

# BMJ Open Quality of care at childbirth during the COVID-19 pandemic in Belgium: a cross-sectional study based on WHO standards

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## ABSTRACT

**Objectives** To examine quality of maternal and newborn care (QMNC) around childbirth in facilities in Belgium during the COVID-19 pandemic and trends over time.

**Design** A cross-sectional observational study.

**Setting** Data of the Improving MATernal Newborn carE in the EURO region study in Belgium.

**Participants** Women giving birth in a Belgian facility from 1 March 2020 to 1 May 2023 responded a validated online questionnaire based on 40 WHO standards-based quality measures organised in four domains: provision of care, experience of care, availability of resources and organisational changes related to COVID-19.

**Primary and secondary outcome measures** Quantile regression analysis was performed to assess predictors of QMNC; trends over time were tested with the Mann-Kendall test.

**Results** 897 women were included in the analysis, 67% (n=601) with spontaneous vaginal birth, 13.3% (n=119) with instrumental vaginal birth (IVB) and 19.7% (n=177) with caesarean section. We found overall high QMNC scores (median index scores>75) but also specific gaps in all domains of QMNC. On provision of care, 21.0% (n=166) of women who experienced labour reported inadequate pain relief, 64.7% (n=74) of women with an instrumental birth reported fundal pressure and 72.3% (n=86) reported that forceps or vacuum cup was used without their consent. On experience of care, 31.1% (n=279) reported unclear communication, 32.9% (n=295) reported that they were not involved in choices, 11.5% (n=104) stated not being treated with dignity and 8.1% (n=73) experienced abuse. Related to resources, almost half of the women reported an inadequate number of healthcare professionals (46.2%, n=414). Multivariable analyses showed significantly lower QMNC scores for women with an IVB (-20.4 in the 50th percentile with p<0.001 and 95% CI (-25.2 to -15.5)). Over time, there was a significant increase in QMNC Score for 'experience of care' and 'key organisational changes due to COVID-19' (trend test p<0.05).

**Conclusions and relevance** Our study showed several gaps in QMNC in Belgium, underlying causes of these gaps should be explored to design appropriate interventions and policies.

**Trial registration number** NCT04847336.

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ A strength of this study is the use of a validated data collection tool, based on WHO standards, allowing for a comprehensive assessment of quality of maternal and newborn care (QMNC) around childbirth and comparison across countries.
- ⇒ The study covered the complete COVID-19 period and included a time trend analysis, showing how quality of care evolved over time during the COVID-19 pandemic.
- ⇒ The survey was only available online, which will exclude women facing digital poverty.
- ⇒ Women's responses regarding the QMNC are highly coloured by individual expectations, culture and norms.

## BACKGROUND

Childbirth should be a positive experience, ensuring women and their babies reach their full potential for health and well-being.<sup>1</sup> When analysing quality of maternity care worldwide, two extreme situations have been described: too little, too late (TLTL) and too much, too soon (TMTS).<sup>2</sup> While TLTL identifies care with inadequate resources, below evidence-based standards or care withheld or unavailable until too late to help. TMTS identifies care characterised by over-medicalisation, including the use of non-evidence-based interventions or interventions not appropriate for the case.<sup>2</sup> Typical examples of overused interventions during childbirth are caesarean sections, inductions or augmentation of labour, episiotomies and fundal pressure. Both TLTL and TMTS are costly for health systems and can be dangerous for women and newborns.<sup>3-5</sup> In addition, the literature indicates that women, both in low-income and high-income countries (HICs), are often not adequately informed and are minimally involved in decision-making prior to conducting these interventions during



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childbirth.<sup>5–8</sup> Also, other aspects of experience of care such as privacy, quality of communication, respect and dignity have been described as substandard both in low-income countries and HICs.<sup>9–10</sup>

In Belgium, the quality of maternal and newborn health has been mainly explored focusing on clinical outcomes and the provision of care.<sup>11–12</sup> Similar to neighbouring European countries, maternal and newborn health outcomes (such as mortality and morbidity) are among the best in the world.<sup>11–14</sup> Nevertheless, reports also show high rates of interventions (such as caesarean sections and episiotomies) with a high variation between hospitals.<sup>11</sup> This unexplained variation suggests that interventions are not always performed based on evidence and might be the result of organisational policies and health providers' preferences.<sup>11</sup> One prepandemic study also showed women often experience a lack of involvement in the decision-making process during childbirth in Belgium, negatively affecting experience of care.<sup>15</sup> However, more research using validated instruments is needed to capture both experience and provision of childbirth care in Belgium.

On 11 March 2020, the WHO declared the COVID-19 pandemic as a public health emergency of international concern, which was declared as ended on 5 May 2023. Globally, studies have shown that COVID-19 negatively impacted the provision and experience of maternal and newborn healthcare, especially in the first year of the pandemic.<sup>16–18</sup> Rapidly implemented measures (such as stringent lockdown measures, curfews, isolation of suspected and confirmed cases) to control the pandemic negatively affected the availability, utilisation and quality of essential maternal and newborn health services.<sup>17</sup> A systematic review showed maternal and fetal outcomes worsened globally during the COVID-19 pandemic, with an increase in maternal deaths, stillbirth, ruptured ectopic pregnancies and maternal depression.<sup>19–20</sup> However, outcomes show considerable disparity between different settings within and across countries<sup>18–20</sup> and changes over time are yet to be explored.

