), *BMJ* vol 373, 2 June 2021, n1397

The requirement for vaccination with products under emergency use authorisation is new legal territory, finds Jennifer Block. (Author)

Full URL: <https://doi.org/10.1136/bmj.n1397>

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**2021-04135**

**Pregnancy: Coronavirus [written answer].** House of Commons (2021), Hansard Written question 7236, 25 May 2021

Nadhim Zahawi responds to a written question from Catherine West to the Secretary of State for Health and Social Care, regarding what steps his Department is taking to help ensure that pregnant women are supported to access to the covid-19 vaccine. (JSM)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-05-25/7236>

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**2021-04013**

**Frequently asked questions for health-care providers providing care to pregnant patients and their newborns during the COVID-19 pandemic.** Perinatal Services BC (2021), Vancouver: Perinatal Services BC 21 May 2021

Brief fact sheet aimed at health care providers on the care of pregnant women and their newborns during the COVID-19 pandemic. Includes information on women who have tested positive, placental pathology and vaccination. (LDO)

**Full URL:** <http://www.perinataleservicesbc.ca>

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**2021-03900**

**The Effects of the COVID 19 Pandemic on Vaccine Decisions in Pregnant Women.** Gencer H, Özkan S, Vardar O, et al (2021), Women and Birth: Journal of the Australian College of Midwives 19 May 2021, online

**Background**

Pregnancy is an important time for developing attitudes and beliefs about childhood vaccinations. Vaccinations are among the most effective way of preventing some infectious diseases. Discussions on vaccinations have increased due to the Covid-19 pandemic and there is an opportunity to give society correct information on vaccinations.

**Aim**

The aim of the study was to determine the opinions of pregnant women on vaccinations in pregnancy and childhood and the effect of the Covid-19 pandemic on these views.

**Methods**

The study was conducted as a cross-sectional study. The sample included 152 pregnant women. Data were collected through a 25-item online questionnaire created by the researchers.

**Results**

It was found in our study that 29.6% of pregnant women using forum websites exhibited hesitant attitudes towards vaccinations. The vaccine hesitancy rate was found to be high in pregnant women who said that their economic level was low and who worried about the risks of vaccination. The Covid-19 pandemic was reported to be the cause of a decrease in vaccine hesitancy in 28.9% of the participants.

**Conclusion**

The events surrounding the pandemic provided an opportunity to explain how pregnant women feel about vaccinations. Providing pregnant women with access to correct information from health workers may reduce the problem of trust, which is among the most important reasons for vaccine hesitancy. (Author)

**Full URL:** <https://doi.org/10.1016/j.wombi.2021.05.003>

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**2021-03845**

**Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Vaccination in Pregnancy: Measures of Immunity and Placental Histopathology.** Shanes ED, Otero S, Mithal LB, et al (2021), Obstetrics & Gynecology vol 138, no 2, August 2021, pp 281-283

Receipt of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) vaccination was not associated with placental histopathologic lesions. (Author)

**Full URL:** <https://doi.org/10.1097/AOG.0000000000004457>

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**2021-03791**

**Women perception of SARS-CoV-2 vaccination during pregnancy and subsequent maternal anxiety: a prospective observational study.** Mappa I, Luviso M, Distefano FA, et al (2021), The Journal of Maternal-Fetal and Neonatal Medicine 13 April 2021, online

**Objective**

The use of Coronavirus 2 (SARS-CoV-2) vaccine in pregnant women is controversial and still not performed in Italy. Our objective was to evaluate the propensity of a population of Italian women to receive the vaccine and its psychological impact.

**Methods**

A prospective, observational study was performed on pregnant women attending Ospedale Cristo Re Università Roma TorVergata. A multi-section questionnaire was sent to each included woman on the first day of available SARS-CoV-2 vaccination. Part-A was finalized to acquire maternal characteristics and to test the women's perception of vaccinations in pregnancy and their fear-induced by vaccines. Part-B included the State-Trait-Anxiety-Inventory (STAI) a validated test for scoring trait anxiety (basal anxiety, STAI-T) and state anxiety (STAI-S). An abnormal value of STAI was considered when  $\geq 40$ . Comparisons of maternal variables were performed according to their vaccine attitude.

**Results**

The questionnaire was completed by 161 women (80.5% of the population considered). A positive attitude toward the vaccine was present in 136 (84.5%) women (positive) while the remaining 25.5% considered the vaccine not useful (negative). Among the former group 52.9% were favorable to obtain the vaccine during pregnancy despite the current national limitations, a percentage significantly higher ( $p = .02$ ) than in the negative groups. Women with a negative attitude to the vaccine had a lower educational ( $p = .002$ ) and employment level ( $p = .016$ ) when compared to the positive group. In all the women a significant increase of STAI-S from STAI-T values was evidenced ( $p < .0001$ ). The incidence of abnormal STAI T values (basal anxiety) was similar between the 2 groups ( $p = .81$ ), while there was a significant increase of STAI-S values in the negative group (negative 88.0%; vs positive 63.4%;  $p = .018$ )

**Conclusions**

The majority of pregnant women considered have a positive attitude to SARS-CoV-2 vaccine. Vaccine campaign seems to increase the maternal level of anxiety and this increase is more marked with a negative attitude toward the vaccine. (Author)

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**2021-03610**

**Pregnancy: Coronavirus [written answer].** House of Commons (2021), Hansard Written question 1201, 13 May 2021

Nadhim Zawahi responds to a written question asked by Munira Wilson to the Secretary of State for Health and Social Care, regarding what steps he is taking to ensure that pregnant women are offered the Pfizer/BioNTech or Moderna COVID-19 vaccine. (LDO)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-05-13/1201>

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2021-03598

**Maternal and perinatal outcomes of pregnant women with SARS-CoV-2 infection at the time of birth in England: national cohort study.** Gurol-Urganci I, Jardine JE, Carroll F, et al (2021), American Journal of Obstetrics & Gynecology (AJOG) vol 225, no 5, November 2021, pp 522.e1-522.e11

**Objective:** The aim of this study was to determine the association between SARS-CoV-2 infection at the time of birth and maternal and perinatal outcomes.

**Methods:** This is a population-based cohort study in England. The inclusion criteria were women with a recorded singleton birth between 29th May 2020 and 31st 29 January 2021 in a national database of hospital admissions. Maternal and perinatal outcomes were compared between pregnant women with a laboratory-confirmed SARS-CoV-2 infection recorded in the birth episode and those without. Study outcomes were fetal death at or beyond 24 weeks' gestation (stillbirth), preterm birth (<37 weeks gestation), small for gestational age infant (SGA; birthweight <10th centile), preeclampsia/eclampsia, induction of labor, mode of birth, specialist neonatal care, composite neonatal adverse outcome indicator, maternal and neonatal length of hospital stay following birth (3 days or more), 28-day neonatal and 42-day maternal hospital readmission. Adjusted odds ratios (aOR) and their 95% confidence interval (CI) for the association between SARS-CoV-2 infection status and outcomes were calculated using logistic regression, adjusting for maternal age, ethnicity, parity, pre-existing diabetes, pre-existing hypertension and socioeconomic deprivation measured using Index of Multiple Deprivation 2019. Models were fitted with robust standard errors to account for hospital-level clustering. The analysis of the neonatal outcomes was repeated for those born at term ( $\geq 37$  weeks' gestation) since preterm birth has been reported to be more common in pregnant women with SARS-CoV-2 infection.

