

# Repercussions of SARS-CoV-2 infection and the pandemic on birth routes: a cross-sectional study



*Repercussões da infecção por SARS-CoV-2 e da pandemia nas vias de nascimento: estudo transversal*

*Repercusiones de la infección por SARS-CoV-2 y la pandemia en las vías de nacimiento: un estudio transversal*

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## ABSTRACT

**Objