









Women's assessment of the quality of hospital-based perinatal care by mode of birth in Romania during the COVID-19 pandemic: Results from the IMAGiNE EURO study

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Abstract

Objective: To assess women's perceptions of the quality of maternal and newborn care (QMNC) received in hospitals in Romania during the COVID-19 pandemic by mode of birth.

Methods: A validated anonymous online questionnaire based on WHO quality measures. Subgroup analysis of spontaneous vaginal birth (SVB), emergency cesarean, and elective cesarean and multivariate analyses were performed, and QMNC indexes were calculated. Maternal age, educational level, year of birth, mother born in Romania, parity, type of hospital, and type of professionals assisting the birth were used for multivariate analysis.

Results: A total of 620 women completed the survey. Overall, several quality measures suggested gaps in QMNC in Romania, with the lowest QMNC indexes reported for provision of care and availability of resources. Women who had either elective or emergency cesarean compared with those who had SVB more frequently lacked early breastfeeding (OR 2.04 and 2.13, respectively), skin-to-skin contact (OR 1.73 and 1.75, respectively), rooming-in (OR 2.07 and 1.96, respectively), and exclusive breastfeeding at discharge (OR 2.27 and 1.64, respectively). Compared with elective cesarean, emergency cesarean had higher odds of ineffective communication by healthcare providers (OR 1.65), lack of involvement in choices (OR 1.58), insufficient emotional support (OR 2.07), and no privacy (OR 2.06). Compared with other modes of birth, a trend for lower QMNC indexes for emergency cesarean was observed for all domains, while for elective cesarean the QMNC index for provision of care was significantly lower.

Conclusion: Quality indicators of perinatal care remain behind targets in Romania, with births by cesarean the most affected.

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KEYWORDS

breastfeeding, cesarean, childbirth, COVID-19, IMAGiNE EURO, mode of birth, quality of care, Romania

1 | INTRODUCTION

The COVID-19 pandemic shook society. For the Romanian healthcare system, the pandemic amplified existing constraints and unresolved issues, and added new challenges. In response to the pandemic, the Romanian Ministry of Health issued guidelines on safety measures to be adopted inside obstetric wards to reduce the transmission of SARS-Cov2.¹ Maternities were divided into COVID-19 and non-COVID-19 hospitals, where pregnant women were admitted according to their SARS-Cov-2 status (i.e., positive or negative on RT-PCR test).¹ For SARS-Cov-2-positive asymptomatic pregnant women, no formal indication for cesarean was mentioned in the national recommendations, except in cases of rapid deterioration of clinical status during labor.¹ Women with confirmed or suspected COVID-19 were separated from their newborns until they had two consecutive negative SARS-Cov2 test results, a process that can take weeks. In addition, they were not allowed to breastfeed as their breast milk was treated as “waste”.¹

Despite progressive developments in prenatal diagnosis and standards of maternal and newborn care over time, Romania still faces multiple challenges in achieving high-quality perinatal health care, with the high rate of cesareans one of the most concerning indicators. According to recent estimates, the cesarean rate in Romania is increasing significantly, with 37.1% of total births occurring by cesarean in 2016²; this frequency reaches more than 80% in private clinics.³

Several factors may be contributing to this high average rate of cesarean in Romania: few centers provide prenatal parental education, relatively high number of births in private clinics, low number of midwives, limited autonomy of midwives in the clinical decision process, women's preferences,⁴ and increasing maternal age.^{5,6} Although reducing the cesarean rate is recognized as a national priority, some of the current regulations (e.g., reimbursing hospitals with higher rates of cesarean compared with spontaneous vaginal birth [SVB]) may actually be a serious barrier to reducing the cesarean rate in Romania.⁷

There is a lack of studies reporting maternal perceptions of quality of health care received in Romania.⁸ The present paper provides data from Romanian responders participating in the IMAGiNE EURO study, conducted in several countries of the WHO European Region.⁹ The aim of the present study was to report the perspectives of women who gave birth during the COVID-19 pandemic on the quality of maternal and newborn care (QMNC) received in Romania, grouped by mode of childbirth.

2 | MATERIALS AND METHODS

This was a cross-sectional study reported following the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.¹⁰ Women aged 18 years and older who gave birth in

hospitals in Romania from March 1, 2020, up to February 29, 2021, were invited to participate.

Data collection methods have been detailed elsewhere.^{9,11} Briefly, recruitment was prospective between September 2, 2020, and June 1, 2021, through a validated online anonymous questionnaire,⁹ which included 40 questions (one for each single WHO standards-based quality measure) equally distributed across four domains: provision of care, experience of care, availability of human and physical resources, and key organizational changes related to the COVID-19 pandemic. The 40 quality measures contributed to a QMNC index, ranging from 0–400, with higher scores indicating higher adherence to WHO standards.^{11,12}

Data were collected on a centralized platform using REDCap 8.5.21 (Vanderbilt University). A descriptive analysis was conducted, subgrouping women into three groups by mode of birth: SVB, elective cesarean, and emergency cesarean based on the possible responses to the question “How was your baby born?”, with possible response options: SBV, instrumental vaginal birth (by vacuum extraction or forceps), emergency cesarean during labor, emergency cesarean before going into labor, and planned or elective cesarean before going into labor. The number of instrumental vaginal births was too small and was therefore excluded from the analysis. Although emergency cesarean (either during or before labor) and elective cesarean share characteristics, they differ in many aspects of maternal and fetal outcomes that may affect the perception of quality of care; therefore, they were treated separately. A definition of labor was provided in the questionnaire, per the NICE guidelines for intrapartum care of mother and babies.¹³ For women providing data on all 40 quality measures, the QMNC indexes were calculated according to predefined criteria.⁹ Demographic variables, quality measures, and the QMNC index referring to the four domains were compared between groups by mode of birth using χ^2 test, ANOVA, or Mann–Whitney test, according to type of variable (categorical or continuous) and normality. Odds ratios were calculated for quality measures. To further investigate differences among groups, in case of statistical significance, pairwise comparisons were conducted using Bonferroni adjustment. Multivariable quantile regression models were developed with the QMNC index as the dependent variable and including all sociodemographic variables (i.e. maternal age, educational level, year of birth, mother born in Romania), parity, type of hospital (public or private), and type of professionals assisting the woman as independent variables, to account for potential confounding of crude associations by other variables. Data were processed using Stata/SE version 14.0 (Stata Corp) and R version 4.1.1. $P \leq 0.05$ was considered statistically significant.

The IMAGiNE EURO study was approved by the Institutional Review Board of IRCCS “Burlo Garofolo” Trieste, Italy (IRB-BURLO 05/2020 15.07.2020) and was conducted according to General Data Protection Regulation (GDPR) regulations. This was an online anonymous survey that women could decide to join on a voluntary basis;