**Results:** The analysis included 342,080 women, of whom 3,527 had laboratory confirmed SARS-CoV-2 infection.

Laboratory-confirmed SARS-CoV-2 infection was more common in women who were younger, of non-white ethnicity, primiparous, residing in the most deprived areas, or had comorbidities. Fetal death (aOR, 2.21, 95% CI 1.58-3.11;  $P < 0.001$ ) and preterm birth (aOR 2.17, 95% CI 1.96-2.42;  $P < 0.001$ ) occurred more frequently in women with SARS-CoV-2 infection than those without. Risk of preeclampsia/eclampsia (aOR 1.55, 95% CI 1.29-1.85;  $P < 0.001$ ), birth by emergency Cesarean delivery (aOR 1.63, 95% CI 1.51-1.76;  $P < 0.001$ ) and prolonged admission following birth (aOR 1.57, 95% CI 1.44-1.72;  $P < 0.001$ ) were significantly higher for women with SARS-CoV-2 infection than those without. There were no significant differences in the rate of other maternal outcomes.

Risk of neonatal adverse outcome (aOR 1.45, 95% CI 1.27-1.66;  $P < 0.001$ ), need for specialist neonatal care (aOR 1.24, 95% CI 1.02-1.51;  $P = 0.03$ ) and prolonged neonatal admission following birth (aOR 1.61, 95% CI 1.49-1.75;  $P < 0.001$ ) were all significantly higher for infants with mothers with laboratory-confirmed SARS-CoV-2 infection. When the analysis was restricted to pregnancies delivered at term ( $\geq 37$  weeks), there were no significant differences in neonatal adverse outcome ( $P = 0.78$ ), need for specialist neonatal care after birth ( $P = 0.22$ ) or neonatal readmission within four weeks of birth ( $P = 0.05$ ). Neonates born at term to mothers with laboratory-confirmed SARS-CoV-2 infection were more likely to have prolonged admission following birth (21.1% compared to 14.6%, aOR 1.61, 95% CI 1.49-1.75;  $P < 0.001$ ).

**Conclusions:** SARS-CoV-2 infection at the time of birth is associated with higher rates of fetal death, preterm birth, preeclampsia and emergency Cesarean delivery. There were no additional adverse neonatal outcomes, other than those related to preterm delivery. Pregnant women should be counseled regarding risks of SARS-CoV-2 infection and should be considered a priority for vaccination. (Author)

**Full URL:** <https://doi.org/10.1016/j.ajog.2021.05.016>

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**2021-03458**

**Covid-19: Pregnant women should be offered Pfizer or Moderna vaccine, says UK advisory committee.** Mahase E (2021), BMJ vol 373, no 8288, 19 April 2021, n1013

Pregnant women should be offered the Pfizer BioNTech or Moderna covid-19 vaccine at the same time as the rest of the population, with priority based on age and clinical risk group, the government's vaccine advisory committee has said. (Author)

Full URL: <https://doi.org/10.1136/bmj.n1013>

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**2021-03246**

**Advocate for the COVID-19 Vaccine for Pregnant and Breastfeeding Women.** Spatz DL (2021), MCN - American Journal of Maternal/Child Nursing vol 46, no 3, May/June 2021, p 178

Many professional organizations and agencies have advocated for pregnant women and breastfeeding women to be offered the COVID-19 vaccine. Our breastfeeding expert, Dr. Spatz, reviews their recommendations and ways nurses can advocate for this population to receive the vaccine. (Author)

Full URL: <https://doi.org/10.1097/NMC.0000000000000719>

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**2021-03147**

**Covid and pregnancy - should you get the vaccine?.** Foster L (2021), BBC News 7 May 2021

As the Covid vaccine is rolled out to younger age groups, what should you do if you're expecting a baby?

The guidance for pregnant people in the UK was changed last month following new data from the USA involving the Pfizer and Moderna vaccines.

BBC News Health Reporter Laura Foster looks at what the science says. (Author)

Full URL: <https://www.bbc.co.uk/news/av/health-57013743>

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**2021-02984**

**Antibody Response to Coronavirus Disease 2019 (COVID-19) Messenger RNA Vaccination in Pregnant Women and Transplacental Passage Into Cord Blood.** Prabhu M, Murphy EA, Sukhu AC, et al (2021), Obstetrics & Gynecology vol 138, no 2, August 2021, pp 278-280

Coronavirus disease 2019 (COVID-19) vaccination in pregnancy induces a robust maternal immune response, with transplacental antibody transfer detectable in cord blood as early as 16 days after the first dose. (Author)

Full URL: <https://doi.org/10.1097/AOG.0000000000004438>

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**2021-02946**

**JCVI gives green light for pregnant women to be offered Covid-19 vaccine.** Mitchell G (2021), Nursing Times 16 April 2021, online

Pregnant women will be offered the Covid-19 vaccine at the same time as their peers in the wider population following a change in guidance announced today. (Author)

Full URL: <https://www.nursingtimes.net/news/public-health/jcvi-gives-green-light-for-pregnant-women-to-be-offered-covid-19-vaccine-16-04-2021/>

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**2021-02918**

**Severe acute respiratory syndrome coronavirus 2 serology levels in pregnant women and their neonates.** Kubiak JM, Murphy EA, Yee J, et al (2021), American Journal of Obstetrics & Gynecology (AJOG) vol 225, no 1, July 2021, pp 73.e1-73.e7

#### Background

Pregnant women and their neonates represent 2 vulnerable populations with an interdependent immune system that are highly susceptible to viral infections. The immune response of pregnant women to severe acute respiratory syndrome coronavirus 2 and the interplay of how the maternal immune response affects the neonatal passive immunity have not been studied systematically.

#### Objective

We characterized the serologic response in pregnant women and studied how this serologic response correlates with the maternal clinical presentation and with the rate and level of passive immunity that the neonate received from the mother.

#### Study Design

Women who gave birth and who tested positive for immunoglobulin M or immunoglobulin G against severe acute respiratory syndrome coronavirus 2 using semiquantitative detection in a New York City hospital between March 22, 2020, and May 31, 2020, were included in this study. A retrospective chart review of the cases that met the inclusion criteria was conducted to determine the presence of coronavirus disease 2019 symptoms and the use of oxygen support. Serology levels were compared between the symptomatic and asymptomatic patients using a Welch 2 sample t test. Further chart review of the same patient cohort was conducted to identify the dates of self-reported onset of coronavirus disease 2019 symptoms and the timing of the peak immunoglobulin M and immunoglobulin G antibody levels after symptom onset was visualized using local polynomial regression smoothing on log<sub>2</sub>-scaled serologic values. To study the neonatal serology response, umbilical cord blood samples of the neonates born to the subset of serology positive pregnant women were tested for serologic antibody responses. The maternal antibody levels of serology positive vs the maternal antibody levels of serology negative neonates were compared using the Welch 2 sample t test. The relationship between the quantitative maternal and quantitative neonatal serologic data was studied using a Pearson correlation and linear regression. A multiple linear regression analysis was conducted using maternal symptoms, maternal serology levels, and maternal use of oxygen support to determine the predictors of neonatal immunoglobulin G levels.

