Maternal and neonatal outcomes of 3231 pregnancies with COVID-19: A living systematic review

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The present publication is a living systematic review. It is published as a preprint by DiVA portal (www.diva-portal.org) , an institutional repository for research publications and student theses written at 49 universities and research institutions, mostly in Sweden. It is not peer reviewed and I am the sole author.

This systematic review is the base for peer a reviewed guideline in Swedish about COVID-19 (infection with the corona virus SARS-CoV-2), published by www.internetmedicin.se. The guidelines from Internetmedicin are not official but highly regarded and much used – this guideline has been opened well over 100 000 times. My guidelines are compatible with official Swedish guidelines, if they exist. Unfortunately, my English is not revised by a translator.

This is a living systematic review, that is a systematic review that is continually updated, incorporating relevant new evidence as it becomes available (Elliott 2017).

Method

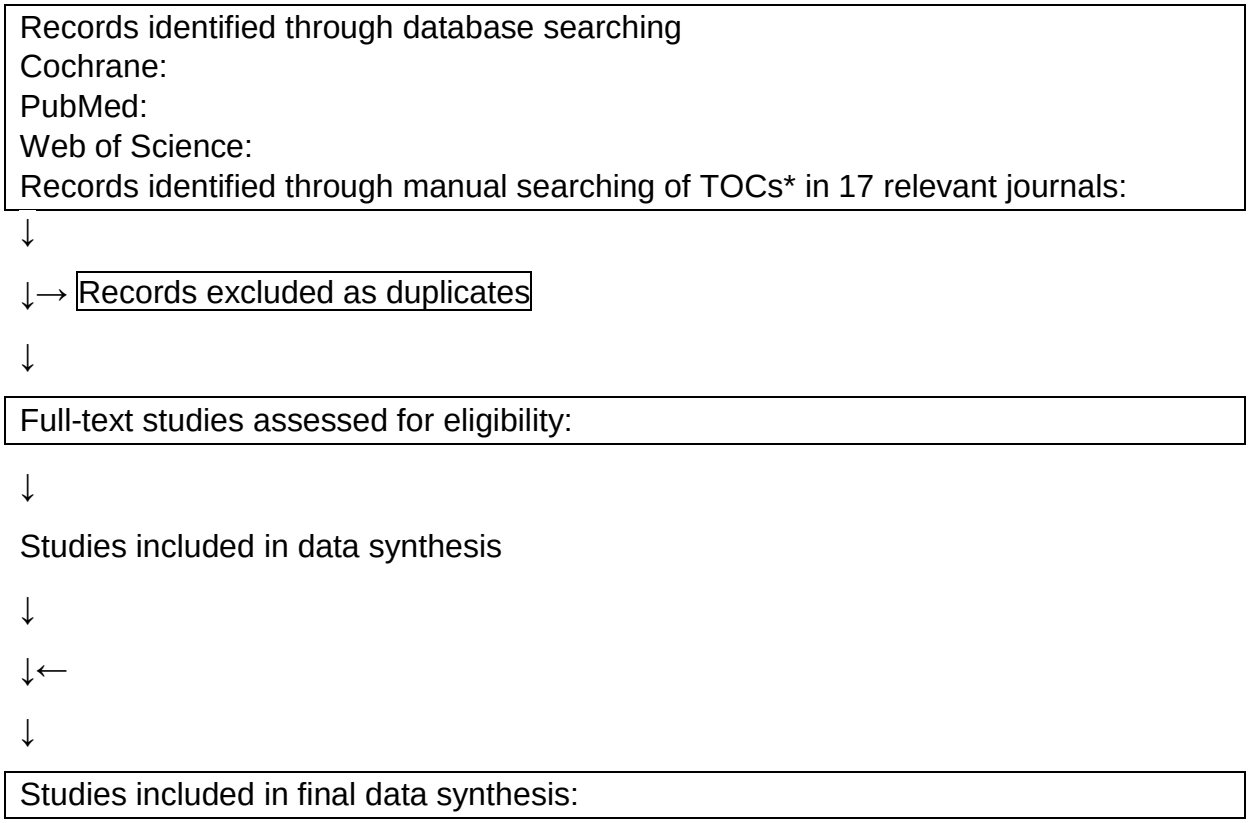
Literature was searched up to June 11, 2020. The Cochrane Library, PubMed and Web of Science were searched for “Covid-19 and pregnan*” and “Covid-19 and child*”. Studies that contained clinical data on pregnant women and/or newborn babies (0-28 days old) who became sick or colonized with SARS-CoV-2 were selected for inclusion in my review. The reference lists of the selected studies and of review articles were also searched. Studies in all West European languages were read but not in e.g. Chinese.

Exclusion criteria: Studies of radiological diagnosis, anesthesiologic methods, compassionate use of drugs or laboratory findings with few clinical data were excluded.

Tables of contents in several journals were read and searched from 1 January 2020: Acta paediatrica, ADC, AOG, BMC Pediatrics, BMJ, Evidence Alerts, JAMA, JAMA Internal Medicine, JAMA Network Open, JAMA Pediatrics, Journal of pediatrics, Lancet, Lancet infection diseases, Lancet respiratory diseases, Lancet Global Health, Medscape pediatrics, NEJM, and Pediatrics.

In systematic reviews, a second researcher independently should check the extraction of data from the study made by the first researcher. Due to time constraints, it was not possible to ask busy clinicians to do this. Therefore, before

submitting the manuscript, I reread all cited studies and checked all data in the tables.



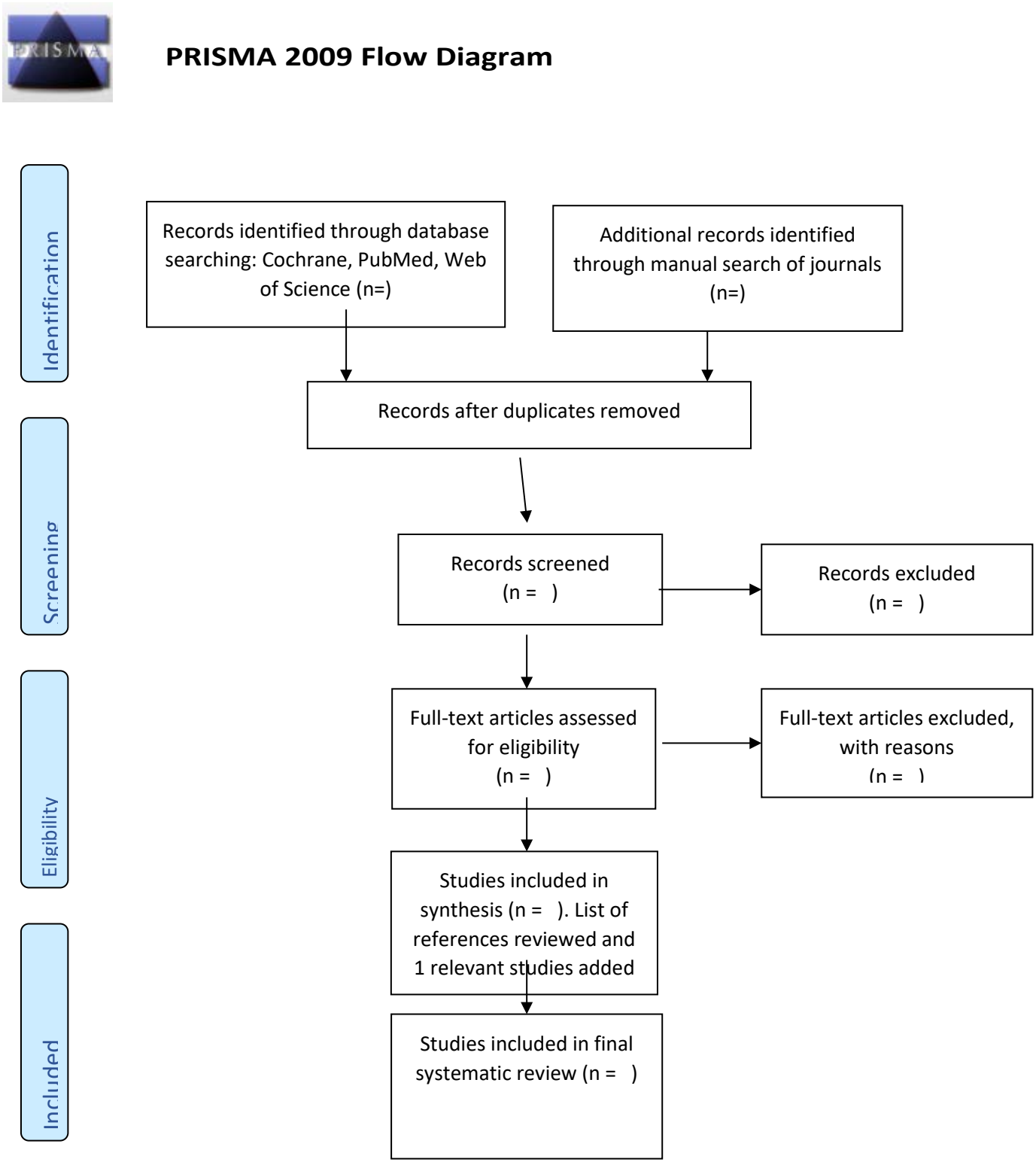


Figure 1. Flow chart of the systematic search process.

Summary of Table 1: Outcome of pregnancies complicated with maternal COVID-19

[figures marked with grey color are not updated]

Studies: 120 studies published from 6 continents. Some of the studies are preprints which are not peer reviewed.

Number of pregnancies: 3231.

Vaginal deliveries: 176. Caesarean sections: 439. Intrauterine fetal deaths: 31. Legal abortions: 9. Unknown mode of delivery or current pregnancy at time of writing: 282.

Maternal deaths

21 mothers have been reported dead in connection with COVID-12 in pregnancy: 8 from Iran, 6 from the UK, 2 each from Turkey and the USA and 1 each from Brazil, France and Sweden. In the Swedish case and several other cases both mother and child died. The most common cause of death was acute respiratory distress syndrome (ARDS). COVID-19 in pregnant women is possibly not significantly more deadly than COVID-19 in non-pregnant women. However, the fact that 2/3 of published cases were from a few months in 2 countries suggests that there is an underreporting in many countries.

Intrauterine fetal deaths

31 fetal deaths. In one case, the placenta was positive for SARS-CoV-2 (Baud 2020).

Neonatal deaths

9 newborns have been reported dead after pregnancy with COVID-19. They were from Brazil (1), China (2 newborns), France (1), Iran (2) and Sweden (1) and the UK (2). In 6 cases, the authors write that the deaths were not directly related to COVID-19 (preterm, asphyxia, MODS).

The Brazilian newborn died of neonatal asphyxia (Tutiya).

One Chinese boy (35 weeks + 2 days gestational age) died of neonatal asphyxia after being delivered by cesarean section while the mother was in mechanical ventilation due to septic shock. Apgar was 1, 1, 1. (Yan 2020)

The other Chinese boy, born after 34 weeks + 5 days, died when 9 days old of disseminated intravascular coagulation (DIC) and multiple organ dysfunction syndrome (MODS). The mother caught fever 3 days after delivery and the boy became ill the day before his death, with tachycardia, refractory shock and gastric bleeding. The authors didn't mention any treatment except transfusion of blood components and didn't suggest any diagnosis. They mentioned viremia but it is unclear if it is a finding or a hypothesis. (Zhu 2020)

The French infant died due to prematurity; details were not published (Kayem).

The Iranian newborns were a pair of twins, born with cesarean section after 28 weeks + 2 days of gestation. On their 3rd day of life, they died of complications to their prematurity. They had no sign of COVID-19. The mother, who was >45 years old, died later. (Hantoushzadeh 2020)

As far as we know, the death of a newborn in Sweden has not been reported in any scientific journal and the only thing we know is that the mother was overweight and also died (Tegnell). Since that is the only maternal death related to COVID-19 in Sweden so far, publication of details is probably incompatible with confidentiality.

The death of 2 British newborns were unrelated to COVID-19, according to the report (Knight).

Vertical transmission

The definition of vertical transmission varies. My definition here is transmission of virus from mother to fetus or infant *in utero*, during delivery or through breastmilk.

About 500 newborns were polymer chain reaction (PCR) negative in tests for RNA from SARS-CoV-2. Most test were from nasal and/or throat swabs but in some cases, tests were also collected from amniotic fluid, umbilical cord blood, breastmilk and placenta; these tests were also negative with a few exceptions.

Exceptions were tests from **nasal and/or throat swabs** from 20 newborns collected 24 hours to 18 days after birth. Some of the newborns had breathing difficulties but both mothers and infants recovered without problems. In addition, media reported that a positive test was collected from a newborn in London a few minutes after birth but it was not known if virus had infected the baby *in utero* or in the vagina (Murphy 2020; baby not included in Table).

In a case of intrauterine fetal death (IUFD), PCR+ tests from **placenta** and mother's nasal swab were PCR+ while tests from amniotic fluid, vagina, newborn's skin, blood, meconium, internal organs were PCR- (Baud, Switzerland). In another case, 3 swabs from the amniotic surface of placenta in proximity to the umbilical cord were PCR+. However, repeated neonatal nasal swabs were PCR- and neonatal blood IgM and IgG were also negative. The newborn was asymptomatic. (Ferraiolo, Italy) These 2 cases were maybe vertical transmission, maybe not.

A pregnancy in gestational week 22 was terminated to rescue mother's life since she had severe eclampsia with DIC. COVID-19 may have caused eclampsia through infection of the placenta. Umbilical cord, placenta, maternal saliva and urine tested PCR+. Electron microscopy of the placental region near the umbilical cord showed virus in placental cells, with the appearance of SARS-CoV-2. (Hosier, USA) This case is probably a case of vertical transmission.

A newborn, whose mother had familiar neutropenia, tested PCR+ for nasal swab, placenta, plasma and stool while the mother tested PCR+ for nasal and vaginal swabs, placenta and breastmilk. Microscopy revealed inflammation in placenta. Virus particles were abundant on the maternal side of placenta (cycle threshold, Ct, 13-16) and less abundant of the fetal side (Ct 26-29) but still significant. The authors state that "[o]ur case represents a probable case of congenital SARSCoV-2 infection"

(Kirtsman, Canada). I agree. The mother and son were discharged home 4 days after birth.

In a cohort of 22 newborns born by mothers with COVID-19, 1 newborn had nasal swabs with PCR+ at day 0, 1, 7; another had nasal swabs with PCR- at day 0, PCR+ at day 7. The fetal side of both placentas also tested PCR+. There hade been no contact between mothers and newborns after birth. There were no neonatal complications. (Patanè, Italy) These infants could be classified as possible or probable vertical transmission.

In another cohort of 11 newborns born by mothers with COVID-19, 1 placenta tested PCR+ and in 2 cases, membranes (amnion and chorion) tested PCR+. It was not possible to say if the specimens were maternal or neonatal. The newborns showed no sign of COVID-19; no further clinical data were presented. (Penfield, USA)

A mother died of ARDS 15 days after cesarean section. In the newborn, initial throat swab and cord blood were PCR- but amniotic fluid and later throat swabs were PCR+. She was healthy. (Zamaniyan, Iran) It is a possible, but less probable example of vertical transmission.

In the cases above, two were fetal deaths, 3 had no signs of COVID-19 and the other 4 were healthy.

In a German study, a PCR-positive mother's **breastmilk** was PCR+ for 4 days (quantitative analysis). The newborn simultaneously changed from PCR- to PCR+ and developed breathing problems. Both mother and newborn were soon healthy. (Groß 2020) Likewise, in a Turkish case, quantitative analyses of breastmilk and newborns' nasal swab, blood and stool were PCR+. Both mother and infant were asymptomatic (Bastug 2020). These two cases strongly suggest that transmission of SARS-CoV-2 through breastmilk is possible.

