DOI: 10.1002/ijgo.14459

SUPPLEMENT ARTICLE

International Journal of Gynecology & Obstetrics FIGO WILEY

Individual and country-level variables associated with the medicalization of birth: Multilevel analyses of IMAgiNE EURO data from 15 countries in the WHO European region

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Funding information
IMAgiNE EURO project was supported by the Ministry of Health, Rome - Italy, in collaboration with the Institute for Maternal and Child Health IRCCS Burlo Garofolo, Trieste - Italy. This study was supported by Bielefeld University through the Gender Epidemiology Junior Research Group and the Projekt DEAL.

Abstract

Objective: To investigate potential associations between individual and country-level factors and medicalization of birth in 15 European countries during the COVID-19 pandemic.

Methods: Online anonymous survey of women who gave birth in 2020–2021. Multivariable multilevel logistic regression models estimating associations between indicators of medicalization (cesarean, instrumental vaginal birth [IVB], episiotomy, fundal pressure) and proxy variables related to care culture and contextual factors at the individual and country level.

Results: Among 27 173 women, 24.4% (n = 6650) had a cesarean and 8.8% (n = 2380) an IVB. Among women with IVB, 41.9% (n = 998) reported receiving fundal pressure. Among women with spontaneous vaginal births, 22.3% (n = 4048) had an episiotomy. Less respectful care, as perceived by the women, was associated with higher levels of medicalization. For example, women who reported having a cesarean, IVB, or episiotomy reported not feeling treated with dignity more frequently than women who did not have those interventions (odds ratio [OR] 1.37; OR 1.61; OR 1.51, respectively; all: $P<0.001$). Country-level variables contributed to explaining some of the variance between countries.

Conclusion: We recommend a greater emphasis in health policies on promotion of respectful and patient-centered care approaches to birth to enhance women's experiences of care, and the development of a European-level indicator to monitor medicalization of reproductive care.

KEYWORDS
birth, cesarean, episiotomy, Europe, gender equality, IMAgiNE EURO, medicalization, midwifery, respectful maternity care

1 | INTRODUCTION

Defined by the World Health Organization (WHO) as the "application of a range of labor practices to initiate, accelerate, terminate, regulate or monitor the physiological process of labor", the medicalization of birth, especially when overused, also tends "to undermine the woman's own capability to give birth and negatively impacts her childbirth experience".[1] In the WHO European Region there is high heterogeneity in the use of obstetric interventions across countries.[2,3] The Organization for Economic Co-operation and Development (OECD) reports cesarean rates varying from 16.2% in the Netherlands to 39.3% in Poland,[4] while there is no evidence of clear benefits (e.g. in terms of maternal and neonatal mortality) beyond a cesarean rate of 10%.[5] Similarly, use of instruments to assist vaginal birth is recommended only when a set of specific conditions are met, as it carries a risk of increased maternal and infant morbidity.[6] Other practices not recommended by the WHO due to a lack of clear benefit and increased risk of adverse outcomes include routine or liberal use of episiotomy and fundal pressure,[1,7] although these are common in the WHO European region.

During the COVID-19 pandemic, particularly its initial phases, several studies documented an increase in interventions such as higher rates of cesarean, induction, and augmentation of labor, although with large heterogeneity of practices in different settings.[8–10] The possibility of increased medicalization of care due to the COVID-19 pandemic has been reported in European countries; for example, a higher induction rate in Italy[11] and an increased cesarean rate without an increase in cesarean indication in England[12] were observed. Such practices, along with early pandemic restrictive policies in maternity wards (e.g. denial of birth companion),[13,14] have caused concerns among human rights advocates and associations of care professionals who were prompt to warn healthcare facilities against potential negative impacts on birth experiences and outcomes.[15,16] The need to prioritize evidenced-based care has since been made clear in professional guidelines and recommendations, which noted the importance of upholding women's rights when implementing COVID-19 pandemic-related measures.[17,18]

Comparable data across countries are critical for monitoring and improving birth outcomes and implementing evidence-based care during the COVID-19 pandemic. However, to date, there is no

multicountry study reporting on indicators of medicalization of care during the pandemic.[9] Additionally, most studies on medicalization of birth have investigated its determinants only at the micro (individual) level, focusing on women's sociodemographic characteristics, provider characteristics, type of hospitals, and other aspects of case management.[2–20] However, a country's more general context, its health system, care culture, and social norms can also influence the provision of care.[21]

Different approaches to maternity care are embedded within wider discourses on childbirth risks and medicalization of birth.[22] Good communication, shared decision-making, and overall patient-centered respectful care can be seen as alternative approaches to a more "technocratic" understanding of birth processes.[23] The evidence-informed framework for maternal and newborn care recently published in the *Lancet* midwifery series identifies limiting the use of unnecessary interventions, including cesarean without a medical indication, as part of the midwifery philosophy.[24] Midwife-led continuity-of-care (MLCC) models, in which a known midwife or a small group of known midwives support low-risk women from pregnancy through the postpartum period, are recommended by WHO for pregnant women in settings with well-functioning midwifery programs.[1] MLCC models are complex care processes, and it is unclear whether positive outcomes stem from the continuity of care, the midwifery philosophy of care promoting autonomy and confidence in the woman's own body function, or other factors. Importantly, the MLCC model requires that midwives are available in sufficient number and have reasonable caseloads.[1] This may involve a shift in financial resources to ensure that health systems are equipped with adequate human resources.[25]

