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Rapid Review Update 1: Is there an increased risk of adverse maternal or fetal outcomes in women infected with COVID-19 during pregnancy?

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Please Note: An update of this review may be available. Access the most current version of this review by visiting the National Collaborating Centre for Methods and Tools COVID-19 Rapid Evidence Service at the above link.

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Executive Summary

Background

Understanding the implications of COVID-19 infection during pregnancy may help public health practitioners to support expectant parents, and may guide obstetric care for patients with COVID-19.

This rapid review was produced to support public health decision makers' response to the coronavirus disease 2019 (COVID-19) pandemic. This review seeks to identify, appraise, and summarize emerging research evidence to support evidence-informed decision making.

This rapid review is based on the most recent research evidence available at the time of release. A previous version was completed on May 15, 2020. This updated version includes evidence available up to August 17, 2020.

In this rapid evidence review, we answer the question: **Is there an increased risk of adverse maternal or fetal outcomes in women infected with COVID-19 during pregnancy?**

What has changed in this version?

- Many more syntheses are emerging in the recently found evidence. Only syntheses published since April 2020, that included quality appraisal of included studies, were added to this update.
- One meta-analysis showed no difference in the rate of pre-term birth or low birthweight among pregnant women with COVID-19 infection compared to non-infected women.

Key Points

- **Maternal outcomes:** Overall, the available evidence shows a low risk of adverse maternal outcomes associated with COVID-19 infection, although most studies do not compare rates to those of non-infected women. The overall certainty of this evidence related to maternal outcomes is very low (GRADE), and findings are very likely to change as more evidence accumulates.
- **Labour and delivery outcomes:** A meta-analysis showed no difference in the rate of pre-term birth among women infected with COVID-19 infection compared to non-infected women. Syntheses report rates of pre-term birth between 20-39% of cases, and a rate for cesarean deliveries among women with COVID-19 of between 48-96% (although the clinical indications for cesarean in these cases are not well described), and the limited available evidence suggests that vaginal delivery can be safe. The overall certainty of this evidence related to labour and delivery outcomes is very low (GRADE), and findings are very likely to change as more evidence accumulates.
- **Fetal and neonatal outcomes:** A meta-analysis found no difference in rates of low birthweight for infected versus non-infected pregnant women. Rates of fetal death and stillbirth are between <1-10%. In syntheses reporting on neonatal COVID-19 infection, between 0-7% of neonates were infected, although it is not known if they were infected

before or during delivery, or after delivery through exposure to infected health care workers. There is no definitive evidence of vertical transmission. The overall certainty of this evidence related to fetal and neonatal outcomes is very low (GRADE), and findings are very likely to change as more evidence accumulates.

Overview of Evidence and Knowledge Gaps

- This rapid review has focused on syntheses. Much of the available evidence comes from case reports and case series, which have an inherently high risk of bias due to the likelihood of selection bias (i.e., those who are included in the study are fundamentally different from those who were not in the study) and lack of a comparison group needed to properly identify elevated rates. Only one synthesis meta-analyzed outcomes for pregnant women with COVID-19 infection versus non-infected pregnant women, based on the results of three studies.
- Although several syntheses exist, there is a large amount of overlap of single studies within the reviews. For example, the same eight observed cases of maternal death were reported in two syntheses; the same neonatal deaths were reported in more than one review. Similarly, the high rate of cesarean delivery may be overestimated due to the same deliveries being reported in multiple reviews. Some syntheses made efforts to eliminate duplicated cases across studies.
- There is a large number of syntheses available at the time of this update – our search located 52 completed syntheses and 41 in progress. Of the available syntheses, this update included seven, published since April 2020 and that undertook quality appraisal of included primary studies. The majority of available syntheses are of low quality, with many lacking methodological details as well as not appraising the quality of included studies. More, rigorous, primary studies are needed, and as they become available, global collaboration is needed to produce a small number of rigorous systematic reviews and meta-analyses.
- Evidence on maternal, fetal and neonate outcomes among women with COVID-19 infection is lacking, particularly for women who are infected in the first and second trimesters.
- It is not known whether COVID-19 infection resulted in clinical indication for cesarean delivery or whether clinician preference determined the method of delivery.
- It is not known whether the reported rate of cesarean delivery or pre-term delivery for women with COVID-19 infection is significantly higher than usual at these locations.

Methods

Research Question

Is there an increased risk of adverse maternal or fetal outcomes in women infected with COVID-19 during pregnancy?

Search

On May 7, 2020, and again on August 17, 2020, the following databases were searched:

- Pubmed's curated COVID-19 literature hub: [LitCovid](#)
- [Trip Medical Database](#)
- World Health Organization's [Global literature on coronavirus disease](#)
- Joanna Briggs Institute [COVID-19 Special Collection](#)
- [COVID-19 Evidence Alerts](#) from McMaster PLUS™
- [Public Health +](#)
- [COVID-19 Living Overview of the Evidence \(L·OVE\)](#)
- [McMaster +](#)
- Cochrane [COVID-19 Special Collections](#)
- Cochrane Rapid Reviews [Question Bank](#)
- Oxford [COVID-19 Evidence Service](#)
- Oxford COVID-19 Evidence Service: [Current Questions Under Review](#)
- Guidelines International Network ([GIN](#))
- [CovidReview](#)
- [Prospero Registry of Systematic Reviews](#)
- NCCMT [COVID-19 Rapid Evidence Reviews](#)
- [MedRxiv preprint server](#)
- [PubMed](#) database

A copy of the search strategy is available on request.

What has changed in the methods for this version?

Only syntheses published since April 2020, that included quality appraisal of included studies, were added to this update. Single studies previously included were removed in this update, given the large number of syntheses now available.

Study Selection Criteria

The search results were first screened for recent guidelines and syntheses. English- and French-language, peer-reviewed sources and sources published ahead-of-print before peer review were included. In the update, only recent syntheses that included quality appraisal of included studies were added.

	Inclusion Criteria	Exclusion Criteria
Population	Pregnant women	
Intervention	COVID-19 infection	
Comparisons		
Outcomes	Maternal outcomes including: Mortality; Clinical features and symptoms Fetal/Neonatal outcomes including: Miscarriage/stillbirth/mortality; Birthweight; COVID-19 infection; Vertical transmission Labour and delivery outcomes including: Preterm; Cesarean.	

Data Extraction and Synthesis

Data relevant to the research question, such as study design, setting, location, population characteristics, interventions or exposure and outcomes were extracted when reported. We synthesized the results narratively due to the variation in methodology and outcomes for the included studies.

Appraisal of Evidence Quality

We evaluated the quality of included evidence using critical appraisal tools as indicated by the study design below. Quality assessment was completed by one reviewer and verified by a second reviewer. Conflicts were resolved through discussion.

Study Design

Synthesis

Critical Appraisal Tool

Assessing the Methodological Quality of Systematic Reviews (AMSTAR)

[AMSTAR 1 Tool](#)

Completed quality assessments for each included study are available on request.

The Grading of Recommendations, Assessment, Development and Evaluations ([GRADE](#)) approach was used to assess the certainty in the findings based on eight key domains.

In the GRADE approach to quality of evidence, **observational studies**, as included in this review, provide **low quality** evidence, and this assessment can be further reduced based on other domains:

- High risk of bias
- Inconsistency in effects
- Indirectness of interventions/outcomes
- Imprecision in effect estimate
- Publication bias

and can be upgraded based on:

- Large effect
- Dose-response relationship
- Accounting for confounding.

The overall certainty in the evidence for each outcome was determined taking the characteristics of the available evidence into account (observational studies, some not peer-reviewed, unaccounted-for potential confounding factors, imprecise estimates, lack of valid comparison groups for most studies). A judgement of 'overall certainty is low (or very low)' means that the findings are likely or very likely to change as more evidence accumulates.

Findings

Summary of Evidence Quality

This version adds seven new completed syntheses and removes three single studies, for a total of 18 publications included in this review. Case reports and case series were excluded from this update, due to the risk of bias inherent in these study designs and the availability of more rigorous evidence.

Outcome	Evidence found		Overall certainty in evidence
Maternal mortality	Completed syntheses	3	Very low
Maternal clinical characteristics	Completed syntheses	7	Very low
Fetal/neonatal mortality	Completed syntheses	10	Very low
Birthweight	Completed syntheses	2	Low
Newborn COVID-19 infection	Completed syntheses	6	Low
Vertical transmission	Completed syntheses	5	Very low
Pre-term birth	Completed syntheses	6	Low
Cesarean	Completed syntheses	11	Very low

Warning

Given the need to make emerging COVID-19 evidence quickly available, many emerging studies have not been peer reviewed. As such, we advise caution when using and interpreting the evidence included in this rapid review. We have provided an assessment of the overall certainty of the evidence and a summary of the quality of the evidence as low, moderate, or high to support the process of decision making. Where possible, make decisions using the highest quality evidence available.

Table 1: Syntheses

Reference	Date Released	Review Question [Population (P), Exposure (E), Comparison (C), Outcomes (O)]	Description of Included Studies	Summary of Findings	Quality Rating: Synthesis	Quality Rating: Included Studies
New evidence reported September 3, 2020						
<p>Akhtar, H., Patel, C., Abuelgasim, E., & Harky, A. (2020). COVID-19 (SARS-CoV-2) infection in pregnancy: A systematic review. <i>Gynecologic and Obstetric Investigation</i>. Epub ahead of print.</p>	<p>Jul 30, 2020 (Search completed May 22, 2020)</p>	<p>P: pregnant women and their fetuses/neonates E: COVID-19 infection C: no comparator O: maternal COVID-19 symptoms, pregnancy complications, neonatal COVID-19 symptoms, neonatal health status, delivery timing and type, vertical transmission</p>	<p>This review includes 22 case reports and case series, reporting on 156 pregnant women aged 22 to 42 with COVID-19 infections.</p>	<p>Outcomes reported were:</p> <ul style="list-style-type: none"> • 108 births (includes 4 sets of twins), 13 women still pregnant at time of reporting, 41 missing outcome data • 10 fetal deaths • 27 pre-term births <p>Maternal outcomes reported:</p> <ul style="list-style-type: none"> • 19 vaginal and 66 cesarean deliveries; others unknown • Most received nasal oxygen therapy • 11 required mechanical ventilation • Most had low lymphocytes • Most had unilateral or bilateral pneumonia on CT scan • Symptoms were most commonly fever (53%), cough (32%), malaise (13%) and myalgia (11%) • 8 maternal deaths <p>Fetal/neonatal outcomes included:</p> <ul style="list-style-type: none"> • Intrauterine distress (14%) and premature rupture of membranes (8%) • Symptoms were most commonly shortness of breath (6%), gastrointestinal symptoms (4%) and fever (3%) <p>The above outcomes were not compared to pregnant women without COVID-19 infection.</p> <p>Outcomes related to vertical transmission were not reported.</p>	<p>Moderate</p>	<p>High</p>