Two of 6 newborns delivered by mothers who were moderately ill in COVIR-19 had high titers of **IgM antibodies** for COVIR-19-virus. "M" in IgM means "macro", i.e. the molecule is not usually transferred from mother to fetus because of its size. Therefore, it is possible that virus has penetrated the fetus and stimulated its production of IgM. This was supported by an increase of interleukin-6 as a sign of infection. The infants were fine with no sign of illness. (Zeng H 2020) Another infant had also high levels of IgM for COVID-19-virus and interleukins 2 hours after birth (Dong L 2020). A newborn suffered severe neonatal asphyxia and was tested for immunoglobulins against SARS-CoV-2 and tested IgG+, IgM+ (Yang H, Hu B, et al., China). It is, however, known that interleukins can cross the placenta barrier and there have been false positive IgM values in other congenital infections. The findings by Zeng, Dong and others may therefore be artefacts. (Kimberlin 2020)

Conclusions: Vertical transmission probably exists via placenta and breastmilk but is rather uncommon and usually harmless.

Limitations

Risk for duplicated publication of pregnancies is a risk. We have read the studies in full if English text has been available and compared the names and addresses of authors. Studies deleted from Table 1 due to suspicion of redundant publication are collected in Table 2.

Table 1. Outcome of pregnancies complicated with maternal COVID-19

Reference (country)	Number of pregnancies (vaginal/CS)	Gestational age at illness onset (weeks or weeks+ days)*	Complications during pregnancy (in addition to maternal COVID-19)	Deaths in mother or child; complications after delivery	Signs of vertical transmission of virus from mother to fetus or newborn; conclusion
Alonso Diaz (Spain)	1 (0/1) CS due to preeclampsia.	38+4	Preeclampsia	0/0. Neonatal CPAP for 2h. 2 days PP, the mother got fever and respiratory difficulties. CXR: pneumonia. PCR+.	No. Neonatal nasal swabs: first PCR-, after 36h PCR+.
AlZaghal (Jordan)	1 (0/1) Indications for CS: maternal request and scar after earlier CS.	Term	No	0/0. Apgar 8, 9.	No. PCR-: neonatal nasal swabs x3, breastmilk.
Alzamora (Peru)	1 (0/1)	33 weeks; mother received steroids for fetal lung maturation	Mechanical ventilation of mother who was on insulin for diabetes (BMI 35 kg/m2)	0/0. After CS under mechanical ventilation, the newborn was also under mechanical ventilation immediately because of heavy sedation of mother. nCPAP after 12h.	Yes or no? Neonatal PCR+: throat swab 16h and 48h after CS. IgM and IgG titers for SARS-CoV-2 were negative.
Andrikopoulou (USA)	158. Number of deliveries not stated.	2 preterm deliveries.	None needed mechanical ventilation. 13% had BMI<25, 51% had BMI≥30. 78% had asymptomatic or mild infection.	0/0.	NA
Bastug (Turkey)	1 (1/0)	39	No comorbidity. No symptoms.	0/0. Both mother and newborn were asymptomatic and separated after delivery. Expressed breast milk was given to the newborn.	Yes, probably. Maternal PCR+: breastmilk x3 (quantitative), nasal swab. Neonatal PCR+: nasal swab, blood, stool (all quantitative at day 4; nasal swab PCR- at day 0).
Baud (Switzerland)	1 (0/0) (IUFD)	19	Obesity. Vaginal birth of a dead fetus 2 days after	0/1. IUFD	Yes? PCR+ tests from placenta and mother's nasal swab;

			fever, infection symptoms, nasal swab PCR+.		PCR- from amniotic fluid, vagina, newborn's skin, blood, meconium, internal organs.
Blitz (USA)	13 mothers admitted to ICU (1/6; out of 462 PCR+ pregnant women)		2 mothers died of multiple organ failure. One had BMI<40, the other had ARDS.	2/1 (IUFD in a dying mother)	Neonatal nasal swab PCR- (7 newborns)
Breslin (USA)	43 (18 deliveries: 10/8)	37.0 (IQR 32.6-38.9)	Mean BMI: 30.9. 14 were asymptomatic.	0/0. All newborns have been discharged.	PCR: neonatal nasal swab 17-, 1 indeterminant.
Campbell (USA)	30 (20/10)	≥37	770 consecutive mothers admitted for birth were screened with PCR; 30 were +. 22 were asymptomatic, 8 symptomatic.	0/0. Note: If 3% of PCR were false +, the 22 asymptomatic mothers could be false +.	PCR-: nasal swab in all 30 newborns
Cao D (China)	10 (2/8) 11 newborns (1 pair of twins).	4 preterm 33-34 weeks.	Mild COVID-19 in the mothers.	0/0. All mothers had lung pathology on CT after delivery. No neonatal asphyxia.	No. Neonatal throat swab PCR-: 0/5. **Conclusion:** lung CT screening (!) may be necessary during outbreak periods.
Carosso (Italy)	1 (1/0)	37	No	0/0	Yes? Maternal PCR+: nasal and rectal swabs, PCR-: vagina, placenta, colostrum. Newborn: PCR+: nasal swab, PCR-: placenta. Cord blood: IgM-.
Chen H (China)	9 (0/9)	36-39	Fetal distress, PROM, hypertonia, pre-eclampsia, influenza	0/0; no complications	No. PCR-: amniotic fluid, cord blood, newborns' throat swabs, and breastmilk from 6 patients.
Chen R (China)	17 (0/17)	3 newborns were born prematurely.	Anemia (5 mothers), gestational hypertension (1), gestational diabetes (2). All 17 mothers were PCR+ and all had ground-glass opacities on chest CT scan.	0/0; no complications for newborns. 12/14 mothers with epidural anesthesia had hypotension. All newborns had 1' and 5' minutes Apgar 9-10.	No. PCR-: nasal swabs x2 from all 17 newborns.

Chen S, Huang B et al. (China), cited by RCOG (2020:2)	3 (NA)	NA	NA	NA	No. Three placentas of infected mothers were swabbed and tested negative.
Chen S, Liao E et al. (China)	5 (3/2)	38-41	Gestational diabetes (2 mothers), preeclampsia (1), fetal tachycardia (1)	0/0; excellent clinical course	No. Probably throat and/or nasal swab.
Chen Y (China)	4 (1/3)	37-39	No	0/0. One child suffered transient tachypnea of the newborn (TTN) requiring nCPAP for 3d. All infants and mothers became healthy.	No. PCR-: throat swabs from 3 newborns 72h after birth; one healthy boy was not tested.
Choi (Korea)	1 (1/0)	38+6 (admitted when the newborn was 27d old).	No	0/0. Both mother and daughter had mild COVID-19.	Yes? PCR+: maternal and neonatal nasal, throat, saliva and anal swabs; neonatal plasma, urine. The viral loads were ~100 times higher in newborn compared to mother.
Cohen (France)	88 (9/5) questionnaires on Internet to pregnant or puerperal women.	Median term: 27 weeks. 14 newborns: 28-41 weeks.	76% lost smell and/or taste.	0/0	NA
Collin (Sweden)	13 (2/5) pregnant women admitted to ICU		National cohort 1 month 2020. 53 women aged 20-45 years with SARS-CoV-2 in ICU; 13 of them were pregnant or PP (<1 week). RR for pregnant vs non-pregnant: 5.39 (95% CI: 2.89, 10.08).	No death so far.	NA
Cooke WR (UK)	2 (0/2)	28+5, 29+2	Case 1: 39yo Afro-Caribbean	0/0	No. Neonatal PCR-. **Conclusion:** prone position after CS

