Maternal and neonatal outcomes of 913 pregnancies with COVID-19: A fast, systematic review

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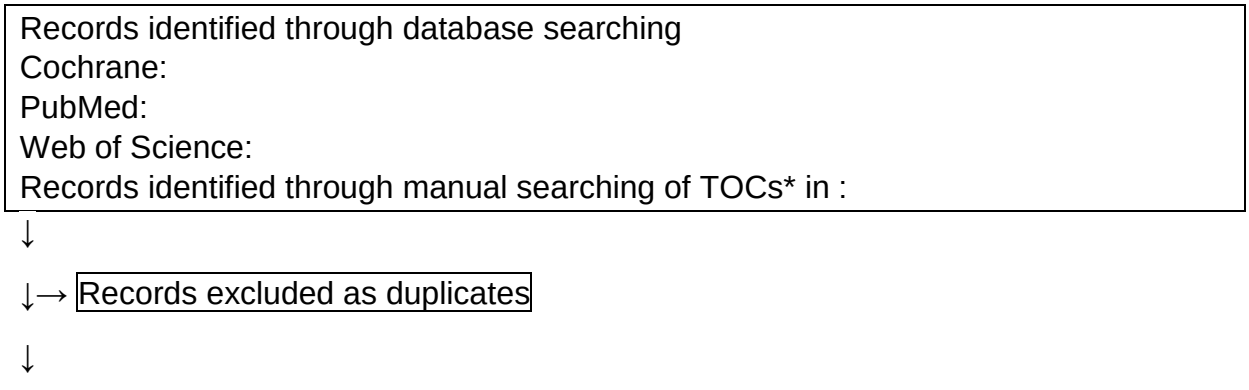
This communication consists of two tables from systematic reviews. They are from peer reviewed guidelines in Swedish about COVID-19 (infection with the corona virus SARS-CoV-2), published by www.internetmedicin.se. Their guidelines are not official but highly regarded and much used. My guidelines are compatible with official Swedish guidelines, if they exist. Unfortunately, my English is not revised by a translator.

Method

Literature was searched up to June 6, 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 mothers and/or newborn babies who 0-28 days old 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 (x-y) were also searched. Studies in all West European languages were read but not in e.g. Chinese.

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.



Full-text studies assessed for eligibility:

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Studies included in data synthesis

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Studies included in final data synthesis:

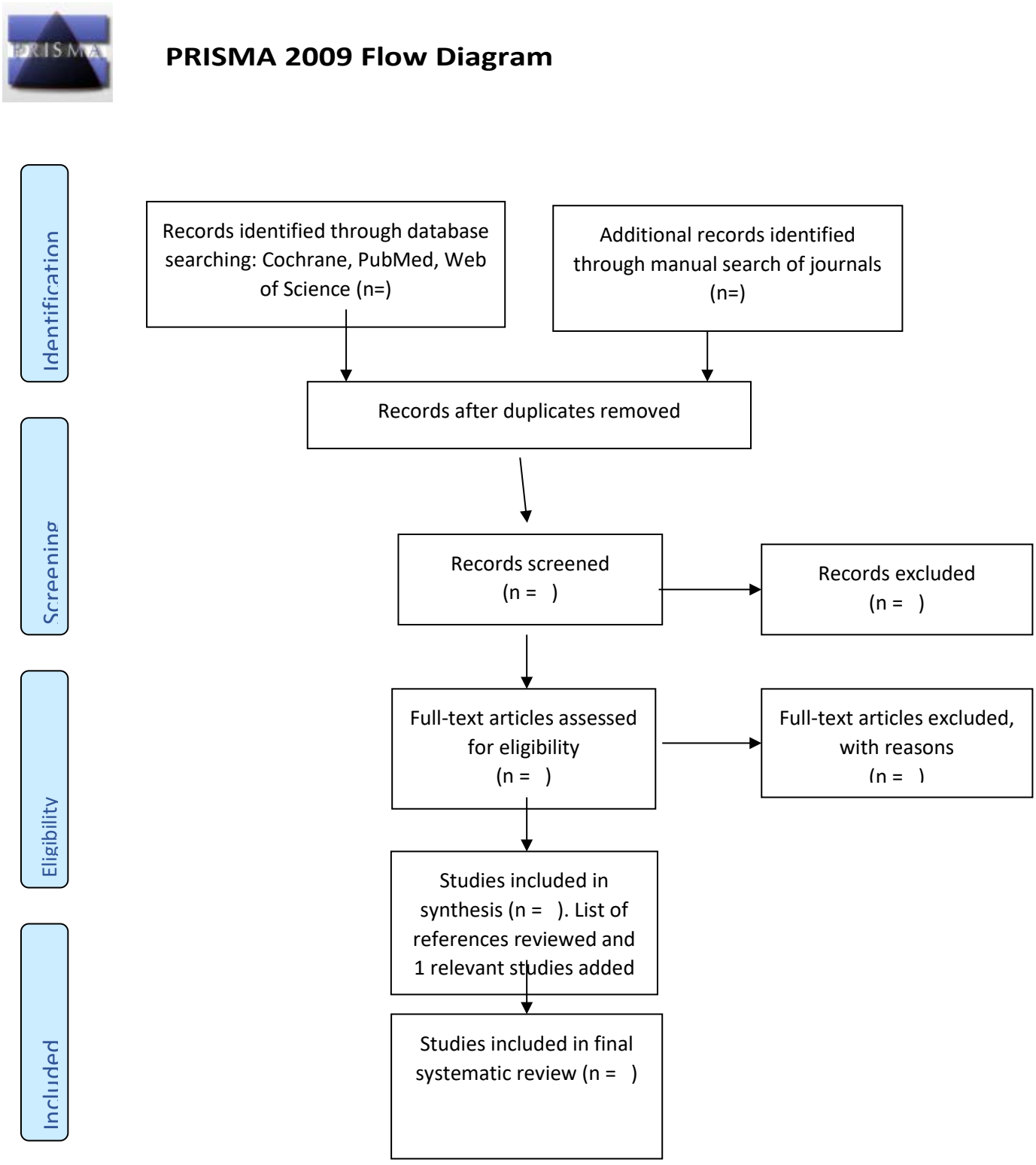

Figure 1. Flow chart of the systematic search process.

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

In 3 cases, symptoms of maternal COVID-19 didn't appear until the first days after delivery.

Countries: 17 countries on 6 continents.

Number of pregnancies: 913

Vaginal deliveries: 176. Caesarean sections: 439. Intrauterine fetal deaths: 13. Legal abortions: 3. Unknown mode of delivery or current pregnancy at time of writing: 282.

Maternal deaths: 12 mothers have been reported dead after COVID-12 in pregnancy, 9 from Iran and 1 each from Brazil, Sweden and the UK. In the Swedish case and several of the Iranian 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 most published cases are from Iran suggests that there is an underreporting in other countries.

Intrauterine fetal deaths: 13 fetal deaths. In one case, the placenta was positive for SARS-CoV-2 (Baud 2020).

Neonatal deaths: 5 newborns have been reported dead after pregnancy with COVID-19. They were from China (2 newborns), Iran (2) and Sweden (1).

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 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, only in media, and the only thing we know is that the mother was overweight and died also. Since that is the only maternal death related to COVID-19 in Sweden, publication of details is probably incompatible with confidentiality.

Vertical transmission: 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 one exception.

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).

One PCR-positive mother's **breastmilk** was PCR+ for 4 days. The newborn had PCR+ and breathing problems. Both mother and newborn were soon healthy. (Groβ 2020) In our paper, this is the case with strongest suspicion of vertical transmission.