Alongside well-known social determinants of health such as socioeconomic status and migration background, gender norms play an important role in the construction of health inequalities.[26,27] The link between medicalization and gendered power relations and hierarchies has been the subject of numerous studies in the social sciences.[28–30] In particular, the approach to reproductive health and birth is often interpreted as a reflection of the role and place granted to women in societies, and how they are valued in other spheres of life.[31] Most of the literature on medicalization of birth and gender norms is qualitative, while quantitative research on the topic is limited. Rather than directly measuring gender norms, quantitative studies use proxies that measure the manifestation of gender imbalances in different spheres of life (e.g. health, education, employment) such as gender equality indices.[32,33] Overall, there is a lack of quantitative research exploring the link between the medicalization of birth and gender-related country-level factors, when adjusting also for individual sociodemographic variables.

Multilevel analyses can capture societal factors and their consequences on health outcomes. They have been used in health research[34]; for example, to explore the multilevel determinants of discrimination on health status.[35] The units of analysis are usually individuals nested within contextual units.[36] The present study considered individual births (level 1) as nested within national contexts of care culture and gender equality (level 2) to investigate the potential association between individual and country-level characteristics and the medicalization of birth in 15 European countries during the first 15 months of the COVID-19 pandemic.

2 | MATERIALS AND METHODS

IMAgiNE EURO is a multicountry cross-sectional study.[37] Women aged 18 years and older who gave birth in a facility from March 1, 2020 were eligible to participate in an online, open, anonymous survey (REDCap 8.5.21; Vanderbilt University, Nashville, TN, USA) on a voluntary basis. The survey was available in 23 languages and actively promoted by project partners through a predefined dissemination plan, which principally included social media, organizational websites, and local networks. It included questions on the individual characteristics of the participants, provision of care, the experience of care, availability of human and physical resources, and organizational features related to the COVID-19 pandemic. Women consented to participation before completing the questionnaire. There were no incentives to participate in the survey.

The survey was approved by the Institutional Review Board of the coordinating center, IRCCS Burlo Garofolo Trieste (IRB-BURLO 05/2020 15.07.2020) and by ethical committees of four other countries: Portugal (Instituto de Saúde Pública da Universidade do Porto, CE20159), Norway (Norwegian Regional Committee for Medical Research Ethics, 2020/213047), Germany (Bielefeld University ethics committee, 2020-176), and Latvia (Rīgas Stradiņa universitātes, 22-2/140/2021-16/03/2021). No data elements that could disclose personal identity were collected and data were stored and analyzed by the coordinating center; therefore, other partners' ethics committees waived formal approval. The survey met General Data Protection Regulation (GDPR) requirements (https://gdpr.eu/).

The outcomes of the study were four dichotomous variables used as proxies to measure medicalization of birth: cesarean, instrumental vaginal birth (IVB), episiotomy, and fundal pressure. In the majority of cases, cesarean is performed by an obstetrician/gynecologist (ob/gyn) in surgical settings, but occasionally by other surgeons. In most countries included in the study, IVB is usually not performed by midwives alone, and requires the presence of an ob/gyn doctor. In theory, episiotomy and fundal pressure can happen during both doctor-led and midwife-led births. Due to the questionnaire's structure, not all outcomes were reported for the whole study population: episiotomy was only recorded among women who had spontaneous vaginal birth (SVB); and fundal pressure among women who had IVB. Emergency cesarean (i.e. unplanned cesarean) was also used as an outcome for sensitivity analyses.

At the individual level we included the following variables that pertain to care culture: type of facility (public vs. private) and measures of respectful maternity care as perceived by women (yes/sometimes/no): effective communication, involvement in choices, companion allowed to stay as much as needed, and treated with dignity. For episiotomy, which can be performed by midwives and doctors, we included a birth attendant variable (birth assisted by a midwife and without presence of an ob/gyn doctor [yes/no]).

At the country level, we included proxy measures of care culture and social norms:

- The number of midwives per 100000 inhabitants.[38] Although the role of midwives varies in different settings, a higher prevalence of midwives may be an appropriate way to signal a maternity care system based on midwifery care.[25]
- National cesarean rates,[4] understood as a proxy of the medicalization of birth.
- The global gender gap index (GGGI) by the World Economic Forum[39] as a proxy for the manifestation of gender norms. This estimates gender-related disparities through economic, political, educational, and health variables. Scores range between 0 and 1 (1 = total equality). For sensitivity analyses, we used the OECD Social Institutions and Gender Index (SIGI), which has a strong emphasis on social structures (e.g. measures of discriminatory family code, restricted physical integrity/resources and civil rights).[40] Scores range between 0 and 100 (100 = very high discrimination). SIGI data were missing for Luxembourg.
- Economic indicators that may be relevant for the financing of health and the healthcare workforce: the national gross domestic product per capita (GDP) and health expenditure as a percentage of GDP for the year 2021.

