J Surg Med. 2026;10(4):112-115.
https://doi.org/10.28982/josam.8274

JOSAM

Research article
https://jsurgmed.com/

Journal of Surgery and Medicine

e-ISSN: 2602-2079

Did the COVID-19 pandemic have an impact on pregnant women's participation in routine antenatal care and on pregnancy and neonatal outcomes?

Murat Gözüküçük, Özge Saygılı, Munire Sena Kaya, Süheyla Aydoğmuş, Yusuf Üstün

University of Health Sciences, Ankara Training and Education Hospital, Department of Obstetrics and Gynecology, Ankara, Turkey

ORCID of the author(s)

MG: https://orcid.org/0000-0002-4418-7570
ÖS: https://orcid.org/0000-0002-6866-2305
MSK: https://orcid.org/0000-0002-7213-5022
SA: https://orcid.org/0000-0003-3441-4597
YÜ: https://orcid.org/0000-0003-1529-2555

Corresponding Author
Murat Gözüküçük
Ankara Training and Research Hospital, Sakarya District. Ulucanlar Street. No:89 Altındağ, Ankara, Turkey
E-mail: muratgozukucuk@gmail.com

Ethics Committee Approval
The study was approved by the Ethics Committee of Ankara Training and Research Hospital, 2021/575.
All procedures in this study involving human participants were performed in accordance with the 1964 Helsinki Declaration and its later amendments.

Conflict of Interest
No conflict of interest was declared by the authors.

Financial Disclosure
The authors declared that this study has received no financial support.

Published
2026 April 24

Abstract

Background/Aim: The COVID-19 pandemic disrupted healthcare systems, affecting pregnant women's access to routine antenatal care. Changes in health policies and heightened anxiety may have influenced care utilization and outcomes. This study aimed to assess the pandemic's impact on antenatal attendance and compare pregnancy and neonatal outcomes with the pre-pandemic period in a tertiary center.

Methods: We retrospectively included all women who delivered at Ankara Training and Research Hospital between September 2020 and January 2021 (pandemic period) and those who delivered between September 2019 and January 2020 (pre-pandemic control). Pregnancies with any documented SARS-CoV-2 infection were excluded. Demographics, number of antenatal visits, antenatal screening tests, obstetric complications, and perinatal outcomes were compared.

Results: A total of 532 women delivered during the pandemic and 650 before the pandemic. The cesarean section rate was higher during the pandemic (40.4% vs 33.8%; P=0.020), with a higher primary cesarean rate (18.4% vs 11.2%; P<0.001). Antenatal visit categories were <4, 4–10, and >10 visits for pandemic vs pre-pandemic groups as follows: 39.4% vs 38.5%, 36.8% vs 42.1%, and 23.8% vs 19.4%, respectively (overall comparison P=0.087). While not statistically significant, there was a trend toward fewer women having 4–10 visits and more having >10 visits during the pandemic. Antenatal screening tests (Down syndrome screening, gestational diabetes screening, and second-trimester anomaly screening) were performed more frequently during the pandemic (all P<0.05). The mean gestational age at delivery was higher during the pandemic (39.25 (1.42) vs 38.65 (2.84) weeks; P<0.001), with fewer preterm (<37 weeks) births and more post-term (>41 weeks) births (P=0.012). Other neonatal outcomes were comparable, except for a small but statistically significant difference in 1-minute Apgar scores (9.02 (0.71) vs 9.10 (1.19); P=0.001).

Conclusion: During the pandemic, overall antenatal attendance did not differ significantly from the pre-pandemic period, although screening tests were utilized more frequently and cesarean delivery was more common. Despite these changes, pregnancy and neonatal outcomes were largely similar between periods.

Keywords: antenatal care; COVID-19; pandemic

How to cite: Gözüküçük M, Saygılı Ö, Kaya MS, Aydoğmuş S, Üstün Y. Did the COVID-19 pandemic have an impact on pregnant women's participation in routine antenatal care and on pregnancy and neonatal outcomes? J Surg Med. 2026;10(4):112-115.