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). 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 and Dong and their coworkers may therefore be artefacts. (Kimberlin 2020)

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 (PN/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
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.
Baud (Switzerland)	1 (0/0) (IUFD)	19	Obesity. Vaginal birth of a dead fetus 2 days after fever, infection symptoms, nasal swab PCR+.	0/1. IUFD	Yes? PCR+ tests from placenta and mother's nasal swab; PCR- from amniotic fluid, vagina, newborn's skin, blood, meconium, internal organs.
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
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, bnewborns' 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 5' minute 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.
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
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.
Ferrazzi (Italy)	42 (24/18)	2 premature deliveries.	Pneumonia	0?/0?	NA
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 complication for mother or child	NA
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 had

					breathing difficulties but was discharged after 2 weeks.
Hantoushzadeh (Iran)	9 (1/6; two fetal deaths not delivered)	24-38	Critically ill in confirmed (PCR+) 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)	7/8. 7 mothers died of ARDS and other 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.	No. PCR-: 5 neonatal nasal swabs including 2 swabs from twins. 1 newborn died later; 1 had pneumonia and nasal swab PCR+ at age 7d.
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.
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".
Khan (China)	17 (0/17)	35-41	3 preterm deliveries	0/0; pneumonia in 5 newborns	No (?) All 17 throat swabs were – at delivery but 2 swabs

					were + within 24 hours. Conflicting data on cord blood analyses.
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 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 (USA)	46 (5/3)	Median age 38.4 weeks (IQR 37.5-39.8). 1 CS at 33 w due to BMI>40 and worsening respiratory status.	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.
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.
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 unknown but 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.
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).
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.
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.
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."
Song L (China)	1 (0/1)	36	No	0/0	No. PCR-: throat swabs at age 3 and 7 days.
Tanno (Brazil)	1 (0/1)	32	Mother died at ICU after emergency CS	1/0	NA
Tegnell (Sweden)	1 (NA)	NA	An overweight mother with COVID-19 and her fetus died in a hospital ward	1/1	NA
Topping (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
Wang J (China)	1 (NA)	NA	NA	0/0 "A neonate with SARS-CoV-2 infection, who had vomiting and milk refusal as the first symptom"	NA
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.
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.

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 (China)	1 (1/0)	33+1. PCR+: maternal throat. SARS-CoV-2-specific IgG+ and IgM+: maternal serum.	PN at 38+4	0/0. No	No. PCR-: maternal cervical secretion, rectal swab, breast milk and amniotic fluid; neonatal 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
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 spontaneous abortion. 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 (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 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 SARS-CoV-2 RNA and mild respiratory signs when 36 hours old; follow-up uneventful.

Yu 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.
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 (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), preterm (1 newborn)	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 babies). 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: 176**		**PCR+: vaginal secretion from 1 mother.**	**12 mothers dead, mostly in ARDS; 4 neonatal deaths.**	**20 PCR+ 24h-18d PP 1 PCR+ placenta after IUFD.**

	CS: 439 IUFD: 13 Legal abortions: 3. Unknown mode of delivery or current pregnancy at time of writing: 282				**1 mother's breastmilk was PCR+ for 4d; the newborn had PCR+ and breathing problems. 3 neonatal IgM+.**

Abbreviations: 10x, tests collected ten times; ARDS, acute respiratory distress syndrome; BMI, body mass index; CS, cesarean section; CXR, chest X-ray; d, day(s); ECMO, extracorporeal membrane oxygenation; 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); PP*, post partum* (after delivery); PROM, premature rupture of membranes; RDS, respiratory distress syndrome; 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.*

Lokken (2020): *4 additional studies.*

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

Reviews which have been searched for missed primary studies

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.*

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

Kasraeian (2020)

Martins-Filho (2020): *1 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.*

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

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

Zaigham and Andersson

Reviews and studies which may contain duplicates

The following reviews and studies were deleted from our review.

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.

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

The case of Karimi (death of a mother and child) may be one of the two mortal cases of Karimi-Zarchi since all three cases are from Zanjan, Iran.

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

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
Chen L	68/63 (118 pregnancies;	14 of 68 were	Abortions: spontaneous 3,	0/0; no case of neonatal	No. PCR- in 8 neonatal throat

	5 PN, 41 ongoing pregnancies, 70 live births including 2 pairs of twins)	preterm (8 iatrogenic)	induced 4; ectopic pregnancies 2	asphyxia; non-invasive mechanical ventilation of 1 mother PP	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.
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.

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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.

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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