#### Results

A total of 88 serology positive pregnant women were included in this study. The antibody levels were higher in symptomatic pregnant women than in asymptomatic pregnant women. Serology studies in 34 women with symptom onset data revealed that the maternal immunoglobulin M and immunoglobulin G levels peak around 15 and 30 days after the onset of coronavirus disease 2019 symptoms, respectively. Furthermore, studies of 50 neonates born to this subset of serology positive women showed that passive immunity in the form of immunoglobulin G is conferred in 78% of all neonates. The presence of passive immunity is dependent on the maternal antibody levels, and the levels of neonatal immunoglobulin G correlate with maternal immunoglobulin G levels. The maternal immunoglobulin G levels and maternal use of oxygen support were predictive of the neonatal immunoglobulin G levels.

#### Conclusion

We demonstrated that maternal serologies correlate with symptomatic maternal infection, and higher levels of maternal antibodies are associated with passive neonatal immunity. The maternal immunoglobulin G levels and maternal use of oxygen support, a marker of disease severity, predicted the neonatal immunoglobulin G levels. These data will further guide the screening for this uniquely linked population of mothers and their neonates and can aid in developing maternal vaccination strategies. (Author)

**Full URL:** <https://doi.org/10.1016/j.ajog.2021.01.016>

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## 2021-02906

**The coronavirus disease 2019 vaccine in pregnancy: risks, benefits, and recommendations.** Stafford IA, Parchem JG, Sibai BM (2021), American Journal of Obstetrics & Gynecology (AJOG) vol 224, no 5, May 2021, pp 484-495

The coronavirus disease 2019 has caused over 2 million deaths worldwide, with over 412,000 deaths reported in United States. To date, at least 57,786 pregnant women in the United States have been infected, and 71 pregnant women have died. Although pregnant women are at higher risk of severe coronavirus disease 2019-related illness, clinical trials for the available vaccines excluded pregnant and lactating women. The safety and efficacy of the vaccines for pregnant women, the fetus, and the newborn remain unknown. A review of maternal and neonatal coronavirus disease 2019 morbidity and mortality data along with perinatal vaccine safety considerations are presented to assist providers with shared decision-making regarding vaccine administration for this group, including the healthcare worker who is pregnant, lactating, or considering pregnancy. The coronavirus disease 2019 vaccine should be offered to pregnant women after discussing the lack of safety data, with preferential administration for those at highest risk of severe infection, until safety and efficacy of these novel vaccines are validated. (Author)

Full URL: <https://doi.org/10.1016/j.ajog.2021.01.022>

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## 2021-02901

**Balancing risks: making decisions for maternal treatment without data on fetal safety.** Minkoff H, Ecker J (2021), American Journal of Obstetrics & Gynecology (AJOG) vol 224, no 5, May 2021, pp 479-483

Challenges arise when treatment to improve maternal health brings the possibility of risk to fetal health. The coronavirus disease 2019 (COVID-19) vaccine is the most recent, but hardly the only, example. Because pregnant patients are often specifically excluded from trials of new therapies, this is often the dilemma that patients and providers face when considering new treatments. In this study, we used the COVID-19 vaccine as an exemplar to question the broader issue of how society, in general, and obstetricians, in particular, should balance obligations to pregnant women's right of access to new therapeutic agents with the physician's desire to protect the fetus from potential risks. We will argue that in almost all circumstances (with few exceptions, as will also be discussed), maternal benefit and respect for autonomy create the uncertainty that absent safety data bring. Consequently, if pregnant women choose to try new interventions and treatments, such as the COVID-19 vaccination, they should be offered those new regimens and their decision supported. In addition, we will argue that the right solution to avoid the dilemma of absent data is to include pregnant individuals in clinical trials studying new treatments, drugs, and other therapies. We will also discuss the basis for our opinion, which are mainstream obstetrical ethics, precedents in law (supreme court ruling that forbids companies to exclude women from jobs that might pose a risk to the fetus), and historic events (thalidomide). The ethical framework includes the supposition that sacrifice to improve fetal outcome is a virtue and not a mandate. Denying a pregnant patient treatment because of threats to their life can create absurd and paradoxical consequences. Either requiring abortion or premature delivery before proceeding with treatments to optimize maternal health, or risking a patient's own life and ability to parent a child by delaying treatment brings clear and significant risks to fetal and/or neonatal outcomes. With rare exceptions, properly and ethically balancing such consequential actions cannot be undertaken without considering the values and goals of the pregnant patient. Therefore, active participation of both the pregnant patient and their physician in shared decision making is needed. (Author)

Full URL: <https://doi.org/10.1016/j.ajog.2021.01.025>

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2021-02900

**Professionally responsible coronavirus disease 2019 vaccination counseling of obstetrical and gynecologic patients.** Chervenak FA, McCullough LB, Bornstein E, et al (2021), American Journal of Obstetrics & Gynecology (AJOG) vol 224, no 5, May 2021, pp 470-478

The development of coronavirus disease 2019 vaccines in the current and planned clinical trials is essential for the success of a public health response. This paper focuses on how physicians should implement the results of these clinical trials when counseling patients who are pregnant, planning to become pregnant, breastfeeding or planning to breastfeed about vaccines with government authorization for clinical use. Determining the most effective approach to counsel patients about coronavirus disease 2019 vaccination is challenging. We address the professionally responsible counseling of 3 groups of patients—those who are pregnant, those planning to become pregnant, and those breastfeeding or planning to breastfeed. We begin with an evidence-based account of the following 5 major challenges: the limited evidence base, the documented increased risk for severe disease among pregnant coronavirus disease 2019-infected patients, conflicting guidance from government agencies and professional associations, false information about coronavirus disease 2019 vaccines, and maternal mistrust and vaccine hesitancy. We subsequently provide evidence-based, ethically justified, practical guidance for meeting these challenges in the professionally responsible counseling of patients about coronavirus disease 2019 vaccination. To guide the professionally responsible counseling of patients who are pregnant, planning to become pregnant, and breastfeeding or planning to breastfeed, we explain how obstetrician-gynecologists should evaluate the current clinical information, why a recommendation of coronavirus disease 2019 vaccination should be made, and how this assessment should be presented to patients during the informed consent process with the goal of empowering them to make informed decisions. We also present a proactive account of how to respond when patients refuse the recommended vaccination, including the elements of the legal obligation of informed refusal and the ethical obligation to ask patients to reconsider. During this process, the physician should be alert to vaccine hesitancy, ask patients to express their hesitation and reasons for it, and respectfully address them. In contrast to the conflicting guidance from government agencies and professional associations, evidence-based professional ethics in obstetrics and gynecology provides unequivocal and clear guidance: Physicians should recommend coronavirus disease 2019 vaccination to patients who are pregnant, planning to become pregnant, and breastfeeding or planning to breastfeed. To prevent widening of the health inequities, build trust in the health benefits of vaccination, and encourage coronavirus disease 2019 vaccine and treatment uptake, in addition to recommending coronavirus disease 2019 vaccinations, physicians should engage with communities to tailor strategies to overcome mistrust and deliver evidence-based information, robust educational campaigns, and novel approaches to immunization. (Author)

