

## THE OUTCOME OF PREGNANT AND NON-PREGNANT LADIES HOSPITALIZED TO ICU DUE TO COVID 19 INFECTION IN MOSUL CITY

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### ABSTRACT

**Purpose:** The study aimed to find out whether pregnant women were more likely than non-pregnant women to be hospitalized and had the worse outcome due to COVID-19 and intensive care unit (ICU) admission.

**Methods:** The study is of cross-sectional design. One hundred and nine pregnant and non-pregnant in child bearing age (16- 49 years) participated in the study. Information about their stay, gestational age, if pregnant, and the presence of medical diseases such as hypertension, diabetes mellitus, asthma, or other disease were recorded. There was a follow-up regarding the duration of hospital stay, their prognosis, and the mortality rate was taken.

**Results:** Diseases such as hypertension and the increase in maternal age were prevalent among the women admitted to ICU. This group of participants has the worst outcome. In our study, pregnant ladies needing respiratory support with CPAP had bad prognosis since 18 of the 19 pregnant ladies died.

**Conclusion:** Women of reproductive age with SARS-CoV-2 were shown to be at increased risk of pneumonia and even death. Even with ICU hospitalization, 18 of 19 pregnant ladies who participated in this study and who needed CPAP as respiratory support died. The 17 ladies with hypertension included in our study had the worse outcome regarding hospital stay duration and bad prognosis or even death.

### INTRODUCTION

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the cause of the coronavirus disease 2019 (Bai et al., 2020). The impact of COVID-19 on specific populations, such as pregnant mothers and their babies is unknown (Yu et al., 2020). There is a lack of evidence on the disease's consequences on pregnant women, and most current research focuses on the disease's impact on the broader population. Pregnant women are more susceptible to viral respiratory infections and severe pneumonia due to immunological and cardiovascular abnormalities (Huang et al., 2020). Pregnant women with covid-19 who are checked in hospitals had fewer symptoms and appear to require more intensive care than non-pregnant women of the same age (Allotey et al., 2020). They found that pregnant women with covid-19 had less fever and muscle discomfort (myalgia) than non-pregnant women of reproductive age, but required more acute care and ventilation (Allotey et al., 2020; Zaigham & Andersson,

2020). Maternal age, obesity, chronic hypertension, and diabetes were all connected to severe covid-19 (Rasmussen et al., 2020). Due to the physiological and immunological changes that occur during pregnancy, pregnant patients with lower respiratory tract infections have generally had worse outcomes, including higher rates of hospitalization and critical care unit admission (World Health Organization, 2020).

The SARS-CoV-2 infection, which is causing the current pandemic in 2020, has a clinical appearance; The severity of this illness varies according to age, sex, co-morbidities, and viral load (Shi et al., 2020). The clinical picture of pregnant women is less known. The clinical picture of SARS-CoV-2 infection in pregnant women is identical to non-pregnant women, according to some research, while others show inconsistent outcomes. Pregnant women's immune systems and reactions to viral infections vary. Pregnancies with SARS-CoV-2 are also unknown (Kasraeian et al., 2022). The immunologic and metabolic changes that occur during pregnancy can increase the risk of serious disease from respiratory infections. Pregnant women make up about 4% of the US population, according to the CDC. Despite the dearth of evidence for Covid-19 in pregnant women, understanding how infection affects the immune system may help guide prenatal therapy (Sappenfield et al., 2013). Understanding pregnancy outcomes in Covid-19-positive women is critical to avoiding widespread harmful consequences. The effects of a novel disease during pregnancy are often unknown until many newborns are affected (Schwartz, 2020).

## METHODOLOGY

Between November 1, 2020, and July 1, 2021, we analyzed data from the Alshifaa hospital in Mosul. SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) testing was done on acutely sick women who had typical respiratory signs and symptoms. The microbiological diagnosis was made based on a positive SARS-CoV-2 real-time reverse transcription-polymerase chain reaction (RT-PCR) result, or radiological diagnosis was made based on particular indicators found on CT scan. We only included pregnant or not-yet-pregnant women in the reproductive age ranges of 16 to 49 years old who were admitted to the intensive care unit. We eliminated those women whose diagnosis of coronavirus 2 infection was not confirmed or whose data was incomplete. A critical care attending physician made the choice to admit the patient to the ICU. Other clinical factors or symptoms, such as medical comorbidities, were not assessed or considered, albeit this was not the case for all women. The study was a cross-sectional study, and we prospectively followed over 100 pregnant and non-pregnant women throughout the duration of their ICU admission and their outcome, whether they fully recovered or died. The severity of the condition was taken into account, such as the necessity for continuous oxygen or continuous positive airway pressure (CPAP). Ladies were also asked if they had any other medical conditions, such as diabetes, hypertension, or other medical conditions, and their parity was factored into the questionnaire data.