Introduction

Coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), rapidly disrupted health systems and society worldwide [1]. Beyond morbidity and mortality, the pandemic affected health-seeking behaviors and service delivery [2]. Anxiety, altered risk perception, and changes in health policy led many patients to defer non-urgent care. Pregnant women, a population requiring regular antenatal care (ANC), were particularly affected. Reports from Europe and elsewhere described modifications to antenatal service provision and utilization during the pandemic [3]. Symptoms of anxiety and depression also increased among pregnant individuals [4]. These factors may influence ANC attendance and pregnancy outcomes. We aimed to determine the effect of the COVID-19 pandemic on antenatal attendance and to compare pregnancy and neonatal outcomes among women who delivered during the pandemic versus the preceding year in our tertiary center.

Materials and methods

Study design and setting

This retrospective comparative study was conducted at Ankara Training and Research Hospital, Turkey. Ethical approval was obtained from the institutional review board (approval number: 2021/575).

Study population

We included all pregnant women who delivered at our center between September 2020 and January 2021 (pandemic group) and those who delivered between September 2019 and January 2020 (pre-pandemic control). To isolate the indirect effects of the pandemic on service utilization and outcomes, women with any documented COVID-19 infection during pregnancy were excluded.

Data sources and variables

Data were retrieved from the hospital electronic medical records and patient files. We recorded maternal age, body mass index (BMI), gravida, parity, nationality, number of antenatal visits, performance of antenatal screening tests [first-trimester combined test and/or second-trimester maternal serum screening; gestational diabetes mellitus (GDM) screening with 50 g, 75 g, or 100 g oral glucose tests; and second-trimester ultrasound anomaly screening], obstetric complications, gestational age at delivery, mode of delivery and indications for cesarean section, neonatal sex, birth weight, 1- and 5-minute Apgar scores, need for neonatal intensive care unit (NICU) admission, intrapartum/postpartum complications, and length of hospital stay.

Statistical analysis

Data distribution was assessed with the Kolmogorov–Smirnov test. Equality of variances, where relevant, was examined using Levene's test. Group comparisons used the independent-samples t-test for parametric data, the Mann–Whitney U test for non-parametric data, and the chi-square test for categorical variables. Correlations were assessed using Pearson or Spearman coefficients as appropriate. A two-sided *P*-value <0.05 was considered statistically significant. Analyses were conducted using SPSS for Windows, version 23.0 (SPSS Inc., Chicago, IL, USA).

Results

During the pandemic period, 549 women delivered at our hospital; 17 with COVID-19 were excluded, yielding 532 women in the pandemic group and 650 in the pre-pandemic group. The pandemic group was younger on average. The overall cesarean section rate and the primary cesarean rate were higher during the pandemic. Antenatal screening tests (Down syndrome screening, GDM screening, and second-trimester anomaly screening) were performed more frequently during the pandemic.

Regarding ANC utilization, the distribution across <4, 4–10, and >10 visits differed modestly between groups, but the overall comparison did not reach statistical significance (*P*=0.087). The mean number of visits was similar between groups.

The mean gestational age at delivery was higher during the pandemic, with fewer preterm (<37 weeks) births and more post-term (>41 weeks) births. Birth weight, NICU admission, and 5-minute Apgar scores were comparable between groups. A statistically significant difference was observed in 1-minute Apgar scores; however, the absolute difference was small. Correlation analysis showed that the number of antenatal visits correlated positively with maternal age, primary cesarean delivery, birth weight, presence of gestational complications, and hospital stay, and negatively with gravida and parity. Detailed data are presented in Tables 1–4.

Table 1. Demographic variables, types of delivery, C/S indications and gestational complications of the study groups

	During pandemic n=532	**Before pandemic n=650**	***P*-value**
Ages (years), Mean (SD)	26.56 (6.36)	27.79 (5.85)	<0.001
Gravida, Mean (SD)	2.78 (1.59)	2.77 (1.49)	0.821
Parity, Mean (SD)	1.47 (1.32)	1.49 (1.26)	0.627
BMI (kg/m2), Mean (SD)	25.72 (4.97)	26.35 (5.21)	0.452
Nationality n (%)			
Turkish	350 (65.8)	438 (67.4)	
Syrian	71 (13.3)	109 (16.8)	0.012
Iraqi	99 (18.6)	96 (14.8)	
Other	12 (2.3)	7 (1.1)	
Type of delivery n (%)			
Vaginal	317 (59.6)	430 (66.2)	0.020
Cesarean section	215 (40.4)	220 (33.8)	
C/S indications n (%)			
C/S or myomectomy history	117 (54.4)	145 (65.9)	
Fetal distress	35 (16.3)	30 (13.6)	
CPD	21 (9.8)	16 (7.3)	0.097
Presentation abnormality	13 (6.0)	7 (3.2)	
Macrosomia	12 (5.6)	9 (4.1)	
Pre-eclampsia	7 (3.3)	5 (2.3)	
Placental abruption-previa	4 (1.8)	4 (1.8)	
Other	6 (2.8)	4 (1.8)	
Total	215 (100)	220 (100)	
Primary C/S delivery n (%)	98 (18.4)	73 (11.2)	<0.001
Gestational complications n (%)			
GDM	26 (4.9)	20 (3.1)	
GHT, pre-eclampsia, eclampsia	5 (0.9)	12 (1.8)	
Placental abrubsio-preiva	2 (0.4)	2 (0.3)	0.106
IUGR	4 (0.8)	4 (0.6)	
Intrauterine fetal demise	3 (0.6)	4 (0.6)	
Other	1 (0.2)	3 (0.5)	

C/S, Cesarean Section; BMI, Body Mass Index; CPD, Cephalo-pelvic Disproportion; GDM, Gestational Diabetes Mellitus; GHT, Gestational Hypertension; IUGR, Intrauterine Growth Restriction

Table 2. Number of antenatal visits and antenatal test status of the study groups

	During pandemic n=532	Before pandemic n=650	*P*-value
Number of antenatal visits n (%)			
<4	205 (39.4)	256 (38.5)	
4-10	224 (36.8)	239 (42.1)	0.087
>10	103 (23.8)	155 (19.4)	
Number of antenatal visits, Mean (SD)	5.87 (4.79)	5.99 (5.15)	0.736
(Total visits)	(3124)	(3899)	
Antenatal screening for Down's syndrome, n (%)			
First-trimester combined test and /or	251 (47.2)	245 (37.7)	0.001
Second-trimester maternal serum screening			
None	281 (52.8)	405 (62.3)	
GDM screening n (%)			
Tested	211 (39.7)	173 (26.6)	<0.001
Not tested	321 (60.3)	477 (73.4)	
Second-trimester ultrasound screening n (%)			
Tested	207 (38.9)	210 (32.3)	0.018
Not tested	325 (61.1)	440 (67.7)	

GDM, Gestational Diabetes Mellitus

Table 3. Pregnancy and neonatal outcomes of the study groups

	During pandemic n=532	Before pandemic n=650	*P*-value
Gestational age at Delivery n(%)			
<37 weeks	37 (7)	63 (9.7)	
37-41 weeks	433 (81.4)	540 (83.1)	0.012
>41 weeks	62 (11.6)	47 (7.2)	
Average Gestational age at Delivery, Mean (SD)	39.25 (1.42)	38.65 (2.84)	<0.001
Gender n (%)			
Male	276 (51.9)	314 (48.3)	0.222
Female	256 (48.1)	336 (51.7)	
Birth weight (gr), Mean (SD)	3245.63 (459.12)	3205.56 (458.18)	0.155
First-minute Apgar score, Mean (SD)	9.02 (0.71)	9.10 (1.19)	0.001
Fifth-minute Apgar score, Mean (SD)	9.81 (0.47)	9.84 (3.71)	0.310
Need for neonatal intensive care n (%)	51 (9.6)	59 (9.1)	0.764
Hospital stays (day), Mean (SD)	1.83 (1.06)	1.66 (0.77)	<0.001