Considering the relevance of some demographic factors on the birthing process and birth outcomes, we also controlled for the following covariates: woman's age, primiparity (yes/no), formal educational level (six categories, from none to postgraduate degree), and migration background (was a woman born in the country where she gave birth: yes/no).

Descriptive statistics were calculated for all variables of interest. We performed multivariable, multilevel logistic regression models to investigate associations between medicalization and proxy variables of care culture at the individual and country level, controlling for relevant covariates. Random intercepts for countries were included to account for the variation across states. Analyses were conducted in R version 4.1.1.[41]

3 | RESULTS

3.1 | Participant characteristics

Participant characteristics are summarized in Table 1. Among the eligible women who gave birth between March 1, 2020 and October 28, 2021 (i.e. date of the data download), 27173 were included in the analysis (Figure 1). For the majority, it was their first time giving birth (n = 15738, 57.9%). Participants tended to be highly educated (n = 18573, 68.4% with at least a university degree). Over 90% (n = 24621) were born in the country where they gave birth. Almost 90% (n = 24276) gave birth in a public facility and about 75% (n = 20026) were aged 25–35 years.

3.2 | Indicators of the medicalization of birth

Out of the total sample, 24.4% (n = 6650) of women had a cesarean and 8.8% (n = 2380) an IVB (Table 1). Among the women who had IVB, 41.9% (n = 998) reported receiving fundal pressure. Among the women who had SVB, 22.3% (n = 4048) had an episiotomy. Regarding perception of maternity care, 32.0% (n = 8682) of women reported that communication from health workers was partly or not effective at all, 37.8% (n = 10268) felt they were not always or never involved in medical choices, and 26.1% (n = 7097) felt they were not always or never treated with dignity. More than 60% (n = 16789) reported that their birth companion of choice was not allowed to accompany them for as long as they needed (Table 1).

3.3 | Multilevel analysis

Several individual and country-level variables were significantly associated with cesarean (Table 2). At the individual level, not being involved in medical choices (sometimes: odds ratio [OR] 1.15; confidence interval [CI] 1.06–1.24; no: OR 1.29; CI 1.15–1.44), not being treated with dignity (sometimes: OR 1.29; CI 1.19–1.41; no: OR 1.37; CI 1.17–1.60), not being allowed a companion of choice (no: OR 1.42; CI 1.31–1.53), being older than 35 (OR 1.51; CI 1.40–1.64), and giving birth in a private hospital (OR:1.88; CI 1.69-2.10) were all associated with increased odds of having a cesarean. At the country level, a higher national cesarean rate (OR 1.88; CI 1.51–2.34) was positively associated with cesarean.

Women who had IVB more frequently reported not being involved in medical choices (sometimes: OR 1.29; CI 1.14–1.45) and not being treated with dignity (sometimes: OR 1.21; CI 1.06–1.38; no: OR 1.61; CI 1.26–2.05) compared with women who had an SVB (Table 2). Younger (OR 0.89; CI 0.80–0.99) or multiparous women were less likely to have an IVB (OR 0.20; CI 0.17–0.22) compared with women aged 31–35 years (reference range) and primiparous women. At the country level, there was a small positive association between GDP per capita and IVB (OR 1.02; CI 1.00–1.03).

Episiotomy was less likely in births attended by a midwife only (OR 0.51; CI 0.47–0.56). Younger (<31 years) (OR 0.89; CI 0.81–0.98) or multiparous women (OR 0.28; CI 0.25–0.30) were less likely to have an episiotomy. An episiotomy was more likely when women reportedly lacked involvement in medical choice (sometimes: OR 1.33; CI 1.19–1.48; no: OR 1.70; CI 1.45–1.98), companion was not allowed (OR 1.18; CI 1.07–1.31), and when women reported not being treated with dignity (sometimes: OR 1.13; CI 1.01–1.27; no: OR 1.51; CI 1.21–1.90). At the country level, there was only a small negative association between GDP per capita and episiotomy (OR 0.98; CI 0.97–0.99) (Table 3).

Fundal pressure was associated with women reporting no (OR 1.45; CI 0.99–2.12) or limited (OR 1.31; CI 1.02–1.69) involvement in medical choices and was slightly negatively associated with GDP per capita (OR 0.98; CI 0.96–0.99) (Table 3).

TABLE 1 Characteristics of the sample, including frequency of the outcomes (2020–2021).

Characteristics	Overall *n* = 27 173 No. (%)	Spontaneous vaginal birth *n* = 18 143 No. (%)	Instrumental vaginal birth *n* = 2380 No. (%)	Cesarean *n* = 6650 No. (%)
Countries				
Bosnia and Herzegovina	534 (2.0)	368 (2.0)	7 (0.3)	159 (2.4)
Croatia	1101 (4.1)	819 (4.5)	29 (1.2)	253 (3.8)
France	1397 (5.1)	945 (5.2)	225 (9.5)	227 (3.4)
Germany	1132 (4.2)	735 (4.1)	90 (3.8)	307 (4.6)
Italy	4833 (17.8)	3137 (17.3)	345 (14.5)	1351 (20.3)
Latvia	2079 (7.7)	1512 (8.3)	149 (6.3)	418 (6.3)
Luxembourg	509 (1.9)	312 (1.7)	71 (3.0)	126 (1.9)
Norway	3326 (12.2)	2387 (13.2)	420 (17.6)	519 (7.8)
Portugal	1845 (6.8)	783 (4.3)	439 (18.4)	623 (9.4)
Romania	1220 (4.5)	454 (2.5)	13 (0.5)	753 (11.3)
Serbia	1030 (3.8)	678 (3.7)	27 (1.1)	325 (4.9)
Slovenia	2342 (8.6)	1797 (9.9)	82 (3.4)	463 (7.0)
Spain	359 (1.3)	223 (1.2)	59 (2.5)	77 (1.2)
Sweden	4833 (17.8)	3628 (20.0)	353 (14.8)	852 (12.8)
Switzerland	633 (2.3)	365 (2.0)	71 (3.0)	197 (3.0)
Year of childbirth				
2020	21 852 (80.4)	14 473 (79.8)	1961 (82.4)	5418 (81.5)
2021	4516 (16.6)	3158 (17.4)	348 (14.6)	1010 (15.2)
Missing	805 (3.0)	512 (2.8)	71 (3.0)	222 (3.3)
Woman gave birth in the same country where she was born				
Yes	24 621 (90.6)	16 492 (90.9)	2123 (89.2)	6006 (90.3)
No	1901 (7.0)	1241 (6.8)	196 (8.2)	464 (7.0)
Missing	651 (2.4)	410 (2.3)	61 (2.6)	180 (2.7)
Age, years				
18–24	1449 (5.3)	1082 (6.0)	112 (4.7)	255 (3.8)
25–30	9628 (35.4)	6716 (37.0)	901 (37.9)	2011 (30.2)
31–35	10 398 (38.3)	6927 (38.2)	911 (38.3)	2560 (38.5)
36–39	3875 (14.3)	2403 (13.2)	304 (12.8)	1168 (17.6)
≥40	1177 (4.3)	610 (3.4)	91 (3.8)	476 (7.2)
Missing	646 (2.4)	405 (2.2)	61 (2.6)	180 (2.7)
Educational level[a]				
None	9 (0.0)	7 (0.0)	0 (0.0)	2 (0.0)
Elementary school	92 (0.3)	66 (0.4)	6 (0.3)	20 (0.3)
Junior high school	1518 (5.6)	1100 (6.1)	70 (2.9)	348 (5.2)
High school	6334 (23.3)	4285 (23.6)	524 (22.0)	1525 (22.9)
University degree	11 188 (41.2)	7612 (42.0)	937 (39.4)	2639 (39.7)
Postgraduate degree/Master/ Doctorate or higher	7385 (27.2)	4668 (25.7)	781 (32.8)	1936 (29.1)
Missing	647 (2.4)	405 (2.2)	62 (2.6)	180 (2.7)

(Continues)

TABLE 1 (Continued)

Characteristics	Overall *n* = 27 173 No. (%)	Spontaneous vaginal birth *n* = 18 143 No. (%)	Instrumental vaginal birth *n* = 2380 No. (%)	Cesarean *n* = 6650 No. (%)
Parity				
1	15 738 (57.9)	9609 (53.0)	2010 (84.5)	4119 (61.9)
>1	10 786 (39.7)	8127 (44.8)	309 (13.0)	2350 (35.3)
Missing	649 (2.4)	407 (2.2)	61 (2.6)	181 (2.7)
Indicators of medicalization				
Spontaneous vaginal birth (SVB)	18 143 (66.8)			
Episiotomy among SVB	4048/18 143 (22.3)	4048 (22.3)	-	-
Instrumental vaginal birth (IVB)	2380 (8.8)			
Fundal pressure among IVB	998/2380 (41.9)	-	998 (41.9)	-
Cesarean	6650 (24.4)			
Type of hospital				
Public	24 276 (89.3)	16 652 (91.8)	2041 (85.8)	5583 (84.0)
Private	2247 (8.3)	1082 (6.0)	278 (11.7)	887 (13.3)
Missing	650 (2.4)	409 (2.3)	61 (2.6)	180 (2.7)
Healthcare worker who directly attended the birth				
Midwife and no obstetrician/gynecologist	-	9486 (34.9)	-	-
Measures of respectful maternity care				
Effective communication				
Yes	18 491 (68.0)	12 833 (70.7)	1524 (64.0)	4134 (62.2)
Sometimes	7138 (26.3)	4381 (24.1)	708 (29.7)	2049 (30.8)
No	1544 (5.7)	929 (5.1)	148 (6.2)	467 (7.0)
Involvement in medical choices				
Yes	16 905 (62.2)	11 932 (65.8)	1354 (56.9)	3619 (54.4)
Sometimes	6818 (25.1)	4221 (23.3)	719 (30.2)	1878 (28.2)
No	3450 (12.7)	1990 (11.0)	307 (12.9)	1153 (17.3)
Companion of choice allowed to stay				
Yes	10 384 (38.2)	7322 (40.4)	1034 (43.4)	2028 (30.5)
Sometimes	4100 (15.1)	2977 (16.4)	376 (15.8)	747 (11.2)
No	12 689 (46.7)	7844 (43.2)	970 (40.8)	3875 (58.3)
Treated with dignity				
Yes	20 076 (73.9)	14 011 (77.2)	1648 (69.2)	4417 (66.4)
Sometimes	5814 (21.4)	3436 (18.9)	584 (24.5)	1794 (27.0)
No	1283 (4.7)	696 (3.8)	148 (6.2)	439 (6.6)

[a]Wording on education levels agreed among partners during survey development (Delphi).

Despite the relative weakness or absence of associations between national level variables and the outcomes, the intraclass correlation (ICC) decreased substantially between the individual level and the multilevel model (e.g. for episiotomy from 0.19 to 0.07), indicating that the country-level indicators explain some of the variance between the countries (Table 3). Model fit also improved significantly after inclusion of country-level variables compared with the empty model and models with individual level variable only (supporting information Tables 1–4).

3.4 | Sensitivity analyses

In a model with emergency cesarean as an outcome, the results were similar to the cesarean model at the individual level. However, at the country level there was additionally a positive association between GGGI and emergency cesarean (OR 1.64; CI 1.14–2.35) (supporting information Table 5). The SIGI was not associated with any medicalization variable in the fully adjusted models (supporting information Tables 6–10).

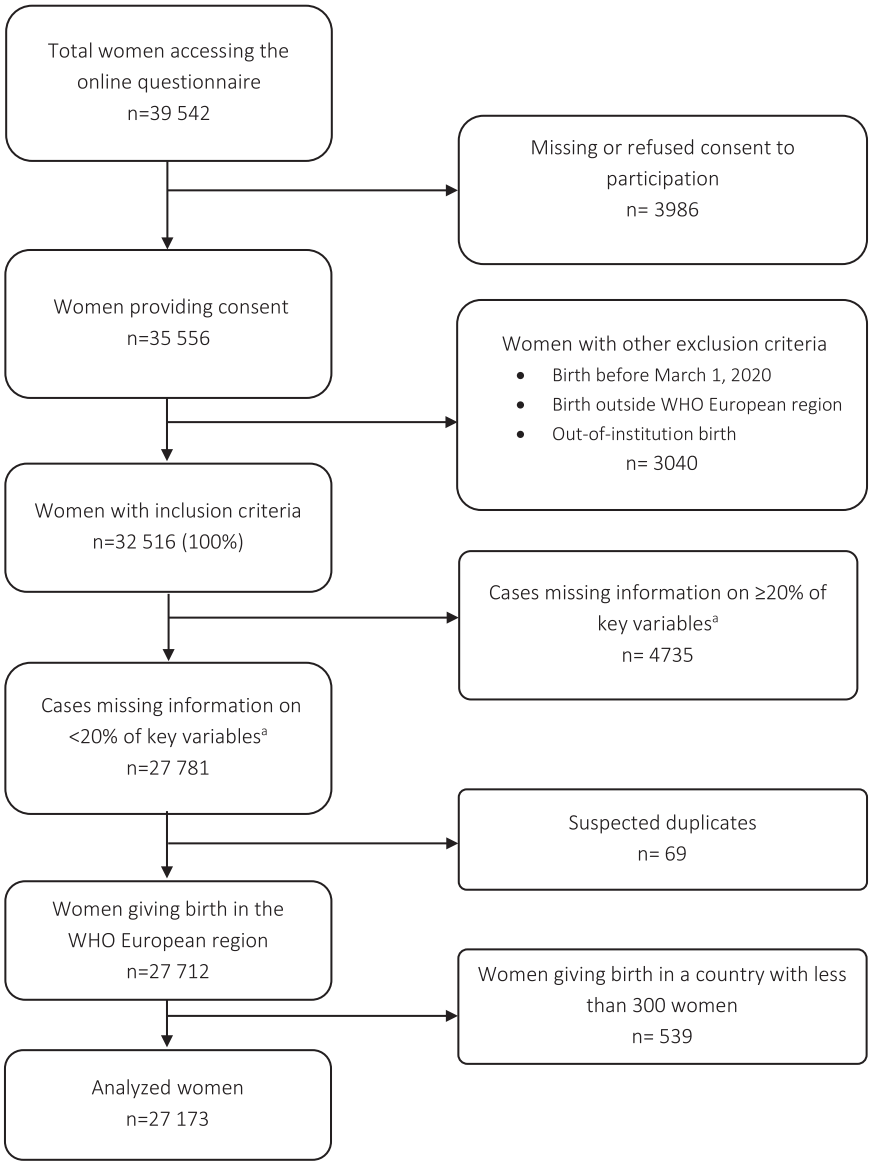

FIGURE 1 Flow diagram of study participants. [a]We used 45 key variables (40 key quality measures and five key sociodemographic questions). see Lazzerini et al.[37] for a description of those variables.