## RESULTS AND DISCUSSION

As shown in table 1., the different groups of age diagnosed with Covid 19 infection and admitted to ICU of the age group from 40- 49 were the larger group of ladies. Table 2 shows the duration of admission to ICU. The majority were admitted for less the 7 days. Table 3 shows the outcome of these ladies admitted to ICU, and the majority improved and ere discharged. However, all ladies were put on CPAP including pregnant and non-pregnant ladies. Table 4 presents the different methods used to diagnose the infection where the majority were done by PCR test. Table 5 shows the medical diseases of ladies admitted to ICU where the majority were suffering from hypertension and asthma. They had the worse

outcome. Table 6 presents the data regarding the need for CPAP or only oxygen demand for respiratory support. Figure 1 shows the diseases, particularly hypertension and age, that are the most important risk factors for severe symptoms, poor outcomes, death, prolonged hospital stays, and the need for CPAP for severe respiratory failure, according to the data and outcomes of non-pregnant women admitted to ICU.

Table 1. Admission to the ICU by Age

Age	No.	%	Chi <sup>2</sup>
16-29	22	20.18	9.61*
30-39	39	35.78	
40-49	48	44.04	
Total	109	100	

\* refers to a highly significant difference between groups at 0.01

Table 2. Duration of Admission to ICU

ICU stays/days	No.	%	Chi <sup>2</sup>
<7days	63	59.43	3.77*
>7days	43	40.57	
Total	106	100	

\* refers to a significant difference between groups at 0.05.

Table 3. Outcome of Women who Admitted to ICU

out come	No.	%	Chi <sup>2</sup>
Improved	88	83.02	46.23*
Died	18	16.98	
Total	106	100	

\* refers to a highly significant difference between groups at 0.01

Table 4. Methods Used to Diagnose the Infection

Dx	No.	%	Chi <sup>2</sup>
PCR	52	34.91	53.22*
CT scan	37	6.6	
CXR	7	49.06	
rapid test	10	9.43	
Total	106	100	

\* refers to a highly significant difference between groups at 0.01

Table 5. Medical Diseases in Patients Admitted to ICU

Medical diseases	No.	%	Chi <sup>2</sup>
HT+	17	17.07	8.46*
DM	7	41.46	
asthma	12	29.27	
others	5	12.2	
Total	106	100	

\* refers to a significant difference between groups at 0.05.

Table 6. Management Options Used to ICU Admitted Ladies

Management	No.	%	Chi <sup>2</sup>
CPAP	20	18.87	41.09*

O2	86	81.13	
Total	106	100	

\* refers to a highly significant difference between groups at 0.01

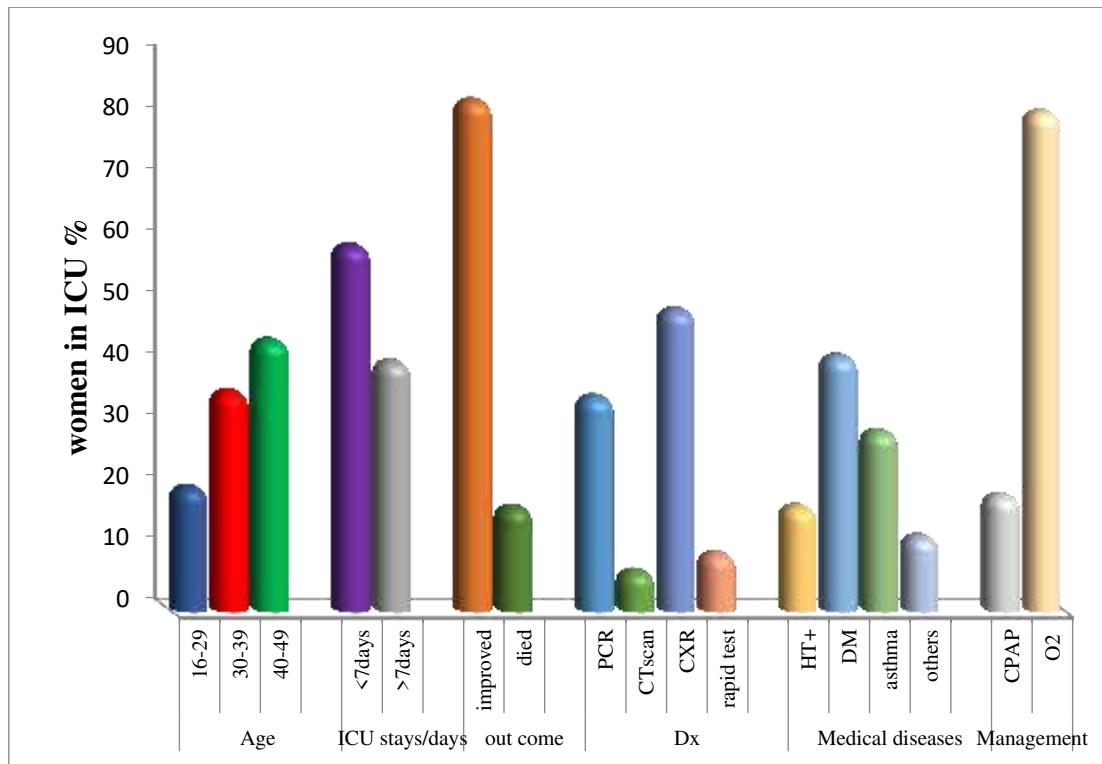


Figure 1. Pregnant And Non-Pregnant Women's Admission to the Intensive Care Unit (ICU), Length of Stay, And Outcome.

Table (2) assessed data from only pregnant women admitted to ICU at various gestational ages, and found that longer stays in the hospital and severe respiratory symptoms were substantially associated with poor outcomes and even maternal mortality. Especially for those pregnant women who require CPAP for respiratory assistance, the results demonstrate that all six women who required CPAP died, indicating a strong link between CPAP and mortality. However, the study needs to include a larger sample size.

Table 2: The outcome of Pregnant Women in ICU.

ICU stays/days	No.	%	Chi <sup>2</sup>
<7days	17	89.47	11.84**
>7days	2	10.53	
Total	19	100	
Out come			
improved	15	78.95	6.38**
died	4	21.05	
Total	19	100	
Dx			
PCR	14	73.68	27.53**
CT scan	5	26.32	
CXR	0.00	0.00	
rapid test	0.00	0.00	

Total	19	100	
Management			
CPAP	4	21.05	6.39*
O2	15	78.95	
Total	19		

\* refer to a significant difference between groups at 0.05.

\*\* refer to a highly significant difference between groups at 0.01.

Several studies and large observational cohorts show that pregnant women with SARS-CoV-2 had a higher risk of severe respiratory symptoms, mechanical ventilation, and ICU admission than non-pregnant women (Tekbali et al., 2020). Among all women hospitalized with COVID-19, pregnant women had no higher risk of ICU admission than non-pregnant women. This result is in line with the lower ICU admission rate of pregnant women with COVID-19 (Tekbali et al., 2020). Pregnant women are known to be more susceptible to respiratory diseases, such as influenza (Sappenfield et al., 2013). Intensive care unit (ICU) admission signifies a more serious disease course. Thus, pregnant women with COVID-19 may not fare worse than non-pregnant women (Blitz et al., 2020). “Intensive care unit admissions of pregnant and non-pregnant women with coronavirus illness 2019,” by Blitz et al. (2020). The American Journal of Obstetrics and Gynecology recently released an article on this topic. The findings showed that pregnant women infected with SARS-CoV-2 may not develop severe illness (Blitz et al., 2020). Swedish Public Health Agency report, a comprehensive review of all pregnant or postpartum women as well as non-pregnant women treated in Swedish ICUs with SARS-CoV-2 infection. Pregnant women with COVID-19 in Sweden had a greater risk of ICU admission than non-pregnant women of the same age. Intensive care was required for 14.4 per 100,000 people in Sweden during the research period, compared to 2.5 per 100,000 for non-pregnant women in the same age group with SARS-CoV-2 laboratory-confirmed, 7.4 per 100,000 pregnant women required invasive mechanical ventilation in the ICU versus 1.8 per 100,000 non-pregnant women (Collin et al., 2021).

Differences in demographics, risk factor prevalence, or even ICU admission thresholds could explain the disparities in outcomes. Both studies used hospital cohorts, but the Swedish study included all pregnant and non-pregnant women aged 20 to 45. Many COVID-19 experiments lack a common denominator, leading to inconsistent and sometimes misleading results (Westgren & Acharya, 2020). Less immunity during pregnancy may alter the clinical course of COVID-19 infection in pregnant people. Because SARS-CoV-2 is a novel virus, body immunity may impact viral load entering the lungs and the time it takes to do so (Matricardi et al., 2020). SARS-CoV-1 is a human virus that is genetically related to SARS-CoV-2. During the 2003 SARS-CoV-1 epidemic, pregnant women died at a high rate (Lam et al., 2004; Wong et al., 2004) at the same age group, pregnant women had a greater rate than non-pregnant women (Lam et al., 2004). Owing to the small sample size of COVID-19 research, the reported rates of severe symptoms and death vary widely. 7/304 (2.3%) maternal mortality in a high-quality systematic study (Juan et al., 2020), with all 7 deaths recorded in a single case series (Hantoushzadeh et al., 2020). The review found 5.1 % ICU admission, 4.7 % severe pneumonia, and 1.% mechanical ventilation (Wong et al., 2004). Pregnant women with pre-existing comorbidities, such as a high maternal age and BMI, are more likely to develop severe COVID-19, according to new research, and pregnancy is associated to ICU therapy (Allotey et al., 2020). Because of physiological changes in the lungs that result in potentially higher interstitial fluid and less interstitial space due to smaller lung volume, pregnant women are more susceptible to pneumonia than non-pregnant women. Pregnancy-related pneumonia is mild in roughly 80% of COVID-19-positive pregnant women

(Kasraeian et al., 2022), and maternal death is rare (Wong et al., 2004; Smith et al., 2020; Ellington et al., 2020; Mullins et al., 2020; Cheng et al., 2020). According to a study published by R. J. Martinez-Portilla in Mexico on December 15, 2020, COVID-19-positive pregnant mothers had a higher risk of pneumonia and death. Varicella and SARS-CoV-1 predisposing factors emerge during pregnancy. Pregnant women's ICU admission rates tended to be unrelated to age, but non-pregnant women's rates tended to rise with age, from 0% to 33% in the 40–49 age group (Blitz et al., 2020). A recent study of symptomatic pregnant women found that pregnancy increases the chance of death, ICU admission, and invasive (Ellington et al., 2020).

According to a study conducted in France and Belgium, pregnant women who were 20 weeks or later had a more severe condition than non-pregnant women (Badr et al., 2020).

Concurrently with the superior clinical course (Liu et al., 2020) of COVID-19, pregnancy is not connected with increased mortality or illness severity in COVID-19 women (Allotey et al., 2020; Wong et al., 2004; Smith et al., 2020; Ellington et al., 2020; Mullins et al., 2020).

## CONCLUSION

The present COVID-19 pandemic has many unanswered problems, including vertical transmission, placental damage and receptors, severe disease diagnostic tests, maternal mortality risk factors, neonatal–maternal long-term impacts, and immunization in pregnancy. Several changes to clinical practice and standards are regularly updated to achieve the greatest outcome for healthcare personnel and patients. Women of reproductive age with SARS-CoV-2 were shown to be at increased risk of pneumonia and even death. Even with ICU hospitalization, 18 of 19 pregnant ladies who participated in this study and who needed CPAP as respiratory support died. The 17 ladies with hypertension included in our study had the worse outcome regarding hospital stay duration and bad prognosis or even death. We recommend more study and data collecting to better treat and predict Covid 19 infection in women. Aside from that, WHO issued interim recommendations on using the mRNA-1273 vaccine (Moderna) against COVID-19b2 (SAGE).

## REFERENCES

- Allotey, J., Stallings, E., Bonet, M., Yap, M., Chatterjee, S., Kew, T., ... & Thangaratinam, S. (2020). Clinical manifestations, risk factors, and maternal and perinatal outcomes of coronavirus disease 2019 in pregnancy: living systematic review and meta-analysis. *BMJ*, 370. <https://doi.org/10.1136/bmj.m3320>
- Badr, D. A., Mattern, J., Carlin, A., Cordier, A. G., Maillart, E., El Hachem, L., El Kenz, H., Andronikof, M., De Bels, D., Damoiseil, C., Preseau, T., Vignes, D., Cannie, M. M., Vauloup-Fellous, C., Fils, J. F., Benachi, A., Jani, J. C., & Vivanti, A. J. (2020). Are clinical outcomes worse for pregnant women at  $\geq 20$  weeks' gestation infected with coronavirus disease 2019? A multicenter case-control study with propensity score matching. *American journal of obstetrics and gynecology*, 223(5), 764–768. <https://doi.org/10.1016/j.ajog.2020.07.045>
- Bai, Y., Yao, L., Wei, T., Tian, F., Jin, D. Y., Chen, L., & Wang, M. (2020). Presumed asymptomatic carrier transmission of COVID-19. *Jama*, 323(14), 1406–1407. <https://doi.org/10.1001/jama.2020.2565>.
- Blitz, M. J., Grünebaum, A., Tekbali, A., Bornstein, E., Rochelson, B., Nimaroff, M., & Chervenak, F. A. (2020). Intensive care unit admissions for pregnant and



nonpregnant women with coronavirus disease 2019. *American Journal of Obstetrics & Gynecology*, 223(2), 290-291. <https://doi.org/10.1016/j.ajog.2020.05.004>

- Cheng, S. O., Khan, S., & Alsafi, Z. (2020). Maternal death in pregnancy due to COVID-19. *Ultrasound in Obstetrics & Gynecology*, 56(1), 122. <https://doi.org/10.1002%2Fuog.22111>
- Collin, J., Byström, E., Carnahan, A. S., & Ahrne, M. (2021). Public Health Agency of Sweden's Brief Report: Pregnant and Postpartum Women with Severe Acute Respiratory Syndrome Coronavirus 2 Infection in Intensive Care in Sweden. *Obstetric Anesthesia Digest*, 41(2), 60. <https://doi.org/10.1111/aogs.13901>
- Ellington, S., Strid, P., Tong, V. T., Woodworth, K., Galang, R. R., Zambrano, L. D., ... & Gilboa, S. M. (2020). Characteristics of women of reproductive age with laboratory-confirmed SARS-CoV-2 infection by pregnancy status—United States, January 22–June 7, 2020. *Morbidity and Mortality Weekly Report*, 69(25), 769. <http://dx.doi.org/10.15585/mmwr.mm6925a1>
- Hantoushzadeh, S., Shamshirsaz, A. A., Aleyasin, A., Seferovic, M. D., Aski, S. K., Arian, S. E., ... & Aagaard, K. (2020). Maternal death due to COVID-19. *American journal of obstetrics and gynecology*, 223(1), 109-e1. <https://doi.org/10.1016%2Fj.ajog.2020.04.030>
- Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y., ... & Cao, B. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The lancet*, 395(10223), 497-506. [https://doi.org/10.1016/S0140-6736\(20\)30183-5](https://doi.org/10.1016/S0140-6736(20)30183-5).
- 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. *Ultrasound in Obstetrics & Gynecology*, 56(1), 15-27. <https://doi.org/10.1002/uog.22088>
- Kasraeian, M., Zare, M., Vafaei, H., Asadi, N., Faraji, A., Bazrafshan, K., & Roozmeh, S. (2022). COVID-19 pneumonia and pregnancy; a systematic review and meta-analysis. *The Journal of Maternal-Fetal & Neonatal Medicine*, 35(9), 1652-1659. <https://doi.org/10.1080/14767058.2020.1763952>
- Lam, C. M., Wong, S. F., Leung, T. N., Chow, K. M., Yu, W. C., Wong, T. Y., ... & Ho, L. C. (2004). A case-controlled study comparing clinical course and outcomes of pregnant and non-pregnant women with severe acute respiratory syndrome. *BJOG: An International Journal of Obstetrics & Gynaecology*, 111(8), 771-774. <https://doi.org/10.1111/j.1471-0528.2004.00199.x>
- Liu, H., Wang, L. L., Zhao, S. J., Kwak-Kim, J., Mor, G., & Liao, A. H. (2020). Why are pregnant women susceptible to COVID-19? An immunological viewpoint. *Journal of reproductive immunology*, 139, 103122. <https://doi.org/10.1016/j.jri.2020.103122>
- Matricardi, P. M., Dal Negro, R. W., & Nisini, R. (2020). The first, holistic immunological model of COVID-19: implications for prevention, diagnosis, and public health measures. *Pediatric Allergy and Immunology*, 31(5), 454-470. <https://doi.org/10.1111/pai.13271>

- Mullins, E., Evans, D., Viner, R. M., O'Brien, P., & Morris, E. (2020). Coronavirus in pregnancy and delivery: rapid review. *Ultrasound in Obstetrics & Gynecology*, 55(5), 586-592. <https://doi.org/10.1002/uog.22014>
- Rasmussen, S. A., Smulian, J. C., Lednicky, J. A., Wen, T. S., & Jamieson, D. J. (2020). Coronavirus disease 2019 (COVID-19) and pregnancy: what obstetricians need to know. *American journal of obstetrics and gynecology*, 222(5), 415-426. <https://doi.org/10.1016/j.ajog.2020.02.017>
- Sappenfield, E., Jamieson, D. J., & Kourtis, A. P. (2013). Pregnancy and susceptibility to infectious diseases. *Infectious diseases in obstetrics and gynecology*, 2013. <https://doi.org/10.1155/2013/752852>
- Schwartz, D. A. (2020). The effects of pregnancy on women with COVID-19: maternal and infant outcomes. *Clinical Infectious Diseases*, 71(16), 2042-2044. <https://doi.org/10.1093/cid/ciaa559>
- Shi, L., Wang, Y., Yang, H., Duan, G., & Wang, Y. (2020). Laboratory abnormalities in pregnant women with novel coronavirus disease 2019. *American journal of perinatology*, 37(10), 1070-1073. <https://doi.org/10.1055/s-0040-1712181>
- Smith, V., Seo, D., Warty, R., Payne, O., Salih, M., Chin, K. L., ... & Wallace, E. (2020). Maternal and neonatal outcomes associated with COVID-19 infection: A systematic review. *Plos one*, 15(6), e0234187. <https://doi.org/10.1371/journal.pone.0234187>
- Tekbali, A., Grünebaum, A., Saraya, A., McCullough, L., Bornstein, E., & Chervenak, F. A. (2020). Pregnant vs nonpregnant severe acute respiratory syndrome coronavirus 2 and coronavirus disease 2019 hospital admissions: the first 4 weeks in New York. *American journal of obstetrics and gynecology*, 223(1), 126-127. <https://doi.org/10.1016/j.ajog.2020.04.012>
- Westgren, M., & Acharya, G. (2020). Intensive care unit admissions for pregnant and nonpregnant women with coronavirus disease 2019. *American Journal of Obstetrics & Gynecology*, 223(5), 779-780. <https://doi.org/10.1016%2Fj.ajog.2020.05.004>
- Wong, S. F., Chow, K. M., Leung, T. N., Ng, W. F., Ng, T. K., Shek, C. C., ... & Tan, P. Y. (2004). Pregnancy and perinatal outcomes of women with severe acute respiratory syndrome. *American journal of obstetrics and gynecology*, 191(1), 292-297. <https://doi.org/10.1016/j.ajog.2003.11.019>
- World Health Organization. (2020). Clinical management of COVID-19: interim guidance, 27 May 2020. <https://apps.who.int/iris/handle/10665/332196>
- Yu, N., Li, W., Kang, Q., Xiong, Z., Wang, S., Lin, X., ... & Wu, J. (2020). Clinical features and obstetric and neonatal outcomes of pregnant patients with COVID-19 in Wuhan, China: a retrospective, single-centre, descriptive study. *The Lancet Infectious Diseases*, 20(5), 559-564. [https://doi.org/10.1016/S1473-3099\(20\)30176-6](https://doi.org/10.1016/S1473-3099(20)30176-6)
- Zaigham, M., & Andersson, O. (2020). Maternal and perinatal outcomes with COVID-19: a systematic review of 108 pregnancies. *Acta obstetrica et gynecologica Scandinavica*, 99(7), 823-829. <https://doi.org/10.1111/aogs.13867>