Table 4. Spearman's correlation analysis of the number of antenatal visits with the other parameters

	r	*P*-value
Age	.157	<0.001
Gravida	-0.088	0.003
Parity	-0.154	<0.001
BMI	0.015	0.523
Presence of gestational complication	0.092	0.002
Intrauterine fetal demise after 24th weeks	-0.023	0.420
Primary C/S delivery	0.211	<0.001
Gestational age at delivery	0.022	0.510
First-minute Apgar score	-0.019	0.515
Fifth-minute Apgar score	-0.041	0.159
Birth weight	0.135	<0.001
Need for neonatal intensive care	0.024	0.419
Hospital stays	0.160	<0.001

BMI, Body Mass Index; C/S, Cesarean Section

Discussion

This study compared antenatal care utilization and perinatal outcomes before and during the COVID-19 pandemic in a large tertiary center. We observed higher cesarean delivery—particularly primary cesarean—during the pandemic, consistent with the possibility of altered risk perceptions or institutional practices during crisis conditions. While our study cannot determine causality, these findings may reflect changes in clinical decision-making, patient preference, or logistical considerations.

COVID-19 has brought many unknowns to our lives. Mood changes, especially increased anxiety and changes in risk perception, are commonly seen during this period [5-7]. Since the pandemic has become the top agenda of the world, it is expected that fewer people visit hospitals for non-COVID-19-related reasons, such as pregnancy follow-up. In the current study, although distribution across ANC visit categories shifted, overall antenatal attendance did not differ significantly. Notably, key antenatal screening tests were performed more frequently during the pandemic. This pattern may indicate prioritization of essential screening within fewer or reorganized in-person contacts; however, we did not capture data on telehealth or scheduling practices.

It is generally considered that antenatal care has a positive effect on the health of both the mother and baby [8-10]. There is a wide variety of guidelines in antenatal care, and not all of them are evidence-based. For example, the recommended number of antenatal visits varies considerably between Western countries [11-13]. It was previously shown that inadequate antenatal care was related to undesirable newborn and pregnancy outcomes, and it was suggested that unwanted pregnancy complications could be reduced with appropriate antenatal visit [14-21]. According to the World Health Organization, antenatal care visits should include at least four visits to medically trained personnel to prevent complications and ensure a safe delivery [22].

The mean gestational age at delivery was higher during the pandemic period, alongside fewer preterm and more post-term births. These shifts are internally consistent and may reflect differences in care pathways or thresholds for induction during the pandemic; definitive explanations require further study. Importantly, most neonatal outcomes were similar between groups. The statistically significant difference in 1-minute Apgar scores likely has limited clinical relevance given the high scores in both groups.

Strengths of this study include the use of a pre-pandemic control period within the same institution and comprehensive capture of antenatal testing and outcomes. Excluding women with COVID-19 infection isolated the indirect effects of the pandemic on care utilization and outcomes. Limitations include the single-center retrospective design, potential residual confounding, lack of data on telemedicine or timing of visits, and limited generalizability beyond the study setting.

In summary, essential antenatal services were largely maintained during the pandemic in our center, with increased utilization of screening and higher cesarean rates, but without major differences in perinatal outcomes.

Conclusion

In this single-center retrospective study excluding SARS-CoV-2–positive pregnancies, overall antenatal attendance did not differ significantly during the pandemic compared with the prior year, while antenatal screening tests were more frequently performed and cesarean delivery was more common. Despite these shifts, pregnancy and neonatal outcomes were largely comparable across periods.