Full URL: <https://doi.org/10.1016/j.ajog.2021.01.027>

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**2021-02893**

**Higher severe acute respiratory syndrome coronavirus 2 infection rate in pregnant patients.** Lokken EM, Taylor G, Huebner EM, et al (2021), American Journal of Obstetrics & Gynecology (AJOG) vol 225, no 1, July 2021, pp 75.e1-75.e16

#### Background

During the early months of the coronavirus disease 2019 pandemic, risks associated with severe acute respiratory syndrome coronavirus 2 in pregnancy were uncertain. Pregnant patients can serve as a model for the success of clinical and public health responses during public health emergencies as they are typically in frequent contact with the medical system. Population-based estimates of severe acute respiratory syndrome coronavirus 2 infections in pregnancy are unknown because of incomplete ascertainment of pregnancy status or inclusion of only single centers or hospitalized cases. Whether pregnant women were protected by the public health response or through their interactions with obstetrical providers in the early months of pandemic is not clearly understood.

#### Objective

This study aimed to estimate the severe acute respiratory syndrome coronavirus 2 infection rate in pregnancy and to examine the disparities by race and ethnicity and English language proficiency in Washington State.

#### Study Design

Pregnant patients with a polymerase chain reaction–confirmed severe acute respiratory syndrome coronavirus 2 infection diagnosed between March 1, 2020, and June 30, 2020 were identified within 35 hospitals and clinics, capturing 61% of annual deliveries in Washington State. Infection rates in pregnancy were estimated overall and by Washington State Accountable Community of Health region and cross-sectionally compared with severe acute respiratory syndrome coronavirus 2 infection rates in similarly aged adults in Washington State. Race and ethnicity and language used for medical care of pregnant patients were compared with recent data from Washington State.

#### Results

A total of 240 pregnant patients with severe acute respiratory syndrome coronavirus 2 infections were identified during the study period with 70.7% from minority racial and ethnic groups. The principal findings in our study were as follows: (1) the severe acute respiratory syndrome coronavirus 2 infection rate was 13.9 per 1000 deliveries in pregnant patients (95% confidence interval, 8.3–23.2) compared with 7.3 per 1000 (95% confidence interval, 7.2–7.4) in adults aged 20 to 39 years in Washington State (rate ratio, 1.7; 95% confidence interval, 1.3–2.3); (2) the severe acute respiratory syndrome coronavirus 2 infection rate reduced to 11.3 per 1000 deliveries (95% confidence interval, 6.3–20.3) when excluding 45 cases of severe acute respiratory syndrome coronavirus disease 2 detected through asymptomatic screening (rate ratio, 1.3; 95% confidence interval, 0.96–1.9); (3) the proportion of pregnant patients in non-White racial and ethnic groups with severe acute respiratory syndrome coronavirus disease 2 infection was 2- to 4-fold higher than the race and ethnicity distribution of women in Washington State who delivered live births in 2018; and (4) the proportion of pregnant patients with severe acute respiratory syndrome coronavirus 2 infection receiving medical care in a non-English language was higher than estimates of pregnant patients receiving care with limited English proficiency in Washington State (30.4% vs 7.6%).

#### Conclusion

The severe acute respiratory syndrome coronavirus 2 infection rate in pregnant people was 70% higher than similarly aged adults in Washington State, which could not be completely explained by universal screening at delivery. Pregnant patients from nearly all racial and ethnic minority groups and patients receiving medical care in a non-English language were overrepresented. Pregnant women were not protected from severe acute respiratory syndrome coronavirus 2 infection in the early months of the pandemic. Moreover, the greatest burden of infections occurred in nearly all racial and ethnic minority groups. These data coupled with a broader recognition that pregnancy is a risk factor for severe illness and maternal mortality strongly suggested that pregnant people should be broadly prioritized for coronavirus disease 2019 vaccine allocation in the United States similar to some states. (Author)

**Full URL:** <https://doi.org/10.1016/j.ajog.2021.02.011>

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## 2021-02795

**Vaccine Update.** Public Health England (2021), London: PHE no 319, April 2021

This special edition of Vaccine Update includes information on COVID-19 vaccination guidelines and deliveries. It highlights the advice given to pregnant women about the risks and benefits of vaccination. (LDO)

**Full URL:** <https://www.gov.uk/government/publications/vaccine-update-issue-319-april-2021-covid-19-phase-2-special-edition/vaccine-update-issue-319-april-2021-covid-19-phase-2-special-edition>

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## 2021-02705

**Pregnancy: Employment [written answer].** House of Commons (2021), Hansard Written question 185871, 22 April 2021

Ms Nadine Dorries responds to a written question from the Secretary of State for Health and Social Care, with reference to the new advice on covid-19 vaccination for pregnant women from Public Health England issued on 16 April 2021, what steps he is taking to issue updated guidance for pregnant employees; and when that guidance will be available. (Author, edited)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-04-22/185871>

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## 2021-02690

**Coronavirus: Vaccination [written answer].** House of Commons (2021), Hansard Written question 137241, 13 January 2021

Nadhim Zahawi responds to a written question from Rachael Maskell to the Secretary of State for Health and Social Care, regarding what discussions he has had with Public Health England on requiring NHS and social care staff to have the covid-19 vaccine in order to keep patients and care residents safe. (JSM)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-01-13/137241>

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## 2021-02511

**SOGC Statement on the COVID-19 vaccines and rare adverse outcomes of thrombosis associated with low platelets.** Society of Obstetricians and Gynaecologists of Canada (2021), Ottawa, Canada: SOGC 20 April 2021

Statement from the Society of Obstetricians and Gynaecologists of Canada (SOGC) on COVID-19 vaccination in pregnancy and rare adverse outcomes. SOGC supports the use of all available COVID-19 vaccines approved in Canada in any pregnancy trimester and during breastfeeding in accordance with regional eligibility. (LDO)

**Full URL:** [https://sogc.org/common/Uploaded%20files/Latest%20News/EN\\_Statement-COVID-19\\_vaccines\\_rare\\_adverse\\_thrombosis.pdf](https://sogc.org/common/Uploaded%20files/Latest%20News/EN_Statement-COVID-19_vaccines_rare_adverse_thrombosis.pdf)

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## 2021-02301

**SARS-CoV-2–Specific Antibodies in Breast Milk After COVID-19 Vaccination of Breastfeeding Women.** Perl SH, Uzan-Yulzari A, Klainer H, et al (2021), JAMA (Journal of the American Medical Association) vol 325, no 19, 18 May 2021, pp 2013-2014

Research letter exploring whether maternal immunisation results in secretion of SARS-CoV-2 antibodies into breast milk, and evaluating any potential adverse outcomes among women and their infants. (LDO)

**Full URL:** <https://doi.org/10.1001/jama.2021.5782>

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## 2021-02083

**Pregnant women should be offered Covid vaccine.** Anon (2021), BBC News 17 April 2021

Pregnant women should be offered a Covid jab when other people their age get one, the UK's vaccine advisers say. (Author)

**Full URL:** <https://www.bbc.co.uk/news/health-56778146>

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**2021-02064**

**Pregnant People's Paradox—Excluded From Vaccine Trials Despite Having a Higher Risk of COVID-19 Complications.** Rubin R (2021), JAMA (Journal of the American Medical Association) Vol 325, no 11, 16 March 2021, pp 1027-1028

This Medical News Quick Uptake discusses the evidence in favor of administering COVID-19 vaccines to pregnant individuals.