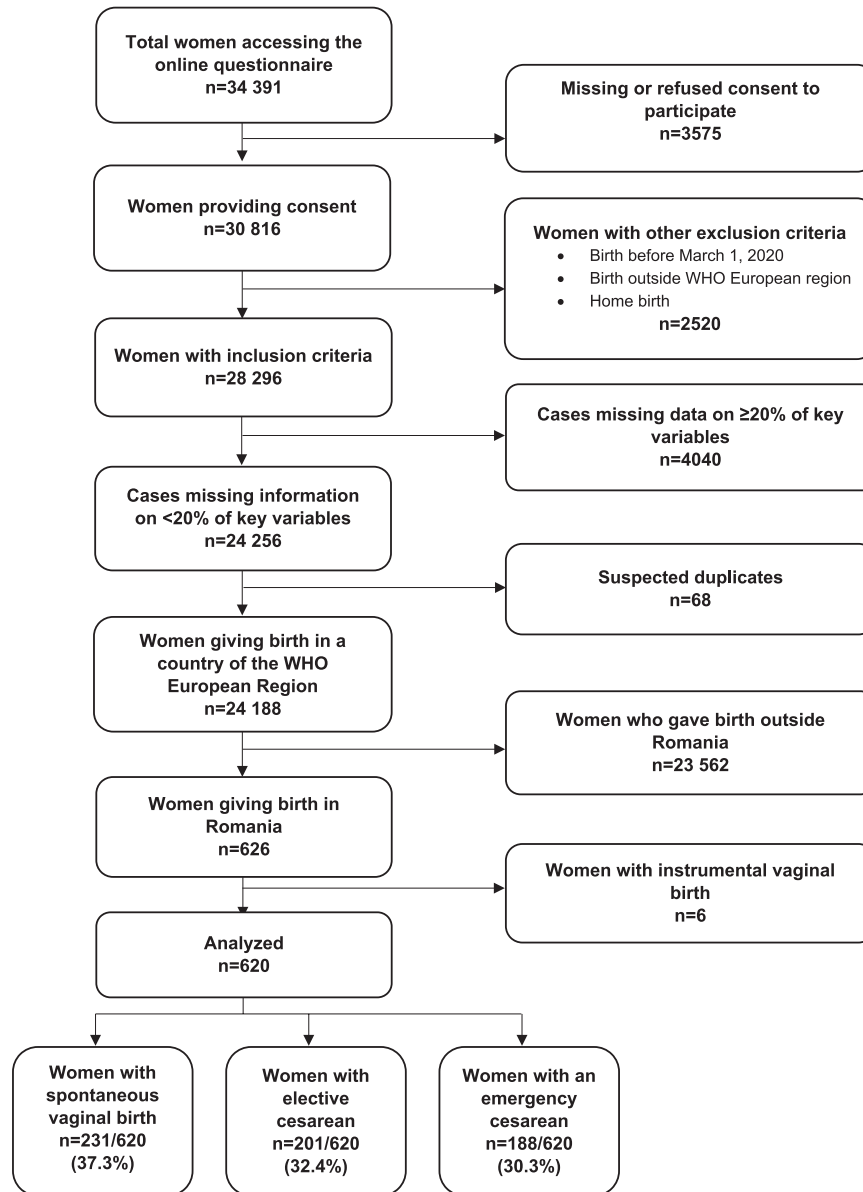


FIGURE 1 Study flow diagram.

no data elements that could disclose maternal identity were collected, answers were recorded directly into a centralized platform hosted in Italy, and no data were treated elsewhere, therefore no further ethical approval was required in Romania. Data transmission and storage were secured by encryption. Each of the participants provided informed consent prior to responding to the survey.

3 | RESULTS

3.1 | Maternal characteristics

After exclusions had been considered, a total of 24 188 women gave birth in a WHO European region country. Of these, 23 562 (97.4%) gave birth outside Romania, leaving 626 (2.6%). After excluding six

women who had an instrumental vaginal birth, 620 women who gave birth in Romania were included in the analysis (Figure 1). Each birth mode accounted for approximately one-third of the total births. There were significant differences among the groups by birth mode: (1) being assisted by an obstetrician/gynecologist was significantly more frequent in women who had either an elective or emergency cesarean ($P < 0.001$); (2) SVB occurred more frequently in younger women ($P < 0.001$) and in public facilities ($P < 0.001$); and (3) emergency cesarean occurred more frequently in older women ($P = 0.019$); (4) elective cesarean was more frequent in private facilities ($P < 0.001$). Midwives were involved more frequently in SVB than in emergency and elective cesareans ($P < 0.001$) (Table 1) Overall, cesarean accounted for 72.7% ($n = 136$) of total births ($n = 187$) in private facilities versus 57.8% ($n = 247$ of total 419 births) in public facilities ($P < 0.001$). From the total number

TABLE 1 Characteristics of responders.

	Total No. (%)	Spontaneous vaginal birth No. (%)	Elective cesarean No. (%)	Emergency cesarean ^a No. (%)	P value ^f
No.	620	231	201	188	
Age, year					
18–24	34 (5.5)	24 (10.4) ^b	7 (3.5)	3 (1.6) ^c	<0.001
25–30	258 (41.6)	95 (41.1)	82 (40.8)	81 (43.1)	0.884
31–35	241 (38.9)	89 (38.5)	77 (38.3)	75 (39.9)	0.941
36–39	58 (9.4)	19 (8.2)	24 (11.9)	15 (8.0)	0.309
≥40	15 (2.4)	1 (0.4)	6 (3.0)	8 (4.3) ^c	0.019
Missing	14 (2.3)	3 (1.3)	5 (2.5)	6 (3.2)	0.462
Educational level ^d					
Elementary school	4 (0.6)	3 (1.3)	0 (0.0)	1 (0.5)	0.327
Junior high school	2 (0.3)	1 (0.4)	1 (0.5)	0 (0.0)	1.000
High school	82 (13.2)	33 (14.3)	28 (13.9)	21 (11.2)	0.605
University degree	251 (40.5)	93 (40.3)	83 (41.3)	75 (39.9)	0.958
Postgraduate degree/ Master/Doctorate or higher	267 (43.1)	98 (42.4)	84 (41.8)	85 (45.2)	0.769
Missing	14 (2.3)	3 (1.3)	5 (2.5)	6 (3.2)	0.462
Year of childbirth					
2020	576 (92.9)	215 (93.1)	187 (93.0)	174 (92.6)	0.975
2021	27 (4.4)	13 (5.6)	7 (3.5)	7 (3.7)	0.485
Missing	17 (2.7)	3 (1.3)	7 (3.5)	7 (3.7)	0.235
Women born in Romania					
Yes	597 (96.3)	227 (98.3)	192 (95.5)	178 (94.7)	0.103
No	9 (1.5)	1 (0.4)	4 (2.0)	4 (2.1)	0.250
Missing	14 (2.3)	3 (1.3)	5 (2.5)	6 (3.2)	0.462
Parity					
1	409 (66.0)	154 (66.7)	123 (61.2)	132 (70.2)	0.165
>1	197 (31.8)	74 (32.0)	73 (36.3)	50 (26.6)	0.120
Missing	14 (2.3)	3 (1.3)	5 (2.5)	6 (3.2)	0.462
Type of hospital					
Public	419 (67.6)	177 (76.6) ^b	116 (57.7)	126 (67.0)	<0.001
Private	187 (30.2)	51 (22.1) ^b	80 (39.8)	56 (29.8)	<0.001
Missing	14 (2.3)	3 (1.3)	5 (2.5)	6 (3.2)	0.462
Healthcare provider who assisted birth ^e					
Midwife	251 (40.5)	182 (78.8) ^b	29 (14.4)	40 (21.3) ^c	<0.001
Nurse	274 (44.2)	102 (44.2)	91 (45.3)	81 (43.1)	0.910
Student	8 (1.3)	5 (2.2)	1 (0.5)	2 (1.1)	0.326
Ob/gyn resident	152 (24.5)	54 (23.4)	43 (21.4)	55 (29.3)	0.173
Ob/gyn specialist	532 (85.8)	174 (75.3) ^b	188 (93.5)	170 (90.4) ^c	<0.001
I don't know	35 (5.6)	13 (5.6)	6 (3.0)	16 (8.5)	0.062
Missing	43 (6.9)	9 (3.9)	17 (8.5)	17 (9.0)	0.070