Improving MATernal Newborn carE in the EURO region (IMAgINE EURO) is a multicountry project that started at the onset of the COVID-19 pandemic, exploring through online surveys the perspective of women and healthcare providers (HCPs) on the quality of maternal and newborn care (QMNC) at childbirth in hospital settings. Two validated questionnaires were developed for this project, containing 80 prioritised WHO quality measures (out of the of more than 300 suggested by the WHO Standards for improving the QMNC).<sup>21</sup> This paper presents detailed survey findings on QMNC and trends over time, from the perspective of women who gave birth in Belgium during the COVID-19 pandemic, between March 2020 and May 2023.

## METHODS

A cross-sectional observational study was conducted and reported according to the Strengthening the Reporting

of Observational Studies in Epidemiology guidelines and the checklist can be found in online supplemental material 1.<sup>22</sup> As the first aim, overall quality of care was explored according to the WHO Quality of Care Measures. As a secondary aim, trends over time were analysed for the different subdomains.

## Data collection

The IMAgINE EURO project involved an online survey for women, translated into 23 languages, actively disseminated by project partners across the WHO European Region, including Belgium. This paper presents only the data collected from Belgium. A structured online questionnaire was used to collect data, recorded with Research Electronic Data Capture (REDCap V.8.5.21) via a centralised platform.<sup>23</sup> The process of questionnaire development, validation and previous use has been reported elsewhere<sup>24–25</sup> and details can be found in online supplemental material 2. The study was registered at the US National Library of Medicine under NCT04847336. The questionnaire for women included 40 questions on one key indicator each, equally distributed in four domains: the three domains of the WHO Quality measures,<sup>21</sup> namely, provision of care, experience of care and availability of human and physical resources, plus an additional domain on key organisational changes related to the COVID-19 pandemic.<sup>25</sup>

Two versions of the questionnaire were available, one tailored for women who experienced labour and one for women who did not (eg, women with caesarean section before labour started). Each included the 40 WHO standard-based prioritised quality measure with 34 measures in common. Labour was defined according to the National Institute for Health and Care Excellence (NICE) guidelines.<sup>26</sup> Questions on individual characteristics of the participants (eg, socioeconomic background, parity) were included. As reported elsewhere,<sup>25</sup> 40 indicators contributed to a composite QMNC Index, ranging from 0 to 100 for each of the four domains, for a total score ranging from 0 to 400 points and higher scores indicating higher adherence to the WHO Standards.<sup>27</sup> The online questionnaire was disseminated in Belgium by social media (Facebook and X) and by distributing leaflets in maternity wards, postnatal clinics and creches. The leaflet contained a QR code and link, bringing participants to the online questionnaire. Dissemination materials were available in Dutch, French and English. Around 90% of the Belgian population has Dutch or French as mother tongue, while English is the most spoken language by foreigners living in Belgium.<sup>28</sup> The Dutch and French leaflet directed participants immediately to the online survey (in Dutch and French, respectively), while the English flyer opened a landing page where participants could choose from 23 languages.

## Participants

Only women who gave birth in a Belgian facility between March 2020 and May 2023 were included in this study,

corresponding to the period the pandemic was officially declared by WHO.<sup>29</sup> Women needed to be 18 years or older to be eligible for participation. Women who gave birth multiple times during the described period could fill in the questionnaire for each childbirth. Women were able to select their preferred language from 28 languages available for completing the questionnaire and participated by actively clicking on the link or scanning the QR code to access the questionnaire. There were no exclusion criteria based on mode of birth, maternal complications or other obstetric characteristics.

### Data analysis

A minimum required sample size of 300 women was calculated, based on preliminary data from other studies on the hypothesis of an average QMNC Index (our primary outcome and dependent variable) of  $75\% \pm 7.5\%$  ( $300 \pm 30$  points, out of 400) and confidence level of 99.5%. Cases with >20% missing values and suspected duplicates, identified using date and place of birth, sociodemographic and obstetric data, were identified and the most recent record was retained. For the primary aim, we calculated absolute frequencies and percentages for sociodemographic variables and for each of the 40 key quality measures. The QMNC index was presented as median and IQR because not normally distributed (Shapiro-Wilk test for normality  $p < 0.05$ ).