4 | DISCUSSION

With more than 27 000 participants across 15 countries, this study is a first attempt to investigate individual and country-level factors associated with indicators of birth medicalization during the COVID-19 pandemic in the WHO European region. As a cross-sectional study based on an online questionnaire, this study is not representative and may carry some bias (e.g. high level of education of the participants). However, it gives valuable insights into how quality of care was perceived by women giving birth in the first year of the pandemic.

The findings show that most of the variables associated with indicators of medicalization are situated at the individual level, directly defined by the immediate birth environment (i.e. what happens during the birth process between the woman and the care providers, as well as by the characteristics of the woman herself). Episiotomies were less likely in births attended by a midwife only than in those where the women reported the presence of an ob/gyn doctor. Midwives' tendency to promote a less interventionist and more physiological approach to birth has been previously highlighted.[42–44] This finding also resonates with studies on birth medicalization and the role of healthcare providers, which showed that, for example, low-risk women had higher odds of vaginal birth when attended by midwives compared with physicians in the USA,[45] and that women in MLCC models were half as likely to have an IVB and had significantly lower cesarean rates compared with women giving birth in obstetric care models.[46] However, it is also possible that ob/gyn doctors are involved in higher-risk cases, which are also more likely to have medical indication for episiotomies. Our data did not allow us to investigate medical indications for interventions nor specific (avoided) neonatal intensive care unit (NICU) outcomes that may have contributed to justify the use of some interventions.

TABLE 2 Results of multilevel regression analysis for outcomes of cesarean and instrumental vaginal birth (2020–2021).

	Cesarean			Instrumental vaginal birth		
	OR	95% CI	*P* value	OR	95% CI	*P* value
Level 1						
Private hospital (ref: public hospital)	1.88	1.69–2.10	<0.001	1.06	0.90–1.24	0.499
Effective communication (ref: yes)						
Sometimes	1.03	0.94–1.12	0.535	0.95	0.84–1.08	0.441
No	0.85	0.72–0.99	0.035	0.80	0.63–1.02	0.074
Involvement in medical choices (ref: yes)						
Sometimes	1.15	1.06–1.24	0.001	1.29	1.14–1.45	<0.001
No	1.29	1.15–1.44	<0.001	1.18	0.98–1.41	0.076
Companion of choice allowed to stay (ref: yes)						
Sometimes	0.87	0.79–0.96	0.005	1.00	0.87–1.14	0.963
No	1.42	1.31–1.53	<0.001	0.93	0.83–1.04	0.180
Treated with dignity (ref: yes)						
Sometimes	1.29	1.19–1.41	<0.001	1.21	1.06–1.38	0.004
No	1.37	1.17–1.60	<0.001	1.61	1.26–2.05	<0.001
Age, years (ref: 31–35)						
18–30	0.75	0.70–0.81	<0.001	0.89	0.80–0.99	0.025
>35	1.51	1.40–1.64	<0.001	1.01	0.89–1.15	0.860
Parity >1 (ref: parity = 1)	0.74	0.69–0.78	<0.001	0.20	0.17–0.22	<0.001
Educational level (ref: university degree)						
High school or lower	1.04	0.97–1.12	0.240	1.00	0.89–1.12	0.946
Postgraduate degree/ Master/Doctorate or higher	0.91	0.85–0.98	0.012	1.07	0.96–1.20	0.199
Migrant women (ref: native)	1.00	0.89–1.13	0.948	1.02	0.86–1.21	0.810
Level 2						
GGGI (2020) (increase of 10%)	1.47	0.97–2.21	0.067	2.03	0.68–6.04	0.205
Number of midwives per 100 000 inhabitants (increase of 1 midwife per 100 000 inhabitants)	1.00	0.99–1.01	0.763	0.98	0.96–1.01	0.127
National cesarean rate (increase of 10%)	1.88	1.51–2.34	<0.001	0.86	0.45–1.61	0.630
GDP per capita (2020) (increase of 1000 GDP per capita)	1.00	0.99–1.00	0.539	1.02	1.00–1.03	0.006
Health expenditure as % of GDP (2018) (increase of 1%)	0.95	0.89–1.01	0.102	1.13	0.94–1.36	0.204
Observations						
No.	26 505			26 505		
Intraclass correlation (ICC) in model with Level 1 variables	0.05			0.21		
ICC in model with Level 1 and 2 variables	0.01			0.10		

Abbreviations: CI, confidence interval; GDP, gross domestic product; GGGI, global gender gap index; OR, odds ratio.

TABLE 3 Results of multilevel regression analysis for outcomes of episiotomy and fundal pressure (2020–2021).