			primigravidae, BMI=42, T2DM.		improvs oxygenation rapidly.
Dong L (China)	1 (0/1)	34+2 (CS 37+4)	No	0/0	Yes? 2h after birth, the newborn's blood contained IgM for SARS-CoV-2 and cytokines
Dória M (Portugal)	12 (4/6)	10 term deliveries (1 pair of twins, i.e. 11 newborns)	1 mother had headache, the others were asymptomatic. No complications.	0/0. No asphyxia. 8/11 had mild fetal growth retardation.	Neonatal PCR+: 0/11.
Ellington (USA)	16 death pregnant women with COVID-19.		CFR for women with COVID-19: pregnant 16/8207 = 0.2%, non-pregnant 208/83205=0.2%	16/?. Pregnant women with COVID-19 had much more ICU admissions and mechanical ventilation but the same mortality as non-pregnant women with COVID-19.	NA
Fan (China)	2 (0/2)	37, 36	No	0/0	No. PCR-: maternal serum, cord blood, placenta tissue, amniotic fluid, vaginal swab, breast milk; neonatal nasal swabs.
Feld (USA)	1 (3 febrile infants; 1 was neonatal: age 28 days; the others were both 43d old)	1 (birth details NA)	NA	Fever, sleepiness, poor feeding, irritable. No respiratory difficulties.	No, not sick until 4 weeks PP. PCR+.
Ferraiolo (Italy)	1 (0/1) Urgent CS due to CTG pathology.	38+3	Mother had asymptomatic COVID-19.	0/0. Newborn was asymptomatic.	Yes? PCR+: 3 swabs from the amniotic surface of placenta in proximity to the umbilical cord. PCR-: repeated neonatal nasal swabs. Neonatal IgM-, IgG-.
Ferrazzi (Italy)	42 (24/18)	2 premature deliveries.	Pneumonia	0?/0?	NA
Fontanella (Ireland and The	2 (0/1)	31 and 40	BMI 46 and 40	0/0 (1 pregnancy ongoing)	NA

Netherlands)					
Forero-Peña DA (Venezuela)	1 (0/1)	38	No	0/0	Neonatal samples: PCR-: nasal swabs x3; blood IgM and IgG for SARS-CoV-2.
Fox NS (USA)	33 (92 suspected COVID-19, 33 confirmed). 1 IUFD.	21 delivered without complication. Gestational week or %CS NA.	2 mothers were treated with oxygen by nasal cannula, 1 at home and 1 at hospital. This was the only hospital admission.	0/0	NA (neonatal PCR was not available).
Gidlöf (Sweden)	1 (0/1) (twins)	36+2; CS the same day	Severe preeclampsia; gestational diabetes (BMI 38 at first antenatal visit)	0/0	No. PCR+: maternal nasal swab; PCR-: breastmilk, maternal vaginal secretions, neonatal nasal swab.
Gonzalez-Romero (Spain)	1 (0/1)	29; received 2 doses of betamethasone for pulmonary maturation	Mechanical ventilation of mother	0/0; no PP complication for mother or child	NA
Grimminck (Netherlands)	1 (1/0) induced vaginal birth.	38	The mother was on heavy immune-suppressive medication for SLE and hypertension.	0/0. Mother and child left the hospital after 12h. 4 weeks PP: everything was good.	No. Maternal PCR-: throat, vagina, urine placenta. Neonatal PCR-: placenta, throat.
Groβ (Germany)	2 (NA)	Term	The 2 mothers stayed in the same room in the maternity hospital.	0/0 Both mothers and newborns were PCR+ (nasal and throat swabs)	Yes (?). PCR+: SARS-CoV-2 RNA in milk from one mother for 4 consecutive days. Her newborn changed at the same time from PCR- to PCR+ (nasal and throat swabs) and had breathing difficulties but was discharged after 2 weeks.
Hani (Jordan)	1 (0/1)	Term	No	0/0	No. The newborn girl "was tested to be negative for COVID-19".
Hantoushzadeh (Iran)	9 (1/6; two fetal deaths	24-38	Critically ill in confirmed (PCR+)	7/8. 7 mothers died of ARDS and other	No. PCR-: 5 neonatal nasal swabs

	not delivered; 3 pairs of twins = 12 fetuses)		COVID-19 in 2nd and 3rd trimester, occurring under a 30 days interval. The 9 mothers were older (average 37y) than average pregnant women in Iran (30y, P<0.001)	cardiopulmonary complications; 1 critically ill, 1 recovered. Fetal and neonatal outcomes: 6 cases of IUFD (including 2 pairs of twins), 2 neonatal deaths (twins), 4 surviving newborns.	including 2 swabs from twins. 1 newborn died later; 1 had pneumonia and nasal swab PCR+ at age 7d.
Hijona Elósegui (Spain)	4 (0/0)	Gestational length at amniocentesis : 16, 16, 21 and 24 weeks.	Indications for amniocentesis: suspected chromosomal aberrations or viral infection.	0/0. The mothers had mild COVID-19.	No. PCR- for amniotic fluid and vaginal discharge in all 4 fetuses.
Hirshberg (USA)	5 (3 deliveries: 0/3. Indication for all CS: maternal.)	25-31	3 mothers obese. All were on mechanical ventilation for several days.	0/0? 1 newborn had Apgar 2, 4, 4.	No. PCR-: nasal swabs from 3 newborns.
Hosier (USA)	1	22	Severe eclampsia with DIC. Termination of pregnancy to rescue mother's life. COVID-19 may have caused eclampsia through infection of the placenta (see right).	0/1	PCR+: umbilical cord, placenta, maternal saliva and urine. Placental region near the umbilical cord: EM showed virus in placental cells, with the appearance of SARS-CoV-2.
Iqbal (USA)	1 (1/0)	39	No complication.	0/0	No? "There was no evidence of neonatal or intraamniotic infection."
Juusela (USA)	2 (0/2)	39+3, 34+4	Both mothers developed cardiomyopathy at the end of pregnancy. BMI 45 and 37. At the time of writing the article, both were still in hospital, one in mechanical ventilation.	0?/0	NA

Kalafat (Turkey)	1(0 /1)	35+3 (day 0, first day with symptoms)	Day 1: PCR- (nasal and throat swabs); day 3: US lungs+; day 5:US lungs+, CT lungs+, PCR+, CS due to hypoxemia	NA/0. The mother was still in the ICU at time of writing.	No. PCR-: Blood from umbilical cord, swabs from placenta, breastmilk, neonatal nose and throat.
Karimi-Zarchi (Iran), citing Tasnim Agency	3 (NA)	NA	NA	2/0? two mothers died of ARDS	No. "neonates were negative when tested for COVID-19".
Kayem (France)	617 (94/87) 181 deliveries, 7 pair of twins, 1 triplet make 190 newborns. Mostly 3rd level hospitals.	14 weeks to term. 72% of deliveries were term.	497/617 (81%) were symptomatic. 29 mothers were treated with mechanical ventilation, 6 with ECMO. Risk factors for severe disease: obesity, diabetes, advanced age, hypertension, preeclampsia.	1/1. 7/181 IUFD. The neonatal death was due to prematurity. The maternal death: NA.	No? Neonatal PCR+: 2/90.
Khan (China)	17 (0/17)	35-41	3 preterm deliveries	0/0; pneumonia in 5 newborns	No(?) All 17 throat swabs were PCR– at delivery but 2 swabs were PCR+ within 24 hours. Conflicting data on cord blood analyses.
Khoury (USA)	245 live births to 241 women (141/100; 6 sets of twins, 2 IUFD).	Preterm: 34/233 (15%)	BMI ≥30: 55%. 17 mothers to ICU; 9 were intubated. 148 mothers (62%) were asymptomatic; 102 remained asymptomatic throughout their delivery hospitalization.	0/0. NICU admission: 61/237 (26%). One maternal cardiac arrest due to respiratory failure and COVID-19 pneumonia, which resulted in urgent CS. At the time of writing, she remained intubated >2 weeks later.	Probably not. Neonatal PCR+: 6/236 (2.5%). Data of tissue or time of sample NA.
Kirtsman (Canada)	1 (0/1)	35+5	Mother had familial neutropenia and frequent bacterial infections.	0/0. The boy had initial problems with feeding but mother and son were discharged	Yes, probably. Maternal PCR+: nasal and vaginal swabs, placenta, breastmilk. Neonatal PCR+: nasal swab, placenta,