References

1. Saadat S, Rawtani D, Hussain CM. Environmental perspective of COVID-19. Sci Total Environ. 2020;728:138870.
2. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and associated factors during the initial stage of the COVID-19 epidemic among the general population in China. Int J Environ Res Public Health. 2020;17(5):1729.
3. Editorial. The impact of the coronavirus (COVID-19) pandemic on maternity care in Europe. Midwifery. 2020;88:102779.
4. Lebel C, MacKinnon A, Bagshawe M, Tomfohr-Madsen L, Giesbrecht G. Elevated depression and anxiety symptoms among pregnant individuals during the COVID-19 pandemic. J Affect Disord. 2020;277:5–13.
5. Cullen W, Gulati G, Kelly BD. Mental health in the COVID-19 pandemic. QJM. 2020;113(5):311–6.

6. da Silva AG, Miranda DM, Diaz AP, Teles AS, Malloy-Diniz F, Palha AP. Mental health: why it still matters in the midst of a pandemic. Braz J Psychiatry. 2020;42(3):229–31.
7. Corbett GA, Milne SJ, Hehir MP, Lindow SW, O'Connell MP. Maternal mental health in the time of the COVID-19 pandemic. Eur J Obstet Gynecol Reprod Biol. 2020;249:96–7.
8. Beeckman K, Louckx F, Putman K. Determinants of the number of antenatal visits in a metropolitan region. BMC Public Health. 2010;10:527.
9. Alexander GR, Kotelchuck M. Assessing the role and effectiveness of prenatal care: history, challenges, and directions for future research. Public Health Rep. 2001;116:306–16.
10. World Health Organization. Provision of effective antenatal care. Geneva: WHO; 2006.
11. Raatikainen K, Heiskanen N, Heinonen S. Under-attending free antenatal care is associated with adverse pregnancy outcomes. BMC Public Health. 2007;7:268.
12. American Academy of Pediatrics; American College of Obstetricians and Gynecologists. Antepartum care. In: Guidelines for Perinatal Care. Washington (DC): ACOG; 2007. p. 83–137.
13. Bhowmik KR, Das S, Islam A. Modelling the number of antenatal care visits in Bangladesh to determine risk factors for reduced attendance. PLoS One. 2020;15(1):e0228215.
14. Shiferaw K, Mengiste B, Gobena T, Dheresa M. The effect of antenatal care on perinatal outcomes in Ethiopia: a systematic review and meta-analysis. PLoS One. 2021;16(1):e0245003.
15. Stacey T, Thompson JM, Mitchell EA, Zuccollo JM, Ekeroma AJ, McCowan LM. Antenatal care, identification of suboptimal fetal growth and risk of late stillbirth: findings from the Auckland Stillbirth Study. Aust N Z J Obstet Gynaecol. 2012;52(3):242–7.
16. Gumede S, Black V, Naidoo N, Chersich MF. Attendance at antenatal clinics in inner-city Johannesburg and associations with birth outcomes: analysis of birth register data from three facilities. BMC Public Health. 2017;17:443.
17. Heaman MI, Martens PJ, Brownell MD, Chartier MJ, Derksen SA, Helewa ME. Association of inadequate and intensive prenatal care with maternal, fetal, and infant outcomes: a population-based study in Manitoba, Canada. J Obstet Gynaecol Can. 2019;41(7):947–59.
18. Worku AG, Yalew AW, Afework MF. Contributions of maternity care to reducing adverse pregnancy outcomes: a cohort study in Dabat District, Northwest Ethiopia. Matern Child Health J. 2014;18(6):1336–44.
19. Van Dijk JAW, Anderko L, Stetzer F. Impact of prenatal care coordination on birth outcomes. J Obstet Gynecol Neonatal Nurs. 2011;40(1):98–108.
20. Rosário EVN, Gomes MC, Brito M, Costa D. Determinants of maternal health care and birth outcome in the Dande Health and Demographic Surveillance System area, Angola. PLoS One. 2019;14(8):e0221280.
21. Blondel B, Dutilh P, Delour M, Uzan S. Poor antenatal care and pregnancy outcome. Eur J Obstet Gynecol Reprod Biol. 1993;50(3):191–6.
22. World Health Organization. Integrated management of pregnancy and childbirth: standards for maternal and neonatal care. Geneva: WHO; 2007.