	Episiotomy			Fundal pressure		
	OR	95% CI	*P* value	OR	95% CI	*P* value
Level 1						
Births directly assisted by a midwife (no ob/gyn doctor)	0.51	0.47–0.56	<0.001	-	- -	-
Private hospital (ref: public hospital)	1.14	0.95–1.37	0.163	1.14	0.83–1.58	0.417
Effective communication (ref: yes)						
Sometimes	1.05	0.93–1.17	0.432	0.91	0.69–1.19	0.480
No	1.06	0.85–1.31	0.625	0.81	0.49–1.34	0.410
Involvement in choices (ref: yes)						
Sometimes	1.33	1.19–1.48	<0.001	1.31	1.02–1.69	0.033
No	1.70	1.45–1.98	<0.001	1.45	0.99–2.12	0.056
Companion of choice allowed to stay (ref: yes)						
Sometimes	1.05	0.92–1.19	0.485	1.07	0.79–1.44	0.664
No	1.18	1.07–1.31	0.002	1.07	0.85–1.37	0.554
Treated with dignity (ref: yes)						
Sometimes	1.13	1.01–1.27	0.039	1.18	0.89–1.56	0.241
No	1.51	1.21–1.90	<0.001	1.38	0.84–2.25	0.205
Age, years (ref: 31–35)						
18–30	0.89	0.81–0.98	0.016	1.04	0.84–1.30	0.702
>35	1.11	0.99–1.25	0.086	1.01	0.77–1.33	0.941
Parity >1 (ref: parity = 1)	0.28	0.25–0.30	<0.001	0.77	0.57–1.04	0.084
Educational level (ref: university degree)						
High school or lower	1.04	0.94–1.15	0.453	1.23	0.96–1.57	0.106
Postgraduate degree/Master/Doctorate or higher	0.97	0.87–1.07	0.493	0.86	0.68–1.09	0.207
Migrant women (ref: native)	0.97	0.82–1.14	0.701	0.98	0.68–1.41	0.905
Level 2						
GGGI (2020) (increase of 10%)	1.11	0.40–3.10	0.837	0.35	0.07–1.79	0.208
Number of midwives per 100 000 inhabitants (increase of 1 midwife per 100 000 inhabitants)	1.00	0.99–1.02	0.667	0.98	0.96–1.01	0.257
National cesarean rate (increase of 10%)	1.50	0.88–2.57	0.141	0.79	0.32–1.96	0.618
GDP per capita (2020) (increase of 1000 GDP per capita)	0.98	0.97–0.99	<0.001	0.98	0.96–0.99	0.001
Health expenditure as % of GDP (2018) (increase of 1%)	0.86	0.74–1.01	0.060	0.83	0.66–1.05	0.130
Observations						
No.	17 722			2316		
Intraclass correlation (ICC) in model with Level 1 variables	0.19			0.37		
ICC in model with Level 1 and 2 variables	0.07			0.12		

Abbreviations: CI, confidence interval; GDP, gross domestic product; GGGI, global gender gap index; Ob/gyn, obstetrician/gynecologist; OR, odds ratio.

Our study only investigated some interventions that can be considered proxy indicators of the medicalization of birth. We did not collect data on other interventions, such as induction of labor and epidural, which could help measure to what extent SVB is also medicalized. Our data show that over 40% of women who had an IVB reported receiving fundal pressure—a high figure for an intervention that is likely to cause more harm than benefit. Although we only asked about fundal pressure among women who had IVB, it is

suspected that fundal pressure is also very common in SVB (for example in Spain[47]), and often performed by midwives. Unfortunately, official estimates are lacking since most countries do not collect this data. Further research and monitoring should aim to systematically report occurrences of fundal pressure for all modes of birth.

Associations between indicators of birth medicalization and the variables describing the presence or absence of disrespectful care as perceived by the women (e.g. being treated with dignity and feeling involved in medical choices) also point to the importance of the interactions between healthcare professionals and the woman in the labor room. Furthermore, a clear pattern across outcomes suggests that women perceiving care as respectful tended to experience lower levels of medicalization. This could, to some extent, confirm the hypothesis of the benefits of a physiological, evidence-based, patient-centered approach to birth to contain or reduce medicalization. Conversely, this could also mean that women who experience lower levels of medicalization are more likely to report a better perception and experience of care than those who received more obstetric interventions.[47,48] In any case, our results highlight the relevance of the perception of care and how this has the potential to influence or be shaped by the medicalization of birth. Although circumstances surrounding more complicated births may make it difficult to engage in effective communication, more efforts need to be made in cases of obstetric intervention to ensure that respectful care is still given, and that women are involved in decisions, consent to care, and are satisfied with outcomes.