				home 4 days after birth.	plasma, stool. Pathology: inflammation in placenta.
Knight (UK)	427 (national cohort in the UK) (106/156; 78 unassisted vaginal, 28 operative vaginal)	90% were ≥32 weeks	69% were overweight or obese. Black mothers had RR=8.1 to be admitted for COVID-19 compared to white mothers.	7 IUFD. 5 (1%) mothers died, 3 from COVID-19 and 2 from other causes (1 death caused by COVID in 18 000 pregnant women). 2 newborns died; their deaths were not related to COVID-19.	12/265 (5%) of infants were PCR+ (nasal swabs), 6 of them <12 hours after birth.
Lee (South Korea)	1 (0/1)	36+2	CS at 37+6 due to obstructed labor	0/0	No. PCR-: nasal swab (x2), placenta, amniotic fluid, cord blood.
Lei D (China)	9 (1/3) Other pregnancies: "One case was terminated at 26 gestational weeks"; 4 pregnancies current.	2 term, 2 preterm	1 mother suffered from ARDS; further data are NA.	0?/0	No. PCR- from 4 cases: amniotic fluid, umbilical cord blood, neonatal nasal swabs, breast milk, maternal vagina.
Li N (China)	34 (2/32) 18 of them were PCR- but CT lung+	No data	Significantly increased numbers of preterm deliveries; gestational diabetes and hypertension	0/0 No severe maternal or neonatal complications	No. "COVID-19 infection was not found in the newborns" but only 3 of them were tested (throat swabs)
Li Yang (China)	1 (0/1)	35	Emergency CS due to fetal bradycardia. No other complication.	0/0	No. Neonatal throat swab, blood, feces, and urine samples were PCR- at 7 different times. On the delivery day, maternal sputum was PCR+ but serum, urine, feces, amniotic fluid, umbilical cord blood, placenta, and breast milk were PCR-.

Liao X (China)	1 (0/1)	35	CS due to fetal distress.	0/0	No. PCR-: amniotic fluid, cord blood, placenta, neonatal serum, neonatal throat and anal swabs.
Liang (China) cites anonyme researchers	18 (16/2) (i.e. 16 PN)	NA	NA	NA	No. Methods not specified.
Liu D (China); follow-up by L Li	15 (1/10) 4 mothers still pregnant at follow-up)	12-38 (delivered at 34-38 weeks)	All 15 mothers had mild COVID-19 and recovered	0/0	No. The study says "No SARS-CoV-2 infection was found in the neonates"; methods not specified.
Liu P	51 (3/48)	6/51 35-37, the others were term (preterm <35 were excluded).	27/51 (53%) were asymptomatic. All mothers had chest CT signs of viral pneumonia but only 7 were PCR+.	0/0	No. Throat swabs x3: 51/51 were PCR-.
Liu W, Wang J (China)	19 (1/18)	35-41	10 mothers had PCR+; 9 were diagnosed clinically (including chest CT)	0/0	No. Neonatal PCR-: throat swab, gastric fluid, urine, feces, umbilical cord blood. Maternal PCR-: breastmilk, amniotic fluid. Chest CT of newborns were (almost) normal.
Liu W, Wang Q (China)	3 (1/2)	38-40	One fetus had fetal distress and chorioamnionitis. Both PCR and CT of lungs were positive.	0/0	No. PCR- tissues at delivery: placenta, vaginal mucus, breast milk; newborn throat swabs, umbilical cord blood, serum.
Liu Y (China)	13 (0/10) 3 healthy, on-going pregnancies	25-38	5 emergency CS due to fetal distress (3 cases), PROM (1), IUFD (1). The 9 live born babies had Apgar 1' =10.	0?/1. One mother in ECMO at time of publication, after MODS, ARDS and septic shock.	No. No clinical or serologic evidence of vertical transmission of SARS-CoV-2.
Lokken E (USA)	46 (5/3)	Median age 38.4 weeks (IQR 37.5-39.8). 1 CS at 33 w due to	High prevalence of obesity, asthma, hypertension.	0/1 (7 live births, 1 IUFD). 2 women developed postpartum preeclampsia.	PCR-: placenta of the stillborn child. Other newborns: NA.

		BMI>40 and worsening respiratory status.			
London V (USA) (2 patients also presented by Blitz)	68 (33/22) pregnancies with COVID-19 (46 symptomatic, 22 asymptomatic).	9 preterm, all in the symptomatic group, 8 iatrogenic, 7 for respiratory distress. 1 IUFD.	12 symptomatic and 0 asymptomatic mother needed respiratory support (1 mechanical ventilation).	0/0 (1 IUFD, see left).	No. Neonatal nasal swab on day 0: PCR+: 0/48. **Conclusion:** symptomatic mothers needed more medical interventions than asymptomatic.
Lowe (Australia)	1 (1/0)	40+3	Mother had mild signs of upper respiratory infection.	0/0	No. The newborn was breastfed. Neonatal PCR- at 24h age.
Martinez-Perez (Spain)	82 (41/41) CS was significantly associated with clinical deterioration	25/82 were preterm	4 mothers had severe COVID-19 symptoms (all were preterm)	2 CS newborns with initial PCR- developed COVID-19 symptoms and PCR+. Symptoms resolved <48h. After adjusting for confounding factors, CS remained independently associated with a risk of deterioration.	No? Neonatal nasal swab <6h after birth: 3/72 were PCR+; repeat testing after 48h: PCR-. None of these had signs of COVID-19.
Mehta H (USA)	1 twin pregnancy (0/1).	27 (day 0)	ARDS, mechanical ventilation, emergency CS on day 7. Improved immediately.	0/0. Twin A: PCR+ but no signs of infection. Twin B: PCR-, mechanical ventilation.	No? See left. No contact between mother and newborns after birth and before PCR.
Mohammadi (Iran)	1 (NA)	8	Ovarian venous thrombosis (OVT) in a pregnant woman after COVID-19.	Still pregnant. "Initial antithrombotic therapy was considered."	NA
Munoz (USA)	1 (NA)	Birth at 36 weeks	Maternal COVID-19 not mentioned	0/0. 3 weeks after birth, he had nasal congestion, tachypnea and SaO2 87%. CXR: bilateral linear opacities and consolidation. PCR+. Mechanical ventilation for 5d.	Unlikely. The boy became sick in COVID-19 at home. Rout of transmission probably horizontal. PCR was also + for rhinovirus.