In addition, we performed a multivariable quantile regression analysis with the QMNC Index as the dependent variable and with trimester, maternal age, parity, education, type of facility, mode of birth and presence of an obstetrician/gynaecologist directly assisting childbirth as independent variables. Quantile regression was chosen instead of linear regression since the QMNC Index was not normally distributed and owing to evidence of heteroskedasticity.<sup>30</sup> We conducted a multivariable quantile regression with robust SEs and we modelled the median, the 0.25th and 0.75th quantile, given statistical evidence of heteroskedasticity for parity, mode of birth, place of birth of the woman (Breusch-Pagan/Cook-Weisberg test  $p < 0.05$ ,  $H_0$ : homoskedasticity). The categories with the highest frequency were used as reference. For our secondary aim, we assessed the hypothesis that the QMNC Index improved over time during the pandemic period.<sup>31</sup> We first evaluated time trends by trimester for total QMNC Index and subsequently for the QMNC Index by domain. Time trends were tested with the Mann-Kendall test. All the tests were two-tailed and a  $p$  value  $< 0.05$  was considered statistically significant. Statistical analyses were performed using Stata version V.14 (Stata Corporation) and R V.4.1.1.<sup>32</sup>

Anonymity in data collection during the survey phase was ensured by not collecting any information that could disclose participant identity, such as facility of birth or day of birth of the woman. Data transmission and storage were secured by encryption.

### Patient and public involvement

Patients or the public were not involved in the design, conduct, reporting or dissemination plans of our research.

## RESULTS

### Sociodemographic characteristics

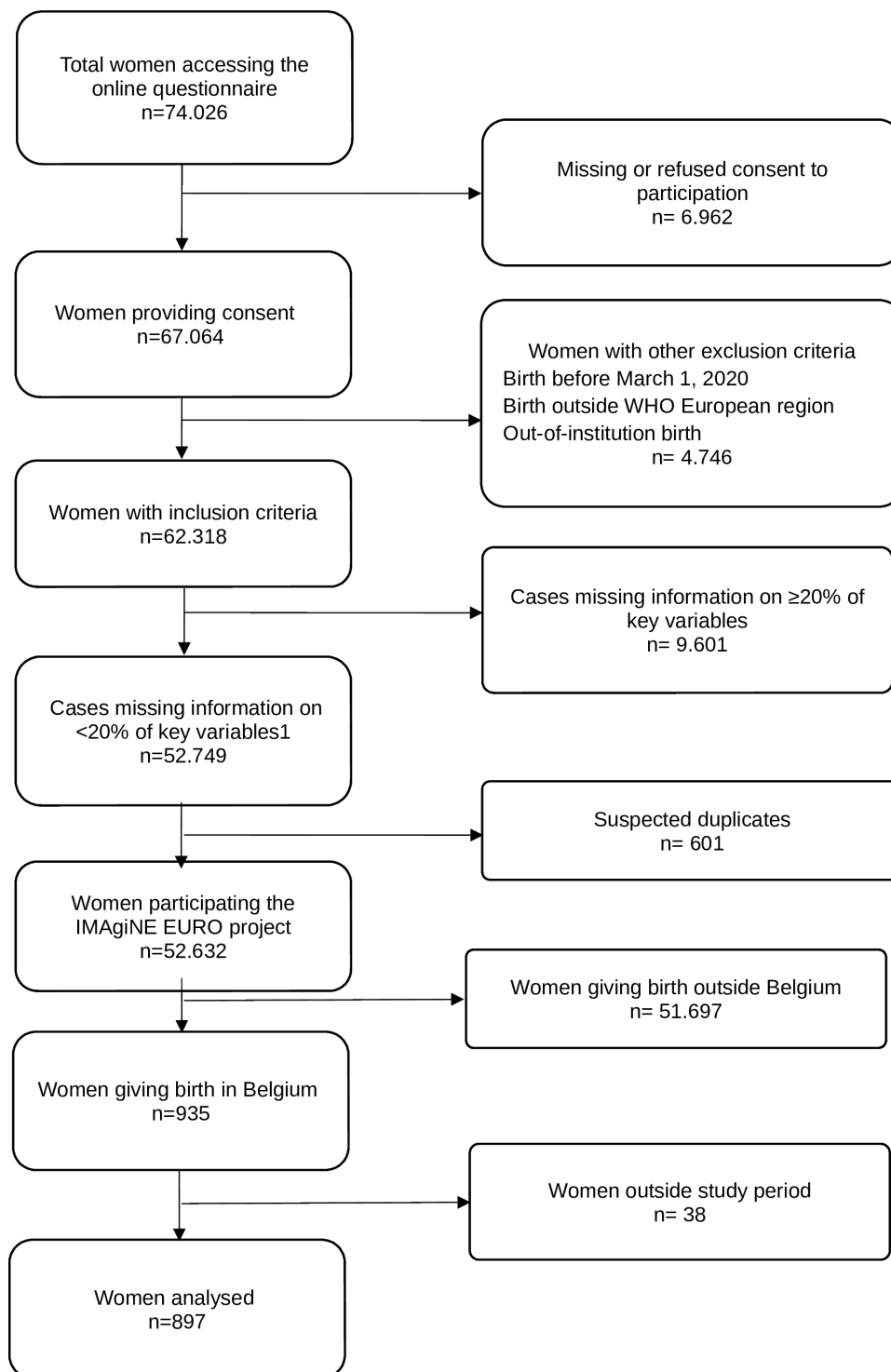
Of 74 026 women accessing the online questionnaire in all participating countries, 52 632 women fulfilled the inclusion criteria and responses from 897 women giving birth in Belgium were analysed after data cleaning (figure 1). The Dutch questionnaire was chosen by 83.8% ( $n=752$ ) of women, the French questionnaire was chosen by 12.2% ( $n=109$ ) of women, 1.7% ( $n=15$ ) chose English, and the rest opted for one of the other available languages (table 1).

Overall, most women (93.7%,  $n=841$ ) were aged between 25 and 39 years and 54.2% ( $n=486$ ) of women had university degree or higher. More than half of the women (61.2%,  $n=549$ ) were primiparous (table 1). Frequencies of spontaneous vaginal birth (SVB) and instrumental vaginal birth (IVB) were 67.0% ( $n=601$ ) and 13.3% ( $n=119$ ), respectively, while frequencies for caesarean during labour, elective and emergency caesarean before labour were 8% ( $n=72$ ), 3.1% ( $n=28$ ) and 8.6% ( $n=77$ ), respectively. Most women gave birth in a public hospital (89.1%,  $n=799$ ). Almost all births were assisted by a midwife or nurse (96.8%,  $n=868$ ) and 87.2% ( $n=782$ ) of births were assisted by an obstetrics or gynaecology doctor. From all women, 11.4% ( $n=102$ ) had a newborn admitted to the neonatal intensive care unit, 1.6% ( $n=14$ ) had multiple births and 0.7% ( $n=6$ ) had a stillbirth.

### WHO-based quality measures

Key results for the domain of provision of care (table 2) were as follows: 21.0% ( $n=166$ ) of women who experienced labour reported inadequate pain relief; 64.7% ( $n=77$ ) of women with an IVB reported fundal pressure during childbirth; 35.8% ( $n=215$ ) of women with SVB had an episiotomy; 4.6% ( $n=41$ ) did not experience skin-to-skin contact with their newborn; 12.5% ( $n=112$ ) reported no early breastfeeding; 10.9% ( $n=98$ ) were not exclusively breastfeeding at discharge; 18.6% ( $n=167$ ) reported inadequate breastfeeding support. From the women who underwent a caesarean section ( $n=177$ ), 14.6% ( $n=26$ ) reported inadequate pain relief after childbirth. Overall, one in three women reported they did not receive immediate attention when needed (29.2%,  $n=262$ ).

For experience of care, 32.9% ( $n=295$ ) women reported that they were not involved in choices and 72.3% ( $n=86$ ) were not asked for consent prior to an IVB. Overall, 1 in 10 women stated that they were not treated with dignity (11.6%,  $n=104$ ), while 8.1% ( $n=73$ ) were exposed to physical, verbal or emotional abuse. Nearly one in four women (23.9%,  $n=189$ ) reported no freedom of movement during labour and 15.9% ( $n=143$ ) reported a lack of privacy while almost none (1.3%,  $n=12$ ) reported they



**Figure 1** Flowchart of the study sample of women. IMAGiNE EURO, Improving MAternal Newborn carE in the EURO region.

performed informal payments. One in three women (31.1%, n=279) mentioned that the communication with healthcare professionals was unclear or ineffective.

For availability of human and physical resources, about half of women (46.2%, n=414) observed that staff were inadequate in number, while around half of women reported they received inadequate information on maternal and newborn danger signs (43.9%, n=394 and 55.4%, n=497, respectively). Room comfort, cleaning and

number of women per room were rated as 'inadequate' by 25.9% (n=232), 18.7% (n=168) and 8.9% (n=80) of women, respectively, while 24.4% (n=219) respondents judged staff professionalism as inadequate.

For reorganisational changes due to COVID-19, around one in three women (30.9%, n=277) reported that COVID-19 had led to a reduction in QMNC and a high percentage of women reported difficulties in attending routine antenatal checks and experienced



**Table 1** Characteristics of responders (n=897)

	N	%
Year of giving birth		
2020	313	34.9
2021	311	34.7
2022	178	19.8
2023	95	10.6
Mother giving birth in the same country where she was born		
Yes	816	91.0
No	81	9.0
Age range (years)		
18–24	21	2.3
25–30	298	33.2
31–35	436	48.6
36–39	107	11.9
≥40	35	3.9
Educational level*		
None	0	0.0
Elementary school	6	0.7
Junior high school	94	10.5
High school	311	34.7
University degree	194	21.6
Postgraduate degree/master/doctorate or higher	292	32.6
Birth mode		
spontaneous vaginal birth	601	67.0
Instrumental vaginal birth	119	13.3
Caesarian section	177	19.7
Parity		
1	549	61.2
>1	348	38.8
Type of hospital		
Public	799	89.1
Private	98	10.9
Type of healthcare providers who directly assisted birth		
Midwife or nurse	868	96.8
A student (ie, before graduation)	302	33.7
Obstetrics registrar/medical resident (under postgraduation training)	285	31.8
Obstetrics and gynaecology doctor	782	87.2
I don't know (healthcare providers did not introduce themselves)	33	3.7
Other	64	7.1
Language in which questionnaire was filled		
Dutch	752	83.8