<p>de Melo, G.C. & de Araujo, K.C.G.M. (2020). COVID-19 infection in pregnant women, preterm delivery, birth weight, and vertical transmission: a systematic review and meta-analysis. <i>Cadernos de Saúde Pública</i>, 36(7), e00087320.</p>	<p>Jul 17, 2020 (Search completed May 4, 2020)</p>	<p>P: pregnant women and their fetuses/neonates E: COVID-19 infection C: no COVID-19 infection O: pre-term delivery, neonatal health status, birth weight, delivery timing and type, vertical transmission</p>	<p>This review includes 38 studies reporting on a total of 520 pregnant women in their third trimesters with COVID-19 infections. Most studies were from China, with other studies from Italy, Peru, India, USA, Portugal, South Korea.</p> <ul style="list-style-type: none"> • 2 cohort studies • 11 cross-sectional studies • 4 case control studies • 11 case reports • 10 case series reports 	<p>Birth outcomes were:</p> <ul style="list-style-type: none"> • 433 newborns (366 cesarean deliveries) • Delivery outcomes for remaining pregnancies not reported <p>In a meta-analysis of 3 studies, 60 pregnant women with COVID-19 infection, as compared to 219 without COVID-19 infection, found:</p> <ul style="list-style-type: none"> • Odds of pre-term delivery not statistically significant (OR = 2.25, 95% CI 0.96, 5.31) • Association of COVID-19 infection and birthweight not statistically significant (MD = -124.16g, 95% CI -260.54, 12.22) • 1-2% of neonates tested positive for COVID-19 infection shortly after birth 	<p>Moderate</p>	<p>Very low</p>
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<p>Khalil, A., Kalafat, E., Benlioglu, C., O'Brien, P., Morris, E., Draycott, T., ... Magee, L. A. (2020). SARS-CoV-2 infection in pregnancy: A systematic review and meta-analysis of clinical features and pregnancy outcomes. <i>EClinicalMedicine</i>. Epub ahead of print.</p>	<p>Jul 3, 2020 (Search completed Jun 8, 2020)</p>	<p>P: pregnant women and their fetuses/neonates E: COVID-19 infection C: no comparator O: maternal COVID-19 symptoms, maternal mortality, neonatal COVID-19 infection, neonatal health status, delivery timing and type, vertical transmission</p>	<p>This review includes 86 studies with 17 studies included in the quantitative synthesis (2567 pregnancies, with 73.9% in the last trimester of pregnancy). There were five reports from national registries (UK, Netherlands, China, France and Brazil), while the rest were regional reports from other countries (Italy, USA, Spain).</p>	<p>Maternal socio-demographic and medical risk factors:</p> <ul style="list-style-type: none"> • 50.8% were minorities (Black, Asian and Other) • 38.2% were obese • 32.5% had co-morbid conditions <p>Meta-analysis of pooled outcomes showed:</p> <ul style="list-style-type: none"> • 48.3% of deliveries were by cesarean section • 21.8% of births were pre-term (before 37 weeks) and medically required in 18.4% of cases • 19.0% of deliveries were for COVID-19 related reasons • Maternal ICU admission occurred in 7.0% of cases <ul style="list-style-type: none"> ○ 3.4% required intensive interventions in ICU ○ maternal death occurred in 0.9% of cases ○ ICU admissions were higher in women with co-morbid health conditions (beta = 0.007, p=0.05) and in those with maternal age > 35 years (beta=0.007, p<0.01) • 0.9% of births were still births • Neonatal death occurred in 0.6% of cases • 1.4% of neonates were SARS-CoV-2 positive after delivery. <p>The above outcomes were not compared to pregnant women without COVID-19 infection.</p>	<p>Moderate</p>	<p>High</p>
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<p>Matar, R., Irahmani, L., Monzer, N., Debiane, L.G., Berbari, E., Fares, J., ... Murad, M.H. (2020). Clinical presentation and outcomes of pregnant women with coronavirus disease 2019: A systematic review and meta-analysis. Epub ahead of print.</p>	<p>Jun 23, 2020 (Search completed Apr 30, 2020)</p>	<p>P: pregnant women and their fetuses/neonates E: COVID-19 infection C: no comparator O: maternal COVID-19 treatment, maternal outcomes, delivery timing and type, neonatal outcomes</p>	<p>This review includes 24 studies (136 women) with maternal age ranging from 25 to 34 years and the gestational age ranging from 30 to 40 weeks. Most were from China, with one each from USA, Korea, Iran, Honduras.</p>	<p>Maternal health and outcomes:</p> <ul style="list-style-type: none"> • 19.7% had at least 1 chronic comorbid condition • 87.7% received antibiotic therapy • 67.5% received antiviral therapy • 73.3% received oxygen therapy • 1 maternal death occurred • 76.3% delivered by cesarean section <p>Neonatal outcomes</p> <ul style="list-style-type: none"> • 37.7% were preterm • Neonatal intensive care admission occurred in 63.7% of cases • 3 fetal deaths occurred • 2 newborns tested positive for COVID-19 <p>The above outcomes were not compared to pregnant women without COVID-19 infection.</p>	<p>Moderate</p>	<p>Good</p>
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<p>Trippella, G., Ciarcià, M., Ferrari, M., Buzzatti, C., Maccora, I., Azzari, C., ... Chiappini, E. (2020). COVID-19 in pregnant women and neonates: A systematic review of the literature with quality assessment of the studies. <i>Pathogens</i>, 9(6), 485.</p>	<p>Jun 18, 2020 (Search completed Apr 18, 2020)</p>	<p>P: pregnant women and their fetuses/neonates E: COVID-19 infection C: no comparator O: maternal COVID-19 symptoms, birth weight, Apgar scores, neonatal health status, COVID-19 test results, delivery timing and type, vertical transmission</p>	<p>This review includes 37 case reports and case series, reporting on a total of 275 pregnant women with COVID-19 infections. 181 of the cases were from China, with 94 from other countries.</p>	<p>Outcomes reported:</p> <ul style="list-style-type: none"> • 248 newborns (60 vaginal and 179 cesarean deliveries) • 48 (23%) pre-term births of 208 reporting gestational age • 3 first-trimester abortions • 2 stillbirths; 1 fetal death • 33 women still pregnant at time of reporting or missing outcome data <p>Maternal outcomes included</p> <ul style="list-style-type: none"> • 36 received nasal oxygen therapy • 5 required mechanical ventilation • 29% had low lymphocytes • 95% had unilateral or bilateral pneumonia on CT scan • Symptoms were most commonly fever (58%), cough (36%), malaise (14%) and shortness of breath (10%) <p>Fetal/neonatal outcomes included</p> <ul style="list-style-type: none"> • Intrauterine distress (13%) and premature rupture of membranes (8%) <p>The above outcomes were not compared to pregnant women without COVID-19 infection.</p> <p>Of 191 neonates tested for the virus that causes COVID-19, 14 (7%) tested positive.</p>	<p>Moderate</p>	<p>High</p>
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<p>de Sousa, Á.F.L., de Carvalho, H.E.F., de Oliveira, L.B., Schneider, G., Camargo, E.L.S., Watanabe, E., ... Fronteira, I. (2020). Effects of COVID-19 Infection during Pregnancy and Neonatal Prognosis: What Is the Evidence? <i>International Journal of Environmental Research and Public Health</i>, 17(11), 4176.</p>	<p>Jun 11, 2020 (Search completed May 26, 2020)</p>	<p>P: pregnant women and their fetuses/neonates E: COVID-19 infection C: no comparator O: maternal COVID-19 treatment, maternal outcomes, delivery timing and type, neonatal outcomes</p>	<p>This review includes 49 studies reporting on a total of 755 pregnant women and 598 infants (born at time of study) and consisted of:</p> <ul style="list-style-type: none"> • 21 case reports • 19 cross-sectional descriptive studies • 7 cross-sectional analytical studies • 1 case-control study • 1 cohort study <p>Women were from China (635), USA (60), Italy (42) Iran (10) and one from each of Asia, Honduras, Australia, Turkey, Spain, Peru, Switzerland and Canada.</p>	<p>Maternal outcomes:</p> <ul style="list-style-type: none"> • 84% of women were in the third trimester of pregnancy. Of those that delivered at the time of the study <ul style="list-style-type: none"> • 148 (65%) delivered by cesarean section <ul style="list-style-type: none"> ○ In 103 of these, infection was listed as the cause for performing the C- section but no further details were provided • 8 maternal deaths were reported <p>Neonatal outcomes:</p> <ul style="list-style-type: none"> • 598 babies were born • 493 (82%) of infants were tested for SARS-CoV-2, of whom 9 (2%) tested positive* • 101 (20%) were premature • 28 (6%) were underweight • 10 neonatal deaths and one spontaneous abortion were reported • 2 had high rates of IgG and IgM antibodies specific to the virus but were asymptomatic. <p>*the authors report various scenarios in which infants tested positive which makes it difficult to establish route of transmission (vertical transmission, vs contact route of transmission due to exposure to mother and or healthcare workers providing care [directly and/or indirectly]).</p> <p>The outcomes were not compared to pregnant women without COVID-19 infection.</p>	<p>High</p>	<p>Very low</p>
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<p>Juan, J., Gil, M. M., Rong, Z., Zhang, Y., Yang, H., & Poon, L. C. (2020). Effect of coronavirus disease 2019 (COVID-19) on maternal, perinatal and neonatal outcome: systematic review. <i>Ultrasound in Obstetrics & Gynecology</i>, 56(1), 15–27.</p>	<p>May 19, 2020 (Search completed Apr 20, 2020)</p>	<p>P: pregnant women and their fetuses/neonates E: COVID-19 infection C: no comparator O: maternal COVID-19 symptoms, pregnancy complications, neonatal COVID-19 symptoms, neonatal health status, delivery timing and type, vertical transmission</p>	<p>This review includes 24 case reports and case series, reporting on a total of 324 pregnant women with COVID-19 infections. The majority of the cases originated from China, with other cases from Australia (1) Canada/France (1), Korea (1) Iran (2 case reports and 1 case series), Italy (1 case series and 1 case report), Peru (1), Spain (2), Sweden (1), Turkey (1) and USA (1 case series and 4 case reports).</p>	<p>Delivery outcomes:</p> <ul style="list-style-type: none"> • 219 births (most were cesarean deliveries; gestational age ranged from 28 to 41 weeks) • 4 neonatal deaths • 4 miscarriages or abortions • 72 women still pregnant at time of reporting <p>Maternal outcomes included</p> <ul style="list-style-type: none"> • Most required ICU admission • Few required mechanical ventilation • 43.1% had low lymphocytes • Most had unilateral or bilateral pneumonia on CT scan <p>The above outcomes were not compared to pregnant women without COVID-19 infection.</p> <p>One case suggested vertical transmission had occurred.</p>	<p>Moderate</p>	<p>High</p>
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Previously reported evidence						
<p>Elshafeey, F., Magdi, R., Hindi, N., Elshebiny, M., Farrag, N., Mahdy, S., ... Nabhan, A. (2020). A systematic scoping review of COVID-19 during pregnancy and childbirth. <i>International Journal of Gynaecology and Obstetrics</i> 150(1), 47–52.</p>	<p>Apr 24, 2020 (Search completed Apr 19, 2020)</p>	<p>P: pregnant women and their fetuses/neonates E: COVID-19 infection C: no comparator O: maternal COVID-19 symptoms, pregnancy complications, neonatal COVID-19 symptoms, neonatal health status, delivery type, vertical transmission</p>	<p>Scoping review of 33 studies from around the world, published between 8 December 2019 and 19 April 2020, reporting on clinical characteristics, maternal and perinatal outcomes of 385 pregnant women with COVID-19. Study designs included case control, case reports, case series.</p>	<p>Included cases were predominantly mild: 368 (95.6%) mild; 14 (3.6%) severe; and 3 (0.8%) critical. 17 women were admitted to intensive care, including 6 who were mechanically ventilated and 1 maternal mortality. 252 women gave birth: 69.4% cesarean and 30.6% vaginal births. Outcomes for 256 newborns included 4 RT-PCR positive neonates, 2 stillbirths, and 1 neonatal death. No evidence of vertical transmission. Limited data suggest that pregnant women have a clinical presentation and severity similar to non-pregnant adults, and adverse maternal and perinatal outcomes were rare.</p>	<p>Moderate</p>	<p>Not reported</p>
<p>Yang, Z., Wang, M., Zhu, Z., & Liu, Y. (2020). Coronavirus disease 2019 (COVID-19) and pregnancy: a systematic review. <i>The Journal of Maternal-Fetal & Neonatal Medicine</i>. Epub ahead of print.</p>	<p>Apr 20, 2020 (Search completed Mar 26, 2020)</p>	<p>P: pregnant women and their fetuses/neonates E: COVID-19 infection C: no comparator O: maternal COVID-19 symptoms, pregnancy complications, neonatal COVID-19 symptoms, neonatal health status, delivery timing and type, vertical transmission</p>	<p>Systematic review of 18 studies from around the world, published between 1 January 2020 and 26 March 2020, reporting on maternal, fetal, and neonatal outcomes of 114 pregnant women infected with (COVID-19). Study designs included case control, case reports, case series.</p>	<p>91% had cesarean delivery. In terms of fetal and neonatal outcomes, stillbirth (1.2%), neonatal death (1.2%), preterm birth (21.3%), low birth weight (<2500 g, 5.3%), fetal distress (10.7%), and neonatal asphyxia (1.2%) were reported. No direct evidence of intrauterine vertical transmission. The clinical characteristics of pregnant women with COVID-19 infection are similar to those of non-pregnant adults. Fetal and neonatal outcomes appear good in most cases. Limitation: Available data only include pregnant women infected in their third trimesters.</p>	<p>Moderate</p>	<p>Low</p>

<p>Della Gatta, A.N., Rizzo, R., Pilu, G., & Simonazzi, G. (2020). Coronavirus disease 2019 during pregnancy: A systematic review of reported cases. <i>American Journal of Obstetrics and Gynecology</i>, 223(1), 36–41.</p>	<p>Apr 17, 2020 (Search completed Mar 16, 2020)</p>	<p>P: pregnant women and their fetuses/neonates E: COVID-19 infection C: no comparator O: maternal COVID-19 symptoms, pregnancy complications, neonatal COVID-19 symptoms, neonatal health status, delivery timing and type, vertical transmission</p>	<p>Systematic review of 6 studies from around the world, published prior to 16 March 2020, reporting on clinical outcomes for 51 pregnant women infected with COVID-19. Study designs included case series, case reports, and retrospective studies.</p>	<p>39% had preterm birth; 96% had cesarean delivery with unclear indications. No evidence of vertical transmission. 1 fetal death occurred in a critically ill patient. Clinical outcome has been generally favorable for both mothers and neonates.</p>	<p>Moderate</p>	<p>Low to moderate</p>
<p>Parazzini, F., Bortolus, R., Mauri, P.A., Favilli, A., Gerli, S. and Ferrazzi, E. (2020). Delivery in pregnant women infected with SARS-CoV-2: A fast review. <i>International Journal of Gynecology & Obstetrics</i>, 150(1), 41–46.</p>	<p>Apr 10, 2020 (Search completed Mar 31, 2020)</p>	<p>P: pregnant women and their fetuses/neonates E: COVID-19 infection C: no comparator O: maternal COVID-19 symptoms, pregnancy complications, neonatal COVID-19 symptoms, neonatal health status, delivery timing and type, vertical transmission</p>	<p>Rapid review of 13 studies from around the world, published between 1 January to 31 March 2020, of clinical maternal characteristics, mode of delivery and neonatal outcomes for 64 pregnant women infected with COVID-19. Study designs included case reports and retrospective clinical series.</p>	<p>Pneumonia was present in 80.3% women, oxygen support was needed by 82.9%, and 6.5% were admitted to a critical care unit (among limited cases for which the information was available). 39.6% had preterm birth; 48.4% had caesarian delivery due to worsening of maternal conditions. In all reported cases the 5-minute Apgar score was greater than 7 and generally 9 or 10. Zero or low rate of vertical or peripartum transmission through cesarean delivery; no data available for vaginal delivery. Risk of transmission during breastfeeding is unknown. Overall, risk of adverse maternal and fetal outcomes is low.</p>	<p>Moderate</p>	<p>Not reported</p>

<p>Zaigham, M., & Andersson, O. (2020). Maternal and perinatal outcomes with COVID-19: A systematic review of 108 pregnancies. <i>Acta Obstetrica Et Gynecologica Scandinavica</i>, 99(7), 823–829.</p>	<p>Apr 6, 2020 (Search completed Apr 4, 2020)</p>	<p>P: pregnant women and their fetuses/neonates E: COVID-19 infection C: no comparator O: maternal COVID-19 symptoms, pregnancy complications, neonatal COVID-19 symptoms, neonatal health status, delivery timing and type, vertical transmission</p>	<p>Systematic review of 18 studies from around the world, published between 8 December 2019 and 4 April 2020, of clinical manifestations and maternal and perinatal outcomes for 108 pregnant women with lab-confirmed COVID-19 infection. Study designs included case reports and case series.</p>	<p>68% presented with a fever at admission. 91% had cesarean delivery. The majority of mothers were discharged without any major complications. However, severe maternal morbidity as a result of COVID-19 and perinatal deaths were reported, with 3% of women requiring admission to maternal ICU, and 1 case of perinatal death. No clear evidence for vertical transmission.</p>	<p>Moderate</p>	<p>Low</p>
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Please note that this information is not available in both official languages because the source of the information is not subject to the Official Languages Act.