Ng (UK)	1 (0/1)	34		0/0. 5d after birth, she came back to the hospital with lethargy, hypothermia and apnea. nCPAP and 30% O2. CXR: Increased opacity in both lungs. Discharged after 8d.	No? Tested + for SARS-CoV-2 and seasonal coronavirus. The authors: probably postnatal infection.
Nie (China)	33 (5/22; 28 newborns) 5 ongoing pregnancies, 1 induced abortion.	18/28 term	29/33 had oxygen supplementation. 1 mother had non-invasive ventilation. None was in ICU.	0/0. 1 newborn (born after 34 weeks gestation) had ARDS but recovered.	No? For 26 newborns, throat swabs were tested; 1 was PCR+ 36h after birth. Asymptomatic and PCR- for cord blood and placenta but CXR was consistent with pulmonary infection. Recovered.
NVOG (The Netherlands)	150 (25/16) 150 (108+41+1) pregnancies were confirmed CONVID-19. 108 were still pregnant, 41 had delivered, 6 had been in ICU (8 May 2020). (Miscarriage: see right.)	1 premature newborn.	1 IUFD. The most frequent complaints: fever 61%, cough 76%, shortness of breath 42%. 18 women received oxygen therapy.	0/1. 9 newborns were treated in NICU but were not seriously ill.	No: "Neither neonate was tested positive for COVID-19." PCR+: maternal vaginal secretion PP (1 case).
Panichaya P (Thailand)	1 (Down´s syndrome)	18 weeks. After 27 days: legal, medical abortion.		0/1	No. PCR-: placental swab, fetal nasal and throat swabs. Placenta histology: no inflammation.
Patanè L (Italy)	22 deliveries by PCR+ mothers. The 2 PCR+ newborns (see right): (1/1).	The two PCR+ newborns: 37+6, 35+1	No	The two cases: 0/0. No neonatal complications.	Yes? Neonatal nasal swab: case 1 PCR+ at day 0, 1, 7; case 2: PCR- at day 0, PCR+ at day 7. Both placentas, fetal side: RNA+ from SARS-CoV-2. No contact

					between mothers and newborns.
Penfield (USA)	11 (7/4)	26-41	3 critical, 2 severe, 6 mild COVID-19. PCR+ (see right column) were from critical and severe cases.	0/0. The newborns showed no sign of COVID-19; no further clinical data.	Yes? Placenta: 1 PCR+, 10 NA; membrane (amnion and chorion): 2 PCR+, 8 PCR-; neonatal samples: 11 PCR-. It was not possible to say if PCR+ were from maternal or neonatal tissues.
Peng (China)	1 (0/1) (35+3)	34+3	No	0/0 (CPAP 0-5d, surfactant; recovered fully)	No. Maternal PCR- tests x10 from amniotic fluid, vagina, cord blood, placenta, anal swabs, breast milk; neonatal PCR- tests x6 from anal and throat swabs, serum, sputum, urine.
Pereira (Spain)	60 (23 delivered: 18/5)	2 preterm	2 preeclampsia, 1 HELLP (low platelet syndrome)	0/0. 21 newborns were breastfed, 2 were in NICU (RDS, hemolytic anemia).	No. PCR-: nasal swabs from all 23 newborns 2h after birth, and placenta from 6 newborns.
Pierce-Williams (USA)	64 (32 delivered: 8/24)	Mean 30 weeks; 35 weeks at delivery.	44 had severe and 20 critical COVID-19. Mean BMI=34.	0/0 (33 newborns; 1 pair of twins).	No. 1 newborn had PCR- at 24h but PCR+ at 48h, with no signs of disease.
Qadria (USA)	16 (8/2)	NA	11/16 mothers were African-American. BMI 26-43. 2 mothers received a short treatment of O2 by nasal cannula.	0/0	No. Neonatal PCR- (nasal swab?).
Rabice (USA)	1 (0/1)	33	Diabetes mellitus type 1. BMI=44. Acute pancreatitis.	0/0	NA
Salvatori (Italy)	2 (NA)	Term	No problems. Mild COVID-19 symptoms PP.	PP probably virus horizontal transmission from third person to both mothers and newborns.	No? PCR+: maternal and neonatal nasal swab at age 10d and 18d, respectively. PCR-: breast milk.
Savasi (Italy)	77 (34/22)	12/57 were preterm.	1 in ECMO for 14 days; survived. Fever and dyspnea	0/0.	No(?). Neonatal nasal swab PCR+: 4/57 (3 in the first

			were associated with severe maternal respiratory deterioration.		day of life). All had rooming-in and breastfeeding. None developed respiratory symptoms.
Schnettler (USA)	1 (0/1)	31 (32 at CS)	Critical disease with severe ARDS.	0/0. Mechanical ventilation of newborn for 3d but no complication.	PCR-: neonatal nasal swab and amniotic fluid.
Sentilhes (France)	54 (12/9) 21 live births, 1 IUFD. 16/54 were PCR- but met the Chinese management guideline criteria for suspected COVID-19.	2/21 were very preterm (<28 weeks).	13/54 needed oxygen support, 3/54 needed mechanical ventilation, 1/54 ECMO.	0/0. 1 mother still treated with ECMO. 3 newborns were intubated due to prematurity (27-28 weeks).	No. PCR-: neonatal throat and rectal swabs x2-3 in 21 newborns.
Sharma (India)	1 (0/1)	NA	No	0/0	No. "The newborn was transferred to the mother's side, breast fed, and tested negative for COVID-19 on day seven. The postnatal period was uneventful."
Silverstein (USA)	2 (0/2)	34, 36	Two young mothers without comorbidity but COVID-19 developed respiratory failure. Intubation, CS, mechanical ventilation.	0/0.	No. Neonatal PCR- (tissue unknown).
Sinelli M (Italy)	1 (1/0)	Term	An uneventful pregnancy.	0/0. On 2nd day after delivery, the mother became febrile. On day 5 of life, the newborn had perioral cyanosis, poor sucking, no tachypnoea, POX 88%. He was	No? On 2nd day after delivery, both mother and child had nasal swab PCR+. Neonatal swab still PCR+ on day 21 of life. **Conclusion:** a newborn with COVID-19 may have hypoxemia without

				treated with 30% O2 for 2 days.	signs of respiratory distress.
Slayton-Milam S (USA)	1 (1/0)	33	While under mechanical ventilation due to COVID-19 with respiratory failure, forceps-assisted vaginal birth was induced.	0/0. Newborn was intubated for 24h but otherwise healthy.	No. PCR-: amniotic fluid, placenta, breastmilk (and nasal swab?). CXR-.
Song L (China)	1 (0/1)	36	No	0/0	No. PCR-: throat swabs at age 3 and 7 days.
Tang MW (Netherlands)	1 (0/1)	41	At delivery, the mother developed immune thrombocytopenia (ITP), likely triggered by COVID-19.	0/0	No. The newborn did not develop any symptoms of COVID-19 or ITP.
Tanno S (Brazil)	1 (0/1)	32	Mother died at ICU after emergency CS	1/0	NA
Tegnell A (Sweden)	1 (NA)	NA	An overweight mother with COVID-19 and her fetus died both in a hospital ward.	1/1	NA
Topping A (UK)	1 (0/1)	NA	Mother was in ICU due to COVID-19 and died soon after emergency CS; the newborn survived.	1/0	NA
Tutiya CT (Brazil)	2 (0/2) emergency CS at ICU with mechanical ventilation.	32 and 29 weeks.	Both were obese. Postoperative deterioration but improved after anticoagulation therapy. Microthrombi in the lungs?	0/1 One newborn (32 weeks) died after severe neonatal asphyxia.	Nasal swabs for both newborns: PCR-. **Conclusion:** anticoagulation therapy may save lives in severe or critical COVID-19 cases.
Vivanti AJ (France)	100 (17/16). 36 newborns (3 sets of twins).	Week 14-PP. Preterm deliveries: 13/33.	99 had PCR+, 1 had CT scan+. 10 were admitted to ICU; 9/10 had mechanical ventilation. BMI for ICU patients: median 31 (range 26-42).	0/0. Neonatal intubations: 6 newborns.	No(?) Neonatal nasal swab PCR+: 1/36; asymptomatic.
Wang J (China)	1 (NA)	NA	NA	0/0 "A neonate with SARS-CoV-2	NA