The importance of individual-level factors and the relatively weak (or totally absent depending on models) association between country-level factors and indicators of medicalization do not necessarily imply that the country-level culture and norms are not relevant to individual birth outcomes. We used proxies to capture care culture and gender norms. To our knowledge, the number of midwives per 100000 inhabitants has not been used so far for this purpose in the scientific literature. Regarding gender equality indices, these have been criticized for their limited scope (specifically the dimensions and variables they include) and for failing to capture important aspects of gender inequality (e.g. power relations).[49,50] In the absence of more appropriate measures that allow international comparisons, the variables chosen were considered the best fit for our objectives. However, because they do not directly measure culture and norms (rather the consequences of them), they may not have captured country-specific characteristics that are most relevant to medicalization. However, the decrease in ICC variance suggests the relevance of taking into account the macro level, and that some type of country effect may be contributing to the medicalization of births and explain some of the variations between countries. A new indicator of structural, state-level sexism built specifically for the USA has proven useful in understanding differences in cesarean rates across states.[32] It includes variables measuring gender inequality in the political, economic, and cultural spheres, as well as a measure of access to reproductive care. One could envisage similar research in Europe, using variations of the OECD SIGI or the European Union Gender Equality Index to investigate country-level cesarean rates. Another relevant addition to this field of research would be the creation at the European level of a measure of the medicalization of (reproductive) care. Indeed, the association between national cesarean rate and cesarean at the individual level in our study, when controlling for other variables, suggests that there may be some care practices in a given country that tend to be more or less medicalized. A more complete measure of medicalization, which would for example take into account a range of obstetric interventions and track the division of tasks between physicians, midwives, and nurses in the different countries, could allow for better monitoring. As a first step, the collection of basic data on the prevalence of evidence-based and nonevidence-supported practices, such as occurrences of fundal pressure, should also be systematized. Additional variables, such as the type of facility (e.g. large specialized hospital, midwife-led maternity center) or staffing numbers at the facility level,[51] could also capture aspects of care culture and the role of organizational determinants.

Another aspect to take into account when interpreting our results is the COVID-19 pandemic itself. Health systems across Europe have responded differently to the risks and challenges posed by the pandemic, and maternity care facilities have encountered various levels of disruption.[52,53] In addition to the specific safety measures implemented in maternity care across countries, birth facilities also had to deal with the consequences of a general pressure on health systems and shortages in human and material resources. We are unable to determine to what extent our findings are the consequences of those extraordinary circumstances or similar to what could have been observed pre-pandemic. Recent studies have shown that, for example, cesarean rates may not have actually increased during the pandemic, or at least not as much as expected at the beginning of the pandemic.[54] We know, however, that worry and "preparedness stress" (i.e. the feeling of being unprepared for birth due to the pandemic) increased in pregnant women during the pandemic[55,56] and that birth partners were not allowed in care facilities to the extent they were before the pandemic. These are two factors that may have contributed to more interventions and more reports of negative experiences.

Mindful of these limitations, we recommend further investigation of associations between individual- and country-level factors and medicalization of birth to better understand what could contribute to moving toward, or maintaining, levels of medicalization that are supported by the evidence, during the pandemic and beyond. Greater emphasis in health policies on the promotion of respectful and patient-centered care approaches to birth would be beneficial, as well as the development at the European level of an indicator for monitoring the medicalization of reproductive health care.

AUTHOR CONTRIBUTIONS

ML conceived the IMAgiNE EURO study, with major inputs from EPV, BC, and additional input from all other authors. All authors promoted the surveys and supported the process of data collection. CM, LW, and SBZ conceived the present article, with major inputs from ML. IM analyzed data, with major inputs from CM, LW, and ML. CM wrote the first draft, with major inputs from all authors. All authors approved the final version of the manuscript for submission.

ACKNOWLEDGMENTS

The IMAgiNE EURO project was supported by the Ministry of Health, Rome - Italy, in collaboration with the Institute for Maternal and Child Health IRCCS Burlo Garofolo, Trieste - Italy. This study was supported by Bielefeld University through the Gender Epidemiology Junior Research Group and the Projekt DEAL. Raquel Costa was supported by the Social European Fund and Foundation for Science and Technology—FCT—under a postdoctoral grant (SFRH/BPD/117597/2016). EPIUnit (UIDB/04750/2020), ITR (LA/P/0064/2020), and HEI-LAB (UIDB/05380/2020) are financed by the FCT (Portuguese Ministry of Science, Technology and Higher Education). Catarina Barata is a doctoral grant receiver (SFRH/BD/128600/2017), supported by the Social European Fund (ESF) and the Foundation for Science and Technology (FCT). Bielefeld University (Germany), through the Gender Epidemiology Junior Research Group, supported the conduct of the study in Germany and funded publication processing charges for the present article. We are grateful to the women who dedicated their time to complete the survey. Special thanks to the IMAgiNE EURO study group for their contribution to the development of this project and support for this manuscript. Open Access funding enabled and organized by Projekt DEAL.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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DATA AVAILABILITY STATEMENT

Data can be made available on reasonable request to the corresponding author.

DISCLAIMER

The authors alone are responsible for the views expressed in this article and they do not necessarily represent the views, decisions, or policies of the institutions with which they are affiliated.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Miani C, Wandschneider L, Batram-Zantvoort S, et al. Individual and country-level variables associated with the medicalization of birth: Multilevel analyses of IMAgiNE EURO data from 15 countries in the WHO European region. *Int J Gynecol Obstet*. 2022;159(Suppl. 1):9-21. doi:10.1002/ijgo.14459