Full URL: <https://doi.org/10.1001/jama.2021.2264>

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**2021-02063**

**Involving Pregnant Individuals in Clinical Research on COVID-19 Vaccines.** Bianchi DW, Kaeser L, Cernich AN (2021), JAMA (Journal of the American Medical Association) Vol 325, no 11, 16 March 2021, pp 1041-1042

This Viewpoint from the National Institute of Child Health and Human Development emphasizes the need to use existing data sources and develop partnerships, infrastructure, and ethical and regulatory standards to generate data about the safety and efficacy of COVID-19 vaccination in pregnant individuals.

Full URL: <https://doi.org/10.1001/jama.2021.1865>

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**2021-02062**

**Pregnancy, Postpartum Care, and COVID-19 Vaccination in 2021.** Rasmussen SA, Jamieson DJ (2021), JAMA (Journal of the American Medical Association) Vol 325, no 11, 16 March 2021, pp 1099-1100

This JAMA Insights review summarizes the epidemiology of SARS-CoV-2 infection in pregnant and lactating women, its effects on perinatal outcomes, and compiles guidance from the CDC, FDA, and obstetrics-gynecology specialty organizations on the safety of coronavirus vaccines during pregnancy and while breastfeeding.

Full URL: <https://doi.org/10.1001/jama.2021.1683>

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**2021-02061**

**COVID-19 Vaccination in Pregnant and Lactating Women.** Adhikari EH, Spong CY (2021), JAMA (Journal of the American Medical Association) Vol 325, no 11, 16 March 2021, pp 1039-1040

This Viewpoint discusses the need for shared decision-making when counseling pregnant and nursing women about the unstudied benefits and risks COVID-19 vaccination, calling for rigorously designed studies with real-time, proactive data collection to establish evidence as quickly as possible about coronavirus vaccine safety in mothers and their infants.

Full URL: <https://doi.org/10.1001/jama.2021.1658>

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**2021-01663**

**COVID-19 vaccination guidance.** Australian Breastfeeding Association, New Zealand Breastfeeding Alliance, Royal Australian and New Zealand College of Obstetricians and Gynaecologists (2021), Australian Breastfeeding Association 6 April 2021

Up to date information for breastfeeding mothers about compatibility of the COVID-19 vaccine with breastfeeding.

The guidance, in the form of an infographic, was launched by the Australian Breastfeeding Association (ABA), the New Zealand Breastfeeding Alliance (NZBA) and the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG). (Author)

Full URL: <https://www.breastfeeding.asn.au/system/files/RANZCOG-ABA-NZBA%20COVID-19%20vaccination%20and%20breastfeeding%20in%20infographic%20final.pdf>

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**2021-01597**

**'No evidence' Covid-19 vaccine will affect fertility, say unions.** Ford M (2021), Nursing Times 21 January 2021

Leading unions have come together to put a stop to misinformation that appears to be circulating in relation to Covid-19 vaccines and fertility. (Author)

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## 2021-01453

**Coronavirus Disease 2019 (COVID-19) Vaccines and Pregnancy: What Obstetricians Need to Know.** Rasmussen SA, Kelley CF, Horton JP, et al (2021), *Obstetrics & Gynecology* vol 137, no 3, March 2021, pp 408-414

Coronavirus disease 2019 (COVID-19) vaccines have begun to be distributed across the United States and to be offered initially to priority groups including health care personnel and persons living in long-term care facilities. Guidance regarding whether pregnant persons should receive a COVID-19 vaccine is needed. Because pregnant persons were excluded from the initial phase 3 clinical trials of COVID-19 vaccines, limited data are available on their efficacy and safety during pregnancy. After developmental and reproductive toxicology studies are completed, some companies are expected to conduct clinical trials in pregnant persons. Until then, pregnant persons and their obstetricians will need to use available data to weigh the benefits and risks of COVID-19 vaccines. Issues to be considered when counseling pregnant persons include data from animal studies and inadvertently exposed pregnancies during vaccine clinical trials when available, potential risks to pregnancy of vaccine reactogenicity, timing of vaccination during pregnancy, evidence for safety of other vaccines during pregnancy, risk of COVID-19 complications due to pregnancy and the pregnant person's underlying conditions, and risk of exposure to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and potential for risk mitigation. The Centers for Disease Control and Prevention, the American College of Obstetricians and Gynecologists, and the Society for Maternal-Fetal Medicine have each issued guidance supportive of offering COVID-19 vaccine to pregnant persons. As additional information from clinical trials and from data collected on vaccinated pregnant persons becomes available, it will be critical for obstetricians to keep up to date with this information. (Author) [Erratum: *Obstetrics & Gynecology*, vol 137, no 5, May 2021, p 962]

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## 2021-01434

**Newborn antibodies to SARS-CoV-2 detected in cord blood after maternal vaccination – a case report.** Paul G, Chad R (2021), *BMC Pediatrics* vol 21, no 138, 22 March 2021

### Background

Maternal vaccination for Influenza and Tetanus, Diphtheria, acellular Pertussis (TDaP) have been well studied in terms of safety and efficacy for protection of the newborn by placental passage of antibodies. Similar newborn protection would be expected after maternal vaccination against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus responsible for coronavirus disease 2019 (COVID-19). There is a significant and urgent need for research regarding safety and efficacy of vaccination against SARS-CoV-2 during pregnancy.

### Case presentation

A vigorous, healthy, full-term female was born to a COVID-19 naïve mother who had received a single dose of messenger RNA (mRNA) vaccine for SARS-CoV-2 3 weeks prior to delivery. IgG cord blood antibodies were detected to SARS-CoV-2 at the time of birth.

### Conclusion

Here, we report the first known case of an infant with SARS-CoV-2 IgG antibodies detectable in cord blood after maternal vaccination. (Author)

**Full URL:** <https://doi.org/10.1186/s12887-021-02618-y>

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## 2021-01267

**Vaccine Update.** Public Health England (2021), London: PHE no 316, January 2021

This special edition of Vaccine Update includes information on the safety of COVID-19 vaccination for pregnant and breastfeeding women. Also includes guidance on COVID-19 vaccination for health and social care workers. (LDO)

**Full URL:** <https://www.gov.uk/government/publications/vaccine-update-issue-316-january-2021-covid-19-special-edition/vaccine-update-issue-316-january-2021-covid-19-special-edition>

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## 2021-01263

**Vaccine Update.** Public Health England (2020), London: PHE no 315, December 2020

This special edition of Vaccine Update includes resources and leaflets on COVID-19 vaccination for pregnant or breastfeeding women. (LDO)

**Full URL:** <https://www.gov.uk/government/publications/vaccine-update-issue-315-december-2020-covid-19-special-edition/vaccine-update-issue-315-december-2020-covid-19-special-edition>