				infection, who had vomiting and milk refusal as the first symptom".	
Wang S	1 (0/1)	40	No complication except mild COVID-19 symptoms.	0/0. No contact between mother and newborn.	No (?) PCR+ at 36h: neonatal pharyngeal swab. PCR-: placenta, cord blood, breastmilk.
Wang X (China)	1 (0/1)	30 (emergency CS 6 days later)	Severe maternal pneumonia; pathological CTG.	0/0. Mother and baby well after delivery.	No. Neonatal PCR- from amniotic fluid, placenta, umbilical cord blood, gastric juice, throat swabs.
Wang Z (China)	30 (7/23)	Median: 38	8/30 were asymptomatic. No severe comorbidity or complication.	0/0. All mothers recovered.	No. PCR- for all 30 newborns (tissue unknown).
Wen (China)	1 (0/0; ongoing pregnancy)	30	No complications so far. COVID-19 healed after treatment with interferon.	The baby was not born at time of publication	NA
Wu C (China)	8 (2/6)	33-40	6 mothers PCR+; the other two were not tested with PCR but had typical chest CT findings. PROM (2 cases), preeclampsia, fetal distress.	0/0	NA
Wu X (China)	23 (2/18 (2 vaginal, 3 legal abortions)	3 ≤12 weeks (abortions), 20 ≥28 weeks	No. The diagnosis of COVID-19 was based on PCR+ (19 cases) or clinical criteria (4 cases)	0/0. 21 healthy babies (including 1 pair of twins)	No. 4 PCR-, 17 clinically healthy.
Wu Y (China)	13 pregnancies, 5 births (1/4). 1 IUFD.	From 35+5 to 38+4 (2 preterm).	No. All had mild COVID-19, all were treated with O2, none was in ICU.	0/0. 2 cases of neonatal pneumonia.	No. Maternal PCR+: breastmilk 1/3 (PCR- at reexamination), stool 1/9, vagina 0/13. Neonatal PCR+ swabs: 0/5 throat, 0/4 anal.
Xiaoyuan F, cited by Ma (China)	6 (NA)	Term	NA	0/0 (all newborns recovered fully)	No or yes? PCR+ for all 6; infections 30h–18d after birth.
Xiong X (China)	1 (1/0)	33+1. PCR+: maternal throat. SARS-CoV-2-specific IgG+ and	PN at 38+4	0/0. No	No. PCR-: maternal cervical secretion, rectal swab, breast milk and amniotic fluid; neonatal

		IgM+: maternal serum.			throat and rectal swab. SARS-CoV-2-specific IgG- and IgM-: maternal and neonatal sera. Pathology of the placenta: no inflammation or immunohistochemical sign of SARS-CoV-2
Xu Q (China)	28 (5/17) 23 newborns, 4 medical abortions, 2 continued pregnancies.	24/28 third trimester.	Pregnant and non-pregnant women with COVID-19 had similar clinical course.	0/0. 1 premature birth. No ICU patients.	No newborn was infected with SARS-CoV-2.
Yan J (China)	116 (14/85; 100 newborns incl. 1 pair of twins)	38 (IQR: 36-39)	Abnormal chest CT in 104/108 mothers; PCR+ in 65 mothers. 8 mothers in ICU due to severe pneumonia.	0/1. 1 early IUFD. No maternal death. 1 newborn died of neonatal asphyxia after being delivered by CS while the mother was in mechanical ventilation.	PCR-: amniotic fluid and cord blood (10 cases), neonatal throat swab (86 cases).
Yang H, Hu B, et al. (China)	27 (5/18) (23 mothers to 24 newborns; 4 still pregnant)	1 preterm (30 weeks)	Chest CT: typical viral pneumonia in 26/27 mothers.	0/0. 1 severe neonatal asphyxia.	No(?) Neonatal PCR-: 23 (1 not tested). The case of asphyxia was tested for SARS-CoV-2 immunoglobulins: IgM+, IgG+.
Yang H, Sun G, et al. (China)	13 (4/9)	NA	No complication	0/0; 2 premature newborns had respiratory distress syndrome	No. PCR-: an unknown number of newborns.
Yang P (China)	7 (0/7)	Symptom started 6d before – 2d after CS in week 36-38	Severe preeclampsia prompted emergency CS in 2 cases	0/0. 2 newborns were treated with nCPAP for mild grunting.	No. 5 newborns tested: PCR- for throat swab, amniotic fluid, cord blood.
Yao Li (China)	1 (0/1)	38		0/0	No. PCR-: Neonatal peripheral blood, nasal and anal swabs.
Yu N 2020-03-24 (China)	7 (0/7)	37-41; CS within 3 days of clinical presentation	Influenza, Legionella	0/0; no complications except SARS-CoV-2 (see right)	No? 3 infants tested; 1 had PCR+ and mild respiratory signs when 36 hours old; follow-up uneventful.

Yu N 2020-04-22 (China)	2 (0/0) current pregnancies	8+4, 8+5	Amniocenteses at 16-17 weeks for research	Current pregnancies	No. In amniotic fluid, PCR and SARS-CoV-2-specific IgM and IgG were all negative.
Yu Y (China)	1 (1/0)	34	PP ARDS treated with 14 (!) medicines. Mechanical ventilation for 11 days, with bedsores.	0/0.	Neonatal throat swab: PCR-.
Zamaniyan M (Iran)	1 (0/1)	32	The mother died 15 days after CS due to ARDS.	1/0. The newborn was healthy.	Yes, perhaps. Neonatal PCR-: initial throat swab, cord blood. PCR+: amniotic fluid, later throat swabs.
Zambrano (Honduras)	1 (1/0) Spontaneous vaginal delivery in week 32.	31	Prenatal US: dysplastic and multicystic right kidney.	0/0	No. PCR-: nasal and blood samples.
Zeng H (China)	6 (0/6)	3rd trimester	No	0/0, healthy	Yes or no? PCR-: throat swabs and blood in all newborns. SARS-CoV-2-specific IgM+: sera from 2 newborns. All sera had elevated IL-6.
Zeng L (China)	33 (7/26)	4 preterm babies	No	0/0; 2 term infants had lethargy, fever and pneumonia; one preterm (31w+2d) had asphyxia, fetal distress, pneumonia, RDS, and suspected sepsis. Follow-up was uneventful.	Yes or no? The 3 sick infants (see left) had PCR+ nasal and anal swabs at age 2d and 4d but not at age 6-7d. No data on virus in the other 30 infants.
Zeng Y (China)	16 (4/12)	34-41	PRC+ of respiratory specimens and ground-glass opacity on chest CT scan. No mechanical ventilation.	0/0	No. PCR- for all newborns; sort of specimen not mentioned.
Zhang L, Dong L et al. (China)	18 (1/17)	35-41; 3 preterm (age at delivery).	1 COVID-19 case was classified as severe, 0 as critical.	0/0	No. Throat swab PCR-: 18/18.

			Chest CT: 17/18 had pneumonia. Nasal swab PCR+: 8/18.		
Zhang L, Jiang Y, et al. (China), cited by Schwartz	16 (0/16)	35-41 (age at delivery)	Comorbidity: gestational diabetes, preterm delivery, PROM, preeclampsia, fetal distress, et cetera	0/0. Bacterial pneumonia (3 newborns), 1 preterm.	No (negative throat swabs in 10 babies)
Zhou (China)	1 (0/1)	37+4	CS due to suspected fetal distress	0/0	No. PCR-: peripheral blood and throat swab.
Zhu (China)	9 (2/7; 10 newborns). 3 mothers became sick in COVID-19 1-3 days PP.	31-39; 6 babies were preterm	Fetal distress (6 cases).	0/1 One child died of MODS at 9 days of age.	No. PCR- throat swabs in 9 newborns.
Sum	**913 pregnancies PN: CS: IUFD: 31 Legal abortions: 9. Unknown mode of delivery or current pregnancy at time of writing:**		**PCR+:**	**21 mothers dead, mostly in ARDS; 9 neonatal deaths.**	

Abbreviations: 10x, tests collected ten times; ARDS, acute respiratory distress syndrome; BMI, body mass index; CS, cesarean section; CTG, cardiotocography; CXR, chest X-ray; d, day(s); DIC, disseminated intravascular coagulopathy; ECMO, extracorporeal membrane oxygenation; EM, electron microscopy; h, hour(s); ICU, intensive care unit; IgG, immunoglobulin G; IgM, immunoglobulin M; IL, interleukin; IQR, interquartile range; IUFD, intra-uterine fetal death; MODS, multiple organ dysfunction syndrome; NA, data not available; nCPAP, nasal Continuous Positive Airway Pressure; PCR, polymerase chain reaction for detecting SARS-CoV-2; PCR-/PCR+, negative/positive result of PCR test; PN, *partus normalis* (normal, vaginal delivery); POX, pulse oximeter reading (% O2 saturation); PP, *post partum* (after delivery); PROM, premature rupture of membranes; RDS, respiratory distress syndrome; RR, relative risk; T2DM, type 2 diabetes mellitus; US, diagnostic ultrasound.