^aEmergency cesarean includes both before and during labor.

^bStatistically significant adjusted *P* value (adj *P* < 0.05) in the comparison spontaneous vaginal birth versus elective cesarean.

^cStatistically significant adjusted *P* value (adj *P* < 0.05) in the comparison emergency cesarean versus spontaneous vaginal birth.

^dWording on education levels agreed among partners during the Delphi. Questionnaire translated and back-translated according to ISPOR Task Force for Translation and Cultural Adaptation Principles of Good Practice.

^eMore than one possible answer.

^fBold values are statistically significant. No statistically significant adjusted *P* value were found in the comparison elective cesarean versus emergency cesarean.

of cesareans performed, elective cesarean was more frequent than emergency cesarean in private versus public health facilities (58.8% [$n = 80$ from total 136 cesareans] vs. 47.9% [$n = 116$ from total 242 cesareans]; $P < 0.001$).

3.2 | WHO standards-based quality measures

In the domain of provision of care (Table 2, Supporting information Figure 1), overall, 68.2% ($n = 423$) of women lacked skin-to-skin contact, 68.5% ($n = 425$) lacked early breastfeeding, 52.3% ($n = 324$) did not exclusively breastfeed at discharge, 47.9% ($n = 297$) reported inadequate breastfeeding support, and 43.9% ($n = 272$) reported lack of attention when needed. In addition, 43.4% ($n = 149$ out of 343 who went into labor) of women lacked pain relief during labor, and 68.0% ($n = 157$) had an episiotomy during SVB.

In the domain of provision of care, significant differences were found among groups by birth mode for several WHO standards-based quality measures, with a trend for women who had a cesarean showing the lowest scores (Table 2). Specifically, when compared with women who had SVB, those who had either an elective or emergency cesarean more frequently lacked early breastfeeding (OR 2.04; 95% CI, 1.35–3.07 and OR 2.13; 95% CI, 1.4–3.25, respectively), skin-to-skin contact (OR 1.73; 95% CI, 1.15–2.59 and OR 1.75; 95% CI, 1.15–2.65, respectively), rooming-in (OR 2.07; 95% CI, 1.42–3.06 and OR 1.96; 95% CI, 1.32–2.9, respectively), and exclusive breastfeeding at discharge (OR 2.27; 95% CI, 1.54–3.35 and OR 1.64, 95% CI, 1.11–2.42, respectively). The only indicator showing poorest QMNC in women with SVB was lack of pain relief, which was more frequent than in women who experienced emergency cesarean (OR 7.55, 95% CI, 4.61–12.38).

In the domain of experience of care, key findings included: 93.4% ($n = 579$) of women were not allowed a companion for as long as needed, 48.7% ($n = 302$) felt that they were not involved in choices, 37.7% ($n = 234$) reported that they were not treated with dignity, 19.2% ($n = 119$) reported abuse, and 23.5% ($n = 146$) reported making informal payments. Indicators were significantly worse in the emergency cesarean group compared with (in this order) the SVB and elective cesarean groups. Emergency versus elective cesarean had higher odds of ineffective communication with healthcare providers (HCPs) (OR 1.65; 95% CI, 1.1–2.46), lack of involvement in choices (OR 1.58, 95% CI, 1.06–2.36), insufficient emotional support (OR 2.07; 95% CI, 1.36–3.14), and no privacy (OR 2.06; 95% CI, 1.28–3.33).

In the domain of availability of physical resources, 82.9% ($n = 514$) of women reported inadequate visiting hours for their partner, while 46.9% ($n = 291$) did not receive adequate information on maternal danger signs (e.g. excessive vaginal bleeding, difficulty in urinating, difficulty in breathing). There were no significant differences among groups by birth mode, except for information on newborn danger signs, which was less frequent in women with SVB (58.0% [$n = 134$] vs. 47.3% [$n = 95$] elective cesarean and 47.9% [$n = 90$] for emergency cesarean; $P = 0.042$).

In the domain of reorganizational changes due to COVID-19 (Table 2, Supporting information Figure 2), 55.6% ($n = 345$) of women from the whole sample perceived a reduction in quality of care ($P = 0.050$). In addition, a high percentage of women reported difficulties in attending routine antenatal visits during pregnancy (57.1%, $n = 354$), inadequate communication with HCPs to contain COVID-19-related stress (44.5%, $n = 276$), inadequate reorganization of hospital wards (37.9%, $n = 235$), and inadequate numbers of HCPs (32.1%, $n = 199$), with no significant differences by birth mode.

3.3 | QMNC indexes and multivariate analysis

Overall, the median lowest scores in the QMNC indexes were reported in the domains of provision of care (60, IQR 45.0–75.0) and availability of human and physical resources (65, IQR 45.0–80.0) (Table 3). In the domain of experience of care there were significant differences by birth mode, with women who had an emergency cesarean (65, IQR 50.0–81.2) or SVB (65, IQR 50.0–80.0) showing significantly lower scores than those who had an elective cesarean (75, IQR 57.5–90.0) ($P = 0.002$) (supporting information Figure 3).

When the total QMNC indexes were corrected for other variables (Supporting information Table 1), women who had an elective cesarean, were multiparous, gave birth in private facilities, and were assisted by a midwife or obstetrician/gynecologist reported significantly higher QMNC scores in one or more centiles, while women born in other countries reported lower QMNC indexes.

When the QMNC index was analyzed by domain and adjusting for type of hospital (public or private), lower median QMNC indexes were observed in all of the four domains for cesarean, although this reached statistical significance (adjusted $P < 0.05$) only for provision of care (-10 points and -5 for elective and emergency cesarean, respectively, compared to SVB) (supporting information Table 2). When compared with SVB, women who had an elective cesarean reported a lower QMNC index for provision of care (-10 points, $P < 0.05$), but a higher index for experience of care (+5, $P < 0.05$).

4 | DISCUSSION

This is the first study in Romania using a standardized validated questionnaire to document the quality of perinatal care during the COVID-19 pandemic, as assessed by women as key service beneficiaries. Previous preliminary publications from the IMAGiNE EURO study reporting data from 12 countries showed that the QMNC index reported by women giving birth in Romania was significantly lower than the QMNC index reported by women giving birth in most of the other 11 countries included.^{9,14,15} The current article adds new participants to the previous data and provides additional analyses, exploring QMNC by mode of birth. Given the general lack of published evidence on the QMNC in Romania,¹⁶ the study contributes by filling an evidence gap.