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## 20210125-14\*

**Vaccination: Coronavirus [written answer].** House of Commons (2021), Hansard Written question 137333, 13 January 2021

Ms Nadine Dorries responds to a written question from Marco Longhi to the Secretary of State for Health and Social Care, regarding whether his Department has made an assessment of the potential effect of covid-19 vaccines on fertility. (JSM)

**Full URL:** <https://questions-statements.parliament.uk/written-questions/detail/2021-01-13/137333>

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## 20210108-2\*

**Coronavirus latest: Young women are the unlikely new face of vaccine resistance.** Speed B (2021), iNews 6 January 2021

News item reporting that young women between the ages of 18 and 34 are the most likely population group to refuse the Pfizer/BioNTech COVID-19 vaccine, amid fears sparked by misinformation concerning damage to their fertility. States that no study has been undertaken to support this claim, and Dr Victoria Male, a lecturer in reproductive immunology at Imperial College London, has said that it is not usual for full fertility studies to be undertaken before vaccines and medications are rolled out because of the length of time this would take. States that this vaccine could be particularly important for women who are planning a pregnancy, because pregnancy and COVID-19 put pressure on the lungs and heart. (JSM)

**Full URL:** <https://inews.co.uk/news/health/coronavirus-latest-experts-debunk-vaccine-fertility-myths-women-819783>

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## 20210106-22\*

**Considerations for COVID-19 Vaccination in Lactation.** Stuebe A (2021), Breastfeeding Medicine vol 16, no 1, January 2021, p 2

Statement from the Academy of Breastfeeding Medicine on the safety of the Pfizer/BioNtech and Moderna mRNA vaccines for breastfeeding women. Recommends that future research studies include pregnant and lactating participants. (LDO)

**Full URL:** <https://doi.org/10.1089/bfm.2020.29172.abm>

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## 20210106-21\*

**President's Corner: Introduction to ABM's Statement on Considerations for COVID-19 Vaccination in Lactation.** Stuebe A (2021), Breastfeeding Medicine vol 16, no 1, January 2021, p 1

The recent emergency use authorization of novel mRNA vaccines to prevent COVID-19 is a triumph for science. Less than a year after the SARS-CoV-2 virus was first identified, we have a 95% effective vaccine in production. There is much to celebrate, and there is also a yawning gap: phase 3 trials of these novel mRNA-based vaccines excluded pregnant and lactating women. This void is the product of decisions made >40 years ago to exclude pregnant and lactating women from research, with the goal of avoiding any risk to the fetus or nursing child. In the short term, this strategy avoided liability; in the long term, it has left providers and patients without clinical data to make informed decisions. Without clinical data, the Academy of Breastfeeding Medicine relied on biological plausibility and expert opinion to craft a statement on considerations for mRNA COVID-19 vaccines during lactation. The available information is reassuring; however, pregnant and lactating people deserve better than plausibility to guide medical decisions. Henceforward, phase 3 clinical trials should routinely include pregnant and lactating participants. It is time to protect pregnant and breastfeeding individuals through research, not from research. (Author)

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#### 20210105-34\*

**Coronavirus disease 2019 vaccines in pregnancy.** Craig AM, Hughes BL, Swamy GK (2021), American Journal of Obstetrics & Gynecology MFM vol 3, no 2, March 2021, 100295

As of December 1, 2020, nearly 64 million people have been infected with COVID-19 worldwide with nearly 1.5 million global deaths. The impact of this virus has continued to overwhelm hospital infrastructure and demanded remodeling of healthcare systems. With rising concerns for a third, and possibly the largest, wave of infected individuals, national leaders are continuing to seek avenues by which we can further limit disease transmission and prevent infection with the use of vaccination. To our knowledge, no clinical trial evaluating vaccines to prevent COVID-19 has included pregnant women. By December 2020, it's anticipated that the FDA will approve at least one or two mRNA-based COVID-19 vaccine under emergency use authorization (EUA) based on Phase 3 clinical trial efficacy data. Both Pfizer and Moderna have manufactured mRNA-based vaccines with 95% and 94.1% efficacy against COVID-19. [1, 2] AstraZeneca has manufactured a vaccine using a viral-vector demonstrating early efficacy as well and this next generation platform has previously been utilized with the Ebola vaccine and safely administered during pregnancy with an acceptable safety profile [3]. Approval of these vaccines will have a tremendous impact on the ongoing pandemic, yet there remains a lack of data for use of COVID-19 vaccine in pregnant women. In this article we seek to discuss the available data regarding treatment and prevention of COVID-19 in pregnancy and address the growing questions regarding how best to approach vaccine access and administration in the pregnant population. (Author)

Full URL: <https://doi.org/10.1016/j.ajogmf.2020.100295>

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#### 20210104-22\*

**Coronavirus: Vaccination [written answer].** House of Commons (2020), Hansard Written question 126063, 7 December 2020

Nadhim Zahawi responds to a written question from Alison Thewliss the Secretary of State for Health and Social Care, regarding what the Government's official advice is on covid-19 vaccination for people who are (a) pregnant and (b) lactating. (JSM)

Full URL: <https://questions-statements.parliament.uk/written-questions/detail/2020-12-07/126063>

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#### 20210104-21\*

**Coronavirus: Vaccination [written answer].** House of Commons (2020), Hansard Written question 124187, 2 December 2020

Nadhim Zahawi responds to a written question from Jim Shannon to the Secretary of State for Health and Social Care, whether it is his policy that (a) the elderly and (b) pregnant women will receive the covid-19 vaccine first. (JSM)

Full URL: <https://questions-statements.parliament.uk/written-questions/detail/2020-12-02/124187>

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#### 20210104-13\*

**Pregnancy: Coronavirus [written answer].** House of Lords (2020), Hansard Written question HL11361, 10 December 2020

Lord Bethell responds to a written question from Baroness Manzoor to Her Majesty's Government, regarding what research they have undertaken on the impact of the COVID-19 (1) virus, and (2) vaccines, on the development of embryos in the (a) first, (b) second, and (c) third, trimesters of pregnancy. (JSM)

Full URL: <https://questions-statements.parliament.uk/written-questions/detail/2020-12-10/HL11361>

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#### 2021-00859

**Baby Care Units: Coronavirus [written answer].** House of Commons (2020), Hansard Written question 126073, 7 December 2020

Nadhim Zahawi responds to a written question asked by Vicky Foxcroft to the Secretary of State for Health and Social Care, regarding whether parents of babies in neonatal units will be given priority access to a COVID-19 vaccination. (LDO)

Full URL: <https://questions-statements.parliament.uk/written-questions/detail/2020-12-07/126073>

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**2021-00766**

**Equity in coronavirus disease 2019 vaccine development and deployment.** Modi N, Ayres-de-Campos D, Bancalari E, et al (2021), American Journal of Obstetrics & Gynecology (AJOG) vol 224, no 5, May 2021, pp 423-427