*In most cases, the pregnant woman delivered within one week after the beginning of COVID-19 symptoms.

Studies which have contributed with references to additional studies

Alzamora (2020): *2 additional studies.*

Bastug (2020): *2 additional studies.*

Carosso (2020): *1 additional study.*

Ellington (2020): *1 additional study.*

Kirtsman (2020): *1 additional study.*

Lokken (2020): *4 additional studies.*

Pierce-Williams RAM (2020) *1 additional study.*

Sentilhes L (2020) *1 additional study.*

Systematic reviews which have been searched for missed primary studies

Included are systematic reviews that stopped review literature after May 1, 2020, and a randomized sample of earlier reviews.

Berbari (2020) *No relevant reference.* Also called Matar R et al. (2020).

Dana (2020) *No relevant reference.*

Dashraath (2020)

Della Gatta AN, Rizzo R, Pilu G, Simonazzi G, COVID19 during pregnancy: a systematic review of reported cases., American Journal of Obstetrics and Gynecology (2020). *No relevant reference.*

Di Mascio (2020) *No relevant reference.*

Elshafeey F (2020) *9 relevant references.*

Fernández-Carrasco FJ (2020) *1 relevant reference.*

Fretheim A. Barns rolle i spredning av SARS-CoV-2 (Covid-19) – en hurtigoversikt. Hurtigoversikt, 2020. Oslo: Folkehelseinstituttet, 2020. *1 relevant reference.*

Huntley

Irani (2020) *No relevant reference.*

Kasraeian (2020)

Lackey (2020) *No relevant reference.*

Lopes de Sousa (2020) *5 relevant references.*

Martins-Filho (2020): *1 relevant reference.*

Mei (2020) *No relevant reference.*

Monteleone (2020) *No relevant reference; the table states that Wen et al. (2020) describe a delivery which is not true.*

Muhidin *1 relevant reference.*

Mullins

Panahi (2020)

Parazzini (2020) *No relevant reference.*

Rajewska (2020) *No relevant reference.*

RCOG 2020:8

Schwartz DA (2020): *1 relevant reference.*

Segars (2020): *no relevant reference.*

Simões E Silva (2020) *No relevant reference.*

Smith V (2020) *No relevant reference.*

Stumpfe FM et al. (2020): *No relevant reference.*

Tegnell A (2020) Underlag om gravida med covid-19. Folkhälsomyndigheten 2020-04-27. *3 relevant references.*

Thomas P et al. (2020): *1 relevant reference.*

Thornton

Trippella (2020) Trippella

Trocado V (2020) *No relevant reference. [no copy in my files but I read the paper]*

Walker

Zaigham and Andersson

Reviews and studies which may contain duplicates

The following reviews and studies were deleted from our review.

Blitz et al. (2020) includes patients who have been described earlier by Richardson et al., Vallejo et al., Blitz et al., London et al., McLaren et al. and Gulersen et al. These references except London (2020) are not included in Table 1 (see Blitz et al. 2020 for more information).

The 7 pregnancies described by **Breslin** (2020a) are probably a part of the cohort described by Breslin (2020b).

The 3 cases in **Suliman, Peng** (2020) et al. may have been included in the 17 cases in Suliman, June et al. which was published later than Suliman, Peng et al. Therefore, Suliman, Peng et al. was deleted. Var finns Suliman, June?

Chen L et al. is a review from Wuhan, China, which probably includes pregnancies reported in other studies from Wuhan.

The case of **Karami** (death of a mother and child) was withdrawn on request of the authors. It may be one of the two mortal cases of **Karimi-Zarchi** since all three cases were from Zanjan, Iran.

It is unclear how **Lu Q** (2020) relates to other studies. There are many uncertainties in the study.

Ramos Amorim (2020): see Table 2.

The case of **Wang S** et al. (2020) is included in Xiaoyuan F (2020).

Table 2.

Reference (country)	**Number of deliveries /CS**	**Gestational age at illness onset (weeks or weeks+ days)***	**Complications during pregnancy (in addition to maternal COVID-19)**	**Deaths in mother or child; complications after delivery**	**Signs of vertical transmission of virus to newborns**
Breslin (2020a; USA)	7	26-37	BMI 23-47	Unknown	No. PCR- for 2 newborns (tissue tested unknown)
Chen L	68/63 (118 pregnancies; 5 PN, 41 ongoing pregnancies, 70 live births including 2 pairs of twins)	14 of 68 were preterm (8 iatrogenic)	Abortions: spontaneous 3, induced 4; ectopic pregnancies 2	0/0; no case of neonatal asphyxia; non-invasive mechanical ventilation of 1 mother PP	No. PCR- in 8 neonatal throat swabs and the breast milk of 3 mothers.
Karami (Iran)	1 (0/0)	30+0	During mechanical ventilation, there was a spontaneous vaginal birth with Apgar 0-0. The mother later died, probably of MODS and ARDS.	1/1	NA
Lu Q (China)	3 (NA)	NA	NA	0/0	No? The newborns had signs of infections 17 days, 5 days and 30h after birth.
Ramos Amorim (Brazil)	9 maternal deaths (?/3)	3 cases: 32, 32, 35.	8 deaths PP, 1 death NA.	Maternal deaths: Iran 2, Brazil 5, Mexico 2. These deaths may have	NA

				been described in other studies: Hantoushzadeh (Iran, 7 deaths), Karimi-Zarchi (Iran, 2 deaths), Tanno (Brazil, 1 death), Zamaniyan (Iran, 1 death)	
Wang S (China)	1(0/1)	40	The mother wore an N95 mask throughout the CS; the baby had no contact with the mother after birth.	0/0.	Yes or no? 36h after birth: PCR+ from neonatal throat swab; PCR- from cord blood, placenta, breast milk.

Table 2. Case– fatality ratio (%) for reported COVID–19 cases, by age group, in 5 countries in the year 2020. Data were collected up to the following dates: China 11 February, Italy 9 April, Japan 12 April, South Korea 11 April, Sweden 13 April and the USA 16 March. Sweden doesn't publish any mortality data for people <20 years (Summer 2020).

Age (years)	**0-9**	**10-19**	**20-29**	**30-39**	**40-49**	**50-59**	**60-69**	**70-79**	**≥80**	**Total**
China*	0	1	7	18	38	130	309	312	208	1023**
	0	0,2	0,2	0,2	0,4	1,3	3,6	8,0	14,8	2,3
Italy	1	0	7	36	153	638	1957	5366	8495	16654
	0,1	0	0,1	0,4	0,9	2,4	9,0	23,4	29,8	12,2
Japan	0	0	0	0	2	6	9	37	47	101
South Korea	0	0	0	1	3	14	29	63	101	211
	0	0	0	0,1	0,2	0,7	2,2	9,1	21,3	2,0
Sweden	0	0	3	2	4	35	66	236	573	919
Age (years)	**0-19**		**20-44**		**45-54**	**55-64**	**65-74**	**75-84**	**≥85**	**Total**
USA	3***									
			0,1		0,5	1,4	2,7	4,3	10,4	1,8

Source: CCDC; ISS; Ogiwara; KCDC; FHM; CDC-MMWR. *For each country, total numbers of deaths are shown on the first line and CFR (case fatality rates) on the second line. **The number of COVID deaths in China was 2611 on March 27, 2020 (National Health Commission of the People's Republic of China). ***CDC declared on April 6 that 3 children (<18 years old) were reported dead by COVID-19.

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