TABLE 2 Provision of care, experience of care, and availability of resources.^a

	Total (n = 620) No. (%)	Spontaneous vaginal birth (n = 231) No. (%)	Elective cesarean (n = 201) No. (%)	Emergency cesarean (n = 188) No. (%)	P value ^f
Provision of care					
No pain relief in labor	149/343 (43.4)	124 (53.7)	NA	25/112 (22.3) ^b	<0.001
Episiotomy (in SVB)	157/231 (68.0)	157 (68.0)	NA	NA	NA
No pain relief after cesarean	41/389 (10.5)	NA	16 (8.0)	25 (13.3)	0.087
No skin-to-skin contact	423 (68.2)	140 (60.6) ^c	146 (72.6)	137 (72.9) ^b	0.007
No early breastfeeding	425 (68.5)	135 (58.4) ^c	149 (74.1)	141 (75.0) ^b	<0.001
Inadequate breastfeeding support	297 (47.9)	114 (49.4)	89 (44.3)	94 (50.0)	0.453
No rooming-in	298 (48.1)	86 (37.2) ^c	111 (55.2)	101 (53.7) ^b	<0.001
Not allowed to stay with the baby as wished	156 (25.2)	49 (21.2)	52 (25.9)	55 (29.3)	0.162
No exclusive breastfeeding at discharge	324 (52.3)	97 (42.0) ^c	125 (62.2)	102 (54.3) ^b	<0.001
No immediate attention when needed	272 (43.9)	107 (46.3)	82 (40.8)	83 (44.1)	0.512
Experience of care					
No freedom of movements during labor	115/343 (45.2)	113 (48.9)	NA	42/112 (37.5) ^b	<0.001
No choice of birth position (in SVB)	175/231 (75.8)	175 (75.8)	NA	NA	NA
No information on newborn after cesarean	199/389 (51.1)	NA	92 (45.8)	98 (52.1)	0.210
No consent requested for vaginal examination	203 (32.7)	94 (40.7) ^c	44 (21.9) ^d	65 (34.6)	<0.001
No clear/effective communication from HCP	273 (44.0)	105 (45.5)	75 (37.3) ^d	93 (49.5)	0.047
No involvement in choices	302 (48.7)	122 (52.8) ^c	82 (40.8) ^d	98 (52.1)	0.024
Companionship not allowed	579 (93.4)	221 (95.7)	182 (90.5)	176 (93.6)	0.101
Not treated with dignity	234 (37.7)	94 (40.7)	63 (31.3)	77 (41.0)	0.075
No emotional support	252 (40.6)	104 (45.0) ^c	60 (29.9) ^d	88 (46.8)	0.001
No privacy	172 (27.7)	80 (34.6) ^c	35 (17.4) ^d	57 (30.3)	<0.001
Abuse (physical/verbal/emotional)	119 (19.2)	53 (22.9)	30 (14.9)	36 (19.1)	0.108
Informal payment	146 (23.5)	50 (21.6)	56 (27.9)	40 (21.3)	0.214
Availability of physical and human resources					
No timely care by HCPs at hospital arrival	121 (19.5)	50 (21.6)	31 (15.4)	40 (21.3)	0.204
No information on maternal danger signs	291 (46.9)	115 (49.8)	89 (44.3)	87 (46.3)	0.508
No information on newborn danger signs	319 (51.5)	134 (58.0) ^c	95 (47.3)	90 (47.9)	0.042
Inadequate room comfort and equipment	60 (9.7)	22 (9.5)	18 (9.0)	20 (10.6)	0.850
Inadequate number of women per rooms	54 (8.7)	18 (7.8)	18 (9.0)	18 (9.6)	0.804
Inadequate room cleaning	60 (9.7)	23 (10.0)	21 (10.4)	16 (8.5)	0.799
Inadequate bathroom	117 (18.9)	43 (18.6)	36 (17.9)	38 (20.2)	0.839
Inadequate partner visiting hours	514 (82.9)	190 (82.3)	167 (83.1)	157 (83.5)	0.940
Inadequate number of HCPs	126 (20.3)	46 (19.9)	37 (18.4)	43 (22.9)	0.540
Inadequate HCP professionalism	69 (11.1)	19 (8.2)	26 (12.9)	24 (12.8)	0.208

(Continues)

TABLE 2 (Continued)

	Total (n = 620) No. (%)	Spontaneous vaginal birth (n = 231) No. (%)	Elective cesarean (n = 201) No. (%)	Emergency cesarean (n = 188) No. (%)	P value ^f
Reorganizational changes due to COVID-19					
Difficulties in attending routine antenatal visits	354 (57.1)	145 (62.8)	104 (51.7)	105 (55.9)	0.064
Any barriers in accessing the hospital	249 (40.2)	94 (40.7)	72 (35.8)	83 (44.1)	0.241
Inadequate info graphics	161 (26.0)	60 (26.0)	44 (21.9)	57 (30.3)	0.166
Inadequate wards reorganization	235 (37.9)	90 (39.0)	68 (33.8)	77 (41.0)	0.321
Inadequate room reorganization	241 (38.9)	87 (37.7)	70 (34.8)	84 (44.7)	0.123
Lacking one functioning accessible hand-washing station ^e	112 (18.1)	38 (16.5)	38 (18.9)	36 (19.1)	0.722
HCP not always using PPE	102 (16.5)	36 (15.6)	35 (17.4)	31 (16.5)	0.877
Insufficient number of HCPs	199 (32.1)	71 (30.7)	59 (29.4)	69 (36.7)	0.257
Communication inadequate to contain COVID-19-related stress	276 (44.5)	105 (45.5)	77 (38.3)	94 (50.0)	0.064
Reduction in QMNC due to COVID-19	345 (55.6)	139 (60.2)	98 (48.8)	108 (57.4)	0.050

Abbreviations: HCP, healthcare provider; NA, not applicable; SVB, spontaneous vaginal birth; PPE, personal protective equipment; QMNC, quality of maternal and newborn care.