The coronavirus disease 2019 pandemic exposed weaknesses in multiple domains and widened gender-based inequalities across the world. It also stimulated extraordinary scientific achievement by bringing vaccines to the public in less than a year. In this article, we discuss the implications of current vaccination guidance for pregnant and lactating women, if their exclusion from the first wave of vaccine trials was justified, and if a change in the current vaccine development pathway is necessary. Pregnant and lactating women were not included in the initial severe acute respiratory syndrome coronavirus 2 vaccine trials. Therefore, perhaps unsurprisingly, the first vaccine regulatory approvals have been accompanied by inconsistent advice from public health, governmental, and professional authorities around the world. Denying vaccination to women who, although pregnant or breastfeeding, are fully capable of autonomous decision making is a throwback to a paternalistic era. Conversely, lack of evidence generated in a timely manner, upon which to make an informed decision, shifts responsibility from research sponsors and regulators and places the burden of decision making upon the woman and her healthcare advisor. The World Health Organization, the Task Force on Research Specific to Pregnant Women and Lactating Women, and others have highlighted the long-standing disadvantage experienced by women in relation to the development of vaccines and medicines. It is uncertain whether there was sufficient justification for excluding pregnant and lactating women from the initial severe acute respiratory syndrome coronavirus 2 vaccine trials. In future, we recommend that regulators mandate plans that describe the development pathway for new vaccines and medicines that address the needs of women who are pregnant or lactating. These should incorporate, at the outset, a careful consideration of the balance of the risks of exclusion from or inclusion in initial studies, patient and public perspectives, details of “developmental and reproductive toxicity” studies, and approaches to collect data systematically from participants who are unknowingly pregnant at the time of exposure. This requires careful consideration of any previous knowledge about the mode of action of the vaccine and the likelihood of toxicity or teratogenicity. We also support the view that the default position should be a “presumption of inclusion,” with exclusion of women who are pregnant or lactating only if justified on specific, not generic, grounds. Finally, we recommend closer coordination across countries with the aim of issuing consistent public health advice. (Author)

**Full URL:** <https://doi.org/10.1016/j.ajog.2021.01.006>

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**2021-00761**

**Inclusion of pregnant individuals among priority populations for coronavirus disease 2019 vaccination for all 50 states in the United States.** Grünebaum A, McCullough LB, Litvak A, et al (2021), American Journal of Obstetrics & Gynecology (AJOG) vol 224, no 5, May 2021, pp 536-539

Research letter exploring whether pregnant women were uniformly included in priority COVID-19 vaccination phase one allocations across the United States of America. Results demonstrate substantial variations in how pregnancy is classified for COVID-19 vaccination. (LDO)

**Full URL:** <https://doi.org/10.1016/j.ajog.2021.01.026>

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**2021-00217**

**Pregnancy, breastfeeding and the SARS-CoV-2 vaccine: an ethics-based framework for shared decision-making.** Zipursky JS, Greenberg RA, Maxwell C, et al (2021), Canadian Medical Association Journal (CMAJ) vol 193, no 7, 16 February 2021, 202833

Proposes that women who are pregnant or breastfeeding should be offered the SARS-CoV-2 vaccine on ethical grounds, and discusses how health care providers and patients can use a shared decision-making approach to guide these discussions. (Author, edited)

**Full URL:** <https://doi.org/10.1503/cmaj.202833>

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#### 20201221-1\*

**SOGC Statement on COVID-19 Vaccination in Pregnancy [Reaffirmed 3 March 2021].** Society of Obstetricians and Gynaecologists of Canada (2020), Ottawa, Canada: SOGC 18 December 2020

Consensus statement from the Society of Obstetricians and Gynaecologists of Canada (SOGC) on COVID-19 vaccination in pregnancy. Recommends that the COVID-19 vaccine should be offered as the documented risk of not getting the vaccine outweighs the theorised risk of being vaccinated during pregnancy or while breastfeeding. (LDO)

Full URL: [https://www.sogc.org/common/Uploaded%20files/Latest%20News/SOGC\\_Statement\\_COVID-19\\_Vaccination\\_in\\_Pregnancy.pdf](https://www.sogc.org/common/Uploaded%20files/Latest%20News/SOGC_Statement_COVID-19_Vaccination_in_Pregnancy.pdf)

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#### 20201218-24\*

**Safety of COVID-19 vaccines when given in pregnancy [Last updated 30 April 2021].** Public Health England (2020), London: PHE 18 December 2020

This advice provides information on the safety of COVID-19 vaccines when given in pregnancy. It is designed for health professionals to share with women who were vaccinated before they knew they were pregnant. (Author)

Full URL: <https://www.gov.uk/government/publications/safety-of-covid-19-vaccines-when-given-in-pregnancy>

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#### 20201217-55\*

**COVID-19 vaccination and pregnancy.** Royal College of Obstetricians and Gynaecologists (2020), London: RCOG 17 December 2020

Short news item reporting that the Royal College of Obstetricians and Gynaecologists is advising against the use of the new Pfizer-BioNTech COVID-19 vaccine in pregnancy and in breastfeeding women, until more information about it is available. (JSM)

Full URL: <https://www.rcog.org.uk/en/news/covid-19-vaccination-and-pregnancy/>

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#### 20201207-1\*

**COVID-19 vaccination: women of childbearing age, currently pregnant or breastfeeding [Last updated 2 February 2022].** UK Health Security Agency (2020), London: UKHSA 6 December 2020

Information for all women of childbearing age, those currently pregnant or breastfeeding on coronavirus (COVID-19) vaccination. (Author)

Full URL: <https://www.gov.uk/government/publications/covid-19-vaccination-women-of-childbearing-age-currently-pregnant-planning-a-pregnancy-or-breastfeeding>

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#### 20201127-1\*

**Maternal and child healthcare in India during COVID-19 pandemic.** Paul P, Mondal D (2021), Midwifery vol 92, January 2021, 102865

Editorial discussing maternal and child healthcare in India during the COVID-19 pandemic. Highlights the high rates of maternal and infant mortality prior to the pandemic and outlines strategies to minimise further adverse outcomes. (LDO)

Full URL: <https://doi.org/10.1016/j.midw.2020.102865>

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#### 20201028-22\*

**During the second wave of COVID-19, don't forget about influenza: a call to action.** Atallah F, Minkoff H (2021), BJOG: An International Journal of Obstetrics and Gynaecology vol 128, no 1, January 2021, pp 12-13

Discusses the importance of improving influenza vaccine uptake in pregnancy, in particular as co-infection with COVID-19 may increase morbidity. (MB)

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**20200824-48\***

**Inclusion of pregnant women in COVID-19 vaccine development.** Heath PT, Le Doare K, Khalil A (2020), The Lancet Infectious Diseases vol 20, no 9, September 2020, pp 1007-1008

Examines the issues involved in the inclusion of pregnant and lactating women in the development and deployment of COVID-19 vaccines. (MB)

Full URL: [https://doi.org/10.1016/S1473-3099\(20\)30638-1](https://doi.org/10.1016/S1473-3099(20)30638-1)

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**20200525-22\***

**Potential Maternal and Infant Outcomes From (Wuhan) Coronavirus 2019-nCoV Infecting Pregnant Women: Lessons From SARS, MERS, and Other Human Coronavirus Infections.** Schwartz DA, Graham AL (2020), Viruses vol 12, no 2, February 2020, Article no: 194