Table 2: In-progress Syntheses

Title	Anticipated Release Date	Description of Document
Previously reported evidence		
Bahri, N., Dashti, S., Najafi, T.F., & Tohidinik, H.R. (2020). Assessment of the possibility of vertical transmission of COVID-19: a systematic review and meta-analysis protocol . <i>PROSPERO CRD42020173886</i> .	Mar 1, 2021	This review will assess the possibility of vertical transmission of COVID.
Fen, L.Y., Lei, G.X., Han, N.C., Mei, Y.N.P., & Amin, Z. (2020). A systematic review of neonates and COVID-19 . <i>PROSPERO CRD42020183500</i> .	Dec 31, 2020	This review will address four questions: 1) What are the maternal and neonatal serological results (i.e. IgM and IgG) in reported COVID-19 pregnancies; 2) What are the immunological profiles of mothers and neonates in reported COVID-19 pregnancies; 3) What is the effect of gestational age at maternal COVID-19 infection on neonatal outcomes and 4) What are the neonatal outcomes of perinatally acquired infection compared to postnatally acquired infection?
Foratori-Junior, G.A., Mosquim, V., & de Carvalho Sales-Peres, S.H. (2020). COVID-19 and its relation with pregnancy and neonates: a systematic review . <i>PROSPERO CRD42020177354</i> .	Sep 24, 2020	This review will look to synthesize evidence on the symptoms of COVID in pregnant women and in their newborn children as well as the impacts on delivery and the possibility of vertical transmission.
Ramos, M. (2020). COVID-19 in pregnant women: a systematic review . <i>PROSPERO CRD42020179843</i> .	May 31, 2020	The research question for this review is, “What evidence is available about COVID-19 in pregnant women?” The primary outcomes are hospitalization, mortality, medical complications and readmission and secondary outcomes include clinical management and delivery arrangements.
Poon, L., Yang, H., del Mar Gil, M., & Juan, J. (2020). Maternal, fetal and neonatal characteristics and clinical outcomes in cases of COVID-19 infection during pregnancy: a systematic review . <i>PROSPERO CRD42020181557</i> .	May 25, 2020	The research question looks to answer, “What is the effect of SARS-CoV-2 infection (COVID-19 disease) in pregnancy, mother, fetus and newborn”.
Novoa, R., Muñoz, W.Q., Melendez, P.A.L., & Laveriano, W.V. (2020). Maternal clinical characteristics and perinatal outcomes of pregnant women infected by coronavirus (COVID-19). A systematic review . <i>PROSPERO CRD42020176534</i> .	Apr 30, 2020	This review will look to answer two questions: 1) What are the clinical characteristics of COVID-19 infection in pregnant women; and 2) What are the perinatal outcomes of COVID-19 infection in pregnant women?

Please note that this information is not available in both official languages because the source of the information is not subject to the Official Languages Act.

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