^aAll the indicators in the domains of provision of care, experience of care, and resources are directly based on WHO standards.

^bStatistically significant adjusted *P* value (adj *P* < 0.05) in the comparison emergency cesarean versus spontaneous vaginal birth.

^cStatistically significant adjusted *P* value (adj *P* < 0.05) in the comparison spontaneous vaginal birth versus elective cesarean.

^dStatistically significant adjusted *P* value (adj *P* < 0.05) in the comparison elective cesarean versus emergency cesarean.

^eDefined as at least one functioning and accessible hand-washing station (near or inside the room where the mother was hospitalized) supplied with water and soap or with disinfectant alcohol solution.

^fBold values are statistically significant.

TABLE 3 QMNC indexes by domain and mode of birth.

	Total (n = 438) Median [IQR]	Spontaneous vaginal birth (n = 175) Median [IQR]	Elective cesarean (n = 151) Median [IQR]	Emergency cesarean (n = 112) Median [IQR]	P value
Provision of care	60.0 [45.0–75.0]	60.0 [45.0–77.5]	60.0 [45.0–75.0]	60.0 [50.0–70.0]	0.378
Experience of care	70.0 [50.0–85.0]	65.0 [50.0–80.0] ^a	75.0 [57.5–90.0] ^b	65.0 [50.0–81.2]	0.002
Availability of physical and human resources	65.0 [45.0–80.0]	60.0 [45.0–75.0]	65.0 [45.0–85.0]	60.0 [40.0–80.0]	0.498
Reorganizational changes due to COVID-19	80.0 [65.0–90.0]	80.0 [65.0–90.0]	80.0 [65.0–95.0]	75.0 [55.0–90.0]	0.106
Total QMNC index	270.0 [210.0–315.0]	270.0 [215.0–307.5]	280.0 [220.0–330.0]	265.0 [203.8–306.2]	0.135

Abbreviation: QMNC, quality of maternal and newborn care.

^aStatistically significant adjusted *P* value (adj *P* < 0.05) in the comparison spontaneous vaginal birth versus elective cesarean.

^bStatistically significant adjusted *P* value (adj *P* < 0.05) in the comparison elective cesarean versus emergency cesarean.

The findings from the present study confirm previous European reports which showed that the quality of hospital and specialist care in Romania was perceived below the European average¹⁷ and add relevant information on perceived differences in the QMNC by birth mode, highlighting that the lowest scores were reported by women who had an emergency cesarean.

In the domain of provision of care, the major gaps observed were in the practices of essential newborn care, lack of pain relief in labor, and the high rate of episiotomy. Notably, many indicators in this domain suggested the lowest QMNC reported by women who had a cesarean. This is concerning, adding low quality of care reported by this group of women to the burden of the already high cesarean rate

in Romania. Importantly, while women who had an emergency cesarean may have needed postpartum medical treatments that in some cases may have delayed skin-to-skin contact, early breastfeeding, and rooming-in, for both SVB and elective cesarean there is no justification for the lack of these practices, which benefit both maternal and newborn health. This calls for immediate action to promote better essential care in Romania for babies born by cesarean.^{9,18}

Despite that previous studies have reported higher scores in the experience of care domain, our study calculated lower scores for women who had an emergency cesarean compared with women with SVB and elective cesarean (in this order).^{19–22} Additionally, when comparing other European countries, quality measures in this domain, even for elective cesarean, were far beyond the European average.⁹ Several factors may explain why mothers with SVB perceived lower QMNC in the experience of care domain compared with mothers who gave birth by elective cesarean. First, this may be explained by demographic characteristics, significantly different among groups, or by the sample selection. Secondly, these findings may reflect the expectations of women toward cesarean. Third, most births by elective cesarean occurred in private facilities and previous research highlighted that women who delivered in private facilities perceived better care than those delivering in public facilities^{9,23}; however, is uncertain whether this reflects objective quality or rather a subjective judgment.⁹ Finally, some key indicators in the experience of care domain, such as the lack of involvement in choices and the lack of privacy (both reported as more frequent in mothers with SVB compared with elective cesarean), may have affected the perception of other indicators. These factors may also explain the higher total QMNC index reported for private facilities.