In early December 2019 a cluster of cases of pneumonia of unknown cause was identified in Wuhan, a city of 11 million persons in the People's Republic of China. Further investigation revealed these cases to result from infection with a newly identified coronavirus, termed the 2019-nCoV. The infection moved rapidly through China, spread to Thailand and Japan, extended into adjacent countries through infected persons travelling by air, eventually reaching multiple countries and continents. Similar to such other coronaviruses as those causing the Middle East respiratory syndrome (MERS) and severe acute respiratory syndrome (SARS), the new coronavirus was reported to spread via natural aerosols from human-to-human. In the early stages of this epidemic the case fatality rate is estimated to be approximately 2%, with the majority of deaths occurring in special populations. Unfortunately, there is limited experience with coronavirus infections during pregnancy, and it now appears certain that pregnant women have become infected during the present 2019-nCoV epidemic. In order to assess the potential of the Wuhan 2019-nCoV to cause maternal, fetal and neonatal morbidity and other poor obstetrical outcomes, this communication reviews the published data addressing the epidemiological and clinical effects of SARS, MERS, and other coronavirus infections on pregnant women and their infants. Recommendations are also made for the consideration of pregnant women in the design, clinical trials, and implementation of future 2019-nCoV vaccines. (Author)

Full URL: <https://doi.org/10.3390/v12020194>

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**20200515-7\***

**Consider pregnancy in COVID-19 therapeutic drug and vaccine trials.** Whitehead CL, Walker SP (2020), The Lancet vol 395, no 10237, 23 May 2020, p E92

Correspondence urging researchers to afford pregnant women the same autonomy offered to other adults to decide about participation in clinical trials. (MB)

Full URL: [https://doi.org/10.1016/S0140-6736\(20\)31029-1](https://doi.org/10.1016/S0140-6736(20)31029-1)

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**20200501-1\***

**Vaccine Update.** Public Health England (2020), London: PHE no 307, April 2020, pp 1-14

A special edition of Vaccine Update to mark World Immunization Week (WIW), which this year runs from 26th-30th April, and is the World Health Organization's annual celebration of immunisation, best practice, new advances and the work of immunisers, held with the aim of promoting the use of vaccines to protect people of all ages from disease, reflected in the name of this year's theme #VaccinesWork for All. In this, The International Year of the Nurse and Midwife, WHO and Public Health England acknowledge the crucial role played by nurses and midwives as advocates of vaccination throughout the life course. Includes sections on the delivery of immunisation services during the coronavirus pandemic, and vaccinations offered during the antenatal and postnatal periods. (JSM)

Full URL: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/882560/PHE\\_11652\\_VU\\_307\\_April\\_2020.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/882560/PHE_11652_VU_307_April_2020.pdf)

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20200429-36\*

**Protection by Exclusion: Another Missed Opportunity to Include Pregnant Women in Research During the Coronavirus Disease 2019 (COVID-19) Pandemic.** Costantine MM, Landon MB, Saade GR (2020), *Obstetrics & Gynecology* vol 136, no 1, July 2020, pp 26-28

Coronavirus disease 2019 (COVID-19) is a novel infectious disease that started in Wuhan, China, and has rapidly spread all across the world. With limited ability to contain the virus and relatively high transmissibility and case fatality rates, governmental institutions and pharmaceutical companies are racing to find therapeutics and vaccines that target this novel coronavirus. However, once again, pregnant and breastfeeding women are excluded from participating in clinical trials during this pandemic. This 'protection by exclusion' of pregnant women from drug development and clinical therapeutic trials, even during epidemics and pandemics, is not unprecedented. Moreover, it is both misguided and not justifiable and may have excluded them from potentially beneficial interventions. This is another missed opportunity to obtain pregnancy-specific safety and efficacy data, because therapeutics developed for men and nonpregnant women may not be generalizable to pregnant women. Therefore, we recommend and urge the scientific community and professional societies that, without clear justification for exclusion, pregnant women should be given the opportunity to be included in clinical trials for COVID-19 based on the concepts of justice, equity, autonomy, and informed consent. (Author)

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**20200407-14\***

**Coronavirus Disease 2019 (COVID-19) Pandemic and Pregnancy.** Dashraath P, Wong JIJ, Lim MXK, et al (2020), American Journal of Obstetrics & Gynecology (AJOG) vol 222, no 6, June 2020, pp 521-531

The current coronavirus disease 2019 (COVID-19) pneumonia pandemic, caused by the severe acute respiratory syndrome 2 (SARS-CoV-2) virus, is spreading globally at an accelerated rate, with a basic reproduction number (RO) of 2 - 2.5, indicating that 2 - 3 persons will be infected from an index patient. A serious public health emergency, it is particularly deadly in vulnerable populations and communities in which healthcare providers are insufficiently prepared to manage the infection. As of March 16, 2020, there are more than 180,000 confirmed cases of COVID-19 worldwide, with over 7,000 related deaths. The SARS-CoV-2 virus has been isolated from asymptomatic individuals, and affected patients continue to be infectious two weeks after cessation of symptoms. The substantial morbidity and socioeconomic impact have necessitated drastic measures across all continents, including nationwide lockdowns and border closures.

Pregnant women and their fetuses represent a high-risk population during infectious disease outbreaks. To date, the outcomes of 55 pregnant women infected with COVID-19 and 46 neonates have been reported in the literature, with no definite evidence of vertical transmission. Physiological and mechanical changes in pregnancy increase susceptibility to infections in general, particularly when the cardiorespiratory system is affected, and encourage rapid progression to respiratory failure in the gravida. Furthermore, the pregnancy bias towards T-helper 2 (Th2) system dominance which protects the fetus, leaves the mother vulnerable to viral infections, which are more effectively contained by the Th1 system. These unique challenges mandate an integrated approach to pregnancies affected by SARS-CoV-2.

Here we present a review of COVID-19 in pregnancy, bringing together the various factors integral to the understanding of pathophysiology and susceptibility, diagnostic challenges with real-time reverse transcriptase polymerase chain reaction (RT-PCR) assays, therapeutic controversies, intrauterine transmission and maternal-fetal complications. We discuss the latest options in antiviral therapy and vaccine development, including the novel use of chloroquine in the management of COVID-19. Fetal surveillance, in view of the predisposition to growth restriction and special considerations during labor and delivery are addressed. Additionally, we focus on keeping frontline obstetric care providers safe while continuing to provide essential services. Our clinical service model is built around the principles of workplace segregation, responsible social distancing, containment of cross-infection to healthcare providers, judicious use of personal protective equipment and telemedicine. Our aim is to share a framework which can be adopted by tertiary maternity units managing pregnant women in the flux of a pandemic while maintaining the safety of the patient and healthcare provider at its core. (Author)

**Full URL:** <https://doi.org/10.1016/j.ajog.2020.03.021>

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**20200122-1\***

**Inadvertent vaccination in pregnancy (VIP) [Last updated 18 June 2021].** Public Health England (2010), London: PHE 1 May 2010

Advice for health professionals on pregnant women who are inadvertently vaccinated against coronavirus (COVID-19), chicken pox (varicella), shingles or measles, mumps, rubella. (Author)

**Full URL:** <https://www.gov.uk/guidance/vaccination-in-pregnancy-vip>

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