Continued

**Table 1** Continued

	N	%
French	109	12.2
English	15	1.7
Polish	5	0.6
German	3	0.3
Latvian	3	0.3
Swedish	3	0.3
Croatian	2	0.2
Greek	2	0.2
Portuguese	2	0.2
Italian	1	0.1
Other		
Newborn admission to NICU	102	11.4
Maternal admission to ICU	6	0.7
Multiple births	14	1.6
Stillbirth	6	0.7

\*Wording on education levels agreed among partners during the Delphi.  
ICU, intensive care unit; NICU, neonatal intensive care unit.

barriers in accessing the facility (95.1%, n=853 and 97.5%, n=875, respectively). Regarding staff, 7.4% (n=66) women noted that healthcare personnel were not always using personal protective equipment, while for one in four women (24%, n=215) the communication did not contain their stress related to COVID-19-required procedures. Overall 17.6% (n=158) rated the infographics as inadequate and 3.8% noted a lack of handwashing stations (n=34).

### Predictors of QMNC indexes

Multivariable analysis showed that when adjusting the QMNC Index for other variables, only minor differences among groups were observed, except for women who had an IVB (table 3). Significantly lower QMNC indexes were reported by women aged above 40 (−12 in the 75<sup>th</sup> percentile, p=0.027, 95% CI (−17.4 to −6.6)) and women who had an IVB (−23.1 in the 25<sup>th</sup> centile, p=0.009, 95% CI (−31.9 to −14.3); −20.4 in the 50<sup>th</sup> centile, p<0.001, 95% CI (−25.2 to −15.5); −20 in the 75<sup>th</sup> centile, p<0.001, 95% CI (−24.5 to −15.5)). Significantly higher QMNC Index was reported on selected centiles for women who were not born in Belgium (+12 in the 75<sup>th</sup> centile, p=0.004, 95% CI (7.8 to 16.2)), with a university degree (+9.4 in the 50<sup>th</sup> centile, p=0.042, 95% CI (4.8 to 14.1)) or postgraduate degree (+12 in the 50<sup>th</sup> centile, p=0.013, 95% CI (7.2 to 16.9); +9 in the 75<sup>th</sup> centile, p=0.02, 95% CI (5.1 to 12.9)) and who gave birth in a facility with private offers (+8.7 in the 50<sup>th</sup> percentile, p=0.046, 95% CI (4.4 to 13.1)).

**Table 2** Results for WHO standards-based quality measures

	Women experiencing labour		Women not experiencing labour		Overall (women experiencing labour and women not experiencing labour)	
	N=792		N=105		N=897	
	N	%	N	%	N	%
Provision of care						
1. No pain relief during labour	166	21	–	–	–	–
2. Mode of birth					–	–
a. SVB	601	75.9	–	–	–	–
b. IVB	119	15	–	–	–	–
c. CS after labour	72	9.1	–	–	–	–
d. CS before labour	–	–	28	26.7	–	–
e. Elective caesarean	–	–	77	73.3	–	–
3a. Episiotomy (in SVB)	215/601	35.8	–	–	–	–
3b. Fundal pressure (in IVB)	77/119	64.7	–	–	–	–
3c. No pain relief after caesarean	9/72	12.5	17	16.2	26/177	14.6
4. No skin-to-skin contact	23	2.9	18	17.1	41	4.6
5. No early breastfeeding	84	10.6	28	26.7	112	12.5
6. Inadequate breastfeeding support	149	18.8	18	17.1	167	18.6
7. No rooming-in	71	9	13	12.4	84	9.4
8. Not allowed to stay with the baby as wished	40	5.1	7	6.7	47	5.2
9. No exclusive breastfeeding at discharge	83	10.5	15	14.3	98	10.9
10. No immediate attention when needed	230	29	32	30.5	262	29.2
Experience of care						
1a. No freedom of movements during labour	189	23.9	–	–	–	–
1b. No consent requested for vaginal examination before prelabour caesarean	–	–	21	20	–	–
2a. No choice of birth position (in SVB)	276/601	45.9	–	–	–	–
2b. No consent requested (for IVB)	86/119	72.3	–	–	–	–
2c. No information on newborn (after caesarean)	16/72	22.2	16	15.2	32/172	18.1
3. No clear/effective communication from healthcare care provider (HCP)	251	31.7	28	26.7	279	31.1
4. No involvement in choices	260	32.8	35	33.3	295	32.9
5. Companionship not allowed	74	9.3	10	9.5	84	9.4
6. Not treated with dignity	88	11.1	16	15.2	104	11.6
7. No emotional support	196	24.7	29	27.6	225	25.1
8. No privacy	128	16.2	15	14.3	143	15.9
9. Abuse (physical/verbal/emotional)	62	7.8	11	10.5	73	8.1
10. Informal payment	11	1.4	1	1	12	1.3
Availability of physical and human resources						
1. No timely care by HCPs at facility arrival	71	9	11	10.5	82	9.1
2. No information on maternal danger signs	343	43.3	51	48.6	394	43.9
3. No information on newborn danger signs	442	55.8	55	52.4	497	55.4
4. Inadequate room comfort and equipment	203	25.6	29	27.6	232	25.9
5. Inadequate number of women per rooms	69	8.7	11	10.5	80	8.9
6. Inadequate room cleaning	145	18.3	23	21.9	168	18.7

Continued

Table 2 Continued

	Women experiencing labour		Women not experiencing labour		Overall (women experiencing labour and women not experiencing labour)	
	N=792		N=105		N=897	
	N	%	N	%	N	%
7. Inadequate bathroom	134	16.9	16	15.2	150	16.7
8. Inadequate partner visiting hours	320	40.4	46	43.8	366	40.8
9. Inadequate number of HCPs	364	46	50	47.6	414	46.2
10. Inadequate HCP professionalism	197	24.9	22	21	219	24.4
Reorganisational changes due to COVID-19						
1. Difficulties in attending routine antenatal Visits	751	94.8	102	97.1	853	95.1
2. Any barriers in accessing the facility	770	97.2	105	100	875	97.5
3. Inadequate infographics	137	17.3	21	20	158	17.6
4. Inadequate ward reorganisation	116	14.6	17	16.2	133	18.7
5. Inadequate room reorganisation	109	13.8	13	12.4	122	13.6
6. Lacking one functioning accessible handwashing station	28	3.5	6	5.7	34	3.8
7. HCP not always using personal protective equipment	59	7.4	7	6.7	66	7.4
8. Insufficient HCP number	205	25.9	33	31.4	238	26.5
9. Communication inadequate to contain COVID	191	24.1	24	22.9	215	24.0
10. Reduction in QMNC due to COVID-19	238	30.1	39	37.1	277	30.9

Indicators identified with letters (eg, 3a, 3b) were tailored to take into account different mode of birth (ie, spontaneous vaginal, instrumental vaginal and caesarean section). These were calculated on subsamples (eg, 3a was calculated on spontaneous vaginal births; 3b was calculated on instrumental vaginal births). Indicator six in the 'reorganisational changes due to COVID-19' domain was defined as: at least one functioning and accessible hand-washing station (near or inside the room where the mother was hospitalised) supplied with water and soap or with disinfectant alcohol solution.

CS, caesarean section; HCP, healthcare care provider; IVB, instrumental vaginal birth; PPE, personal protective equipment; QMNC, quality maternal and newborn care; SVB, spontaneous vaginal birth.

### Trends over time for QMNC indexes

The median QMNC Index scores for each domain (experience of care, provision of care, availability of physical and human resources, key organisational changes related to the COVID-19 pandemic) varied between 75 and 100, depending on the study period (see online supplemental material 3). For the QMNC Index of experience of care and key organisational changes related to the COVID-19 pandemic, a steady increase over time was observed. Experience of care increased from a median score of 85 points in the first study trimester to 95 points at study end, and key organisational changes related to the COVID-19 pandemic evolved from a median score of 90 points in the first trimester to 95 points at study end (trend test  $p < 0.05$ ) (figure 2). The QMNC indexes in the domains of provision of care and availability of human and physical resources did not show any significant trend over time (see online supplemental material 3).

### DISCUSSION

This is the first study exploring the perceived QMNC care at birth facilities in Belgium during COVID-19, using a set of 40 quality measures based on WHO Standards. Many

of the quality measures explored, such as those related to the high rate of early breastfeeding, skin-to-skin contact, privacy and timely care, suggest high QMNC in Belgium. This is in line with the literature showing high satisfaction with maternity care in Belgium and high rankings of maternal and newborn health outcomes in Europe.<sup>14 33–35</sup> However, gaps in QMNC were also reported in our study for each domain: provision of care (eg, no pain relief after caesarean and inadequate breastfeeding support); experience of care (lack of consent request and involvement in choices); availability of resources (inadequate number of HCPs and HCP professionalism) and reorganisational changes (barriers in accessing the facility and reduction in QMNC due to COVID-19). Reports showed an improved trend over time in the domains of reorganisational changes due to COVID-19 and experience of care suggesting that the impact of COVID-19 was most severe in the first months of the pandemic.

Some study findings are of particular concern. In the domain of provision of care, the results showed that 64.6% of women with an IVB are subjected to fundal pressure. This is surprising, since both WHO and the International Federation of Gynaecology and Obstetrics (FIGO)