Indicators of availability of resources and reorganization of care were not statistically different by birth mode; however, several gaps were revealed, with top priorities being accessibility of care, communication related to stress, and inadequate ward organization. More than half of the respondents reported a reduction in the QMNC and difficulties in attending routine antenatal visits, which were, even before the pandemic, poorly accessible in Romania.²⁴ A national report from 2016 showed that 7.1% of women had any medical consultation before birth and 69% did not attend the recommend number of visits during the pregnancy.²

The present study confirms the high rate of cesarean in Romania (62.7%), in line with the most recent report of the National Insurance House reporting 57.9% of singleton births by cesarean.²⁵ Notably, elective cesarean also includes cesarean on request. The National Guide for cesarean endorsed by the Ministry of Health specifies that the doctor will discuss this topic with the patient only “after the legislative frame will be set up”. In contrast, some experts consider that cesarean on request can be performed under general legislation referring to a patient’s rights.²⁶ Due to this ambiguity in legislation, reporting is not compulsory and no official national data about the different subtypes of elective cesarean are currently available. However, since other studies in Romania confirm high rates of elective and emergency cesarean,^{3,25,27,28} these data should drive a

public debate to define appropriate evidence-based policies to reduce the rate of cesarean.

This paper presents maternal characteristics by birth mode varying by age, type of hospital, and type of HCP related to the provision of quality of care during labour and childbirth. Regarding HCPs, the differences may be explained by the distinction in competencies between doctors and midwives and the Romanian legislation that restricts midwives' activity to monitoring labor and to a large extent to physiological birth.²⁹

Strengths of the study include a validated questionnaire,^{9,11} based on the WHO quality measures,¹² and the participation of women from different regions of Romania. Official statistics do not provide such detailed information and most national studies have a smaller sample size. Therefore, the results presented in this article are a meaningful contribution to understanding women's perceptions surrounding perinatal care in Romania.

The study also has some limitations. As with any voluntary survey, it relies on willingness to participate, which might reduce the representativeness of the results. Online distribution may limit participation because 64% of individuals in Romania used the internet for social networking in 2021.³⁰ To reduce this risk, a mixed strategy for dissemination of the survey was developed and routinely monitored. It included dissemination via forums and other social networks of mothers, flyers, and posters, and direct contact of perinatal educators with women after birth in the hospital. Another possible weakness is that the survey collected data mainly from women with a high level of education. This may partly reflect the national trend seen in the last decade whereby the proportion of newborns born to women with a higher education level increased by 20%,³¹ while in all other categories of education the numbers decreased. Nevertheless, level of education was not associated with QMNC. To the best of our knowledge, no other study has analyzed women's views on QMNC in Romania and the level of education, while previous studies exploring related themes were contradictory. In one study, level of education did not statistically correlate with confidence in the Romanian healthcare system in general,³² although level of income was negatively related to the “overall impression”. In another study, patients with a higher level of education considered that they had better communication with the medical staff.³³

Finally, the sample included in this study may be slightly older than the national sample of women giving birth in Romania, although directly comparable data are not available.³⁴ This may also have affected results; however, in which direction cannot be predicted. According to previous data, older mothers access health services more frequently² and may have higher risks of cesarean⁴; however, their expectation of QMNC may also be higher. In view of these limitations, we cannot extrapolate the results to the entire population of mothers. Nevertheless, the number of participants is reasonably large and reflects the current tendency of growth in internet users, in higher educated women, and women aged between 25 and 35 years of old. For targeted research on younger and older mothers (representing 9.3% and 16.3% of the

total number of mothers in 2020),³⁵ other specific determinants should be included.

In conclusion, results from this study provide new data valuable for both researchers and policymakers, providing a comprehensive set of WHO standards-based QMNC indicators and showing that major gaps remain in QMNC in Romania—with women who gave birth by emergency cesarean the most affected. There is an urgent need to understand the multiple underlying causes generating low quality of maternal and newborn care in Romania during the pandemic and to monitor trends over time and beyond the pandemic. Most importantly, it is critical to identify the most effective and sustainable interventions to improve QMNC and then take action.

AUTHOR CONTRIBUTIONS

MRO conceived the paper with major inputs from ML, AAS, and CMH. IM analyzed the data with major inputs from MRO, ML, and EPV. MIN and IN contributed to the interpretation of the data in the local context. MRO drafted the first version, with major inputs from ML. All authors approved the final version of the manuscript before submission.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data are available upon reasonable request to the corresponding author.

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