**Table 3** Multivariate analysis predictors QMNC Index

	25th percentile		50th percentile		75th percentile	
	Coefficient (95% CI)	P value	Coefficient (95% CI)	P value	Coefficient (95% CI)	P value
Study trimester	1.55 (0.9 to 2.2)	0.019	0.93 (0.4 to 1.5)	0.102	0.5 (0.1 to 0.9)	0.261
Parity						
>1	-7.8 (-13.1 to -2.5)	0.144	-4.8 (-8.9 to -0.7)	0.239	0.5 (-2.6 to 3.6)	0.87
1	Ref		Ref		Ref	
Mother giving birth in the same country where she was born						
No	12.2 (3.1 to 21.4)	0.182	11.3 (2.3 to 20.3)	0.209	12 (7.8 to 16.2)	0.004
Yes	Ref		Ref		Ref	
Type of facility						
Private	12.6 (3.8 to 21.3)	0.151	8.7 (4.4 to 13.1)	0.046	8.5 (3.8 to 13.2)	0.072
Public	Ref		Ref		Ref	
Maternal age (years)						
18–24	-7.1 (-39.5 to 25.4)	0.827	-0.4 (-18.6 to 17.8)	0.984	-1.5 (-17.5 to 14.5)	0.925
25–30	-12.1 (-18.3 to -5.8)	0.055	-4.6 (-9.6 to 0.3)	0.352	1.5 (-2 to 5)	0.669
31–35	Ref		Ref		Ref	
36–39	8.4 (-0.1 to 17)	0.322	6.3 (0.6 to 12)	0.267	1.5 (-2.2 to 5.2)	0.687
≥40	7.6 (-0.2 to 15.4)	0.333	-5.7 (-12.9 to 1.4)	0.424	-12 (-17.4 to -6.6)	0.027
Maternal education						
Elementary school	4 (-43.7 to 51.6)	0.934	-22.8 (-55.2 to 9.6)	0.482	-3 (-27.2 to 21.2)	0.901
Junior high school	-15.7 (-29 to -2.4)	0.240	-11.7 (-19.4 to -3.9)	0.132	-8 (-17 to 1)	0.374
High school	Ref		Ref		Ref	
University degree	4.7 (-2.4 to 11.7)	0.510	9.4 (4.8 to 14.1)	0.042	5 (1.1 to 8.9)	0.203
Postgraduate degree/ master/doctorate or higher	10.2 (5 to 15.3)	0.050	12 (7.2 to 16.9)	0.013	9 (5.1 to 12.9)	0.020
Mode of birth						
Spontaneous vaginal birth	Ref		Ref		Ref	
Instrumental vaginal birth	-23.1 (-31.9 to -14.3)	0.009	-20.4 (-25.2 to -15.5)	<0.001	-20 (-24.5 to -15.5)	<0.001
Caesarian section	-12.2 (-20.4 to -4.1)	0.132	-6.1 (-11.3 to -0.9)	0.24	-3 (-6.8 to 0.8)	0.432
Presence of an OB/GYN directly assisting childbirth						
Yes	17.2 (10.2 to 24.2)	0.014	16.1 (8.8 to 23.4)	0.028	9 (4.7 to 13.3)	0.039
No	Ref		Ref		Ref	

OB/GYN, obstetrician/gynaecologist.

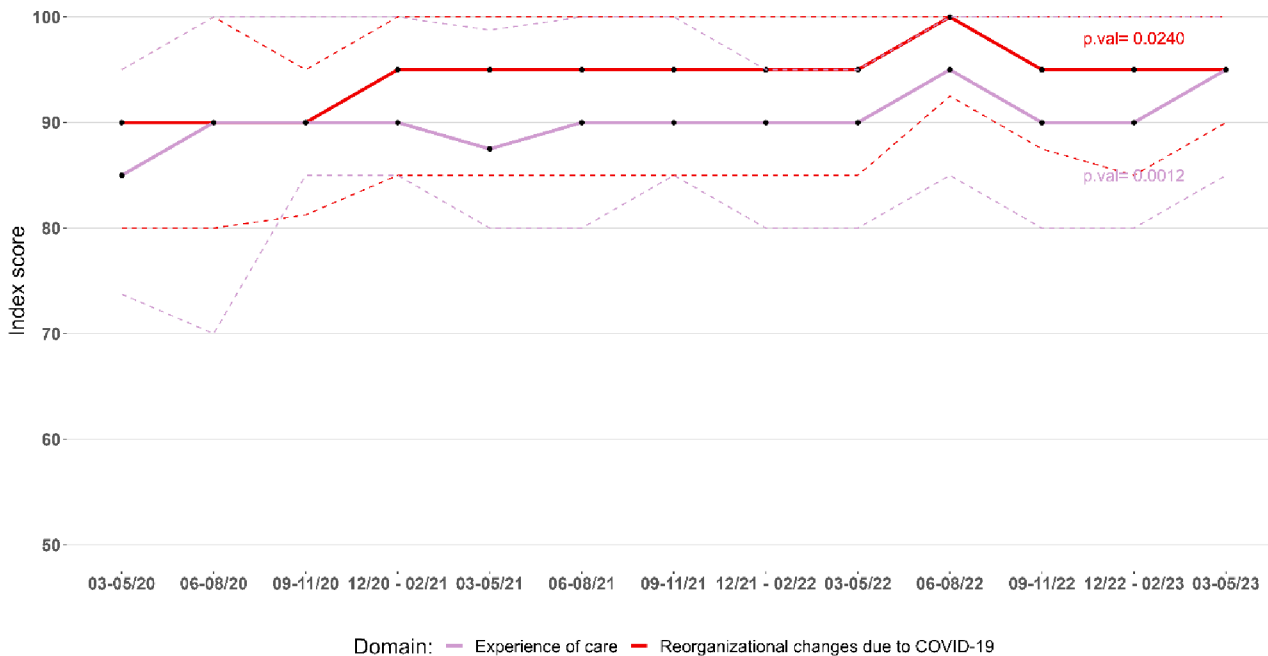
do not recommend this practice, given its safety is yet unproven.<sup>36 37</sup> Also, national guidelines state that ‘there are no medically validated indications for the application of fundal pressure, the traumatic experience of patients, their families and the occurrence of rare but serious complications are reasons for discontinuing its use’.<sup>38</sup> More research will be needed to explore the underlying reasons for the high rates of fundal pressure in this study and how adherence to national and international guidelines can be improved. Similarly, the number of women who underwent episiotomy was high (35.8%), indicating this might still be performed without clear indication. In 2018, the WHO advised against routine or liberal use of episiotomy for normal childbirth<sup>1</sup> and several expert groups refer to ≤5% as an acceptable rate.<sup>39 40</sup>

In the immediate postpartum period, we observed shortcomings in provision of care: a relative high

proportion of women with a caesarean did not receive any pain relief and breastfeeding support seem inadequate. While quality of childbirth care is often evaluated by internal audits and registry data, the (immediate) postpartum care is often receiving less attention. Maternity wards might need more close feedback and audit mechanisms of women and their families to improve quality of (immediate) postpartum care and identify specific breaches in their organisation.<sup>41 42</sup> Especially since there has been a continuing tendency in Belgium to improve efficiency and close smaller maternity units, which might have affected quality of care in a negative way.<sup>43 44</sup>

With respect to experience of care, a high proportion of women state involvement in decisions was limited, communication was inadequate and consent was not requested before performing interventions. Women with an IVB also reported lower QMNC scores. In addition,





**Figure 2** Lineplot showing the experiences of care and reorganisational changes due to COVID-19 indexes by study trimester. Figure shows the median (full line) and IQR (dotted line); the p values are obtained with Mann-Kendall test for monotonic trend (H0: no monotonic trend).

11.6% of women reported she did not feel treated with dignity and 8.1% reported a form of abuse. Lack of communication and autonomy during childbirth is a serious concern and should be tackled to improve women's experience. A recent review by Olde Loohuis *et al* found that communication skills can be enhanced by training and using additional communication tools, however, the importance of an enabling environment cannot be underestimated.<sup>45</sup> The healthcare system in which health providers operate undoubtedly impacts the ability to effectively communicate and respect women's choices. Enabling factors can include a non-excessive workload (allowing time to communicate), availability of adequate space and resources and a work atmosphere where teamwork, empathy and good communication are the norm.<sup>45</sup> More research into these environmental factors and providers' perspectives is highly needed in the Belgian context to tackle these shortcomings in childbirth care.

Related to the availability of human resources (inadequate number of HCPs and HCP professionalism) and reorganisational changes (barriers in accessing the facility and reduction in QMNC due to COVID-19), our study shows similar results as neighbouring countries. These findings confirm the numerous studies highlighting the indirect effects of COVID-19 on QMNC.<sup>20 46-51</sup> A study from the UK showed how mitigation measures caused social isolation of women and delays in care,<sup>49</sup> while global reports show overall higher levels of fear and stress among both health providers and women.<sup>46 48</sup>

Our findings also showed that for the domains of experience of care and key organisational changes due to COVID-19 the QMNC indexes increased over time,

which can be explained by several factors, including a better organisation of care over time, downscaling of restrictions and better anticipation of women on mitigation measures. Unfortunately, the lack of previous studies investigating comprehensively maternal perceptions of the QMNC (with the same WHO Quality measures used in this study) make it impossible to further assess to which extend the study findings may be associated with the pandemic. The IMAGiNE EURO study will perform other rounds of data collection, which will allow us to explore if quality gaps persist beyond the COVID-19 pandemic.

### Limitations and strengths

Limitations and strengths of the multicountry IMAGiNE EURO survey have been described elsewhere and are mainly related to the sampling method and recruitment of participants.<sup>5</sup> All women needed to access internet for completing the survey, which will exclude women with limited digital skills or internet access. Specifically for Belgium we observed that our study sample is highly comparable to the overall population (based on national registry data of women giving birth in Belgium) but a slightly higher proportion of younger (<25) and primiparous women was observed.<sup>11 12</sup> This difference might be related to the recruitment by social media, which might be more accessible to the younger population. In addition, only data from women was collected in this study. Data from health providers is needed, as well as qualitative data from women, to understand the underlying mechanisms causing the different gaps in quality of care in Belgium.

## CONCLUSION

While the evidence overall suggests high QMNC in Belgium, our findings also highlighted several gaps in care. These gaps include inadequate and/or unclear communication from HCPs, lack of involvement in choices, inadequate staff number, frequent use of fundal pressure and inadequate pain management. These reported gaps in care should be analysed more in depth from a health system-based perspective to identify underlying causes and design appropriate interventions and policies. We also found that women's experience of QMNC improved during the study period, but further research is needed to gain knowledge on QMNC beyond the pandemic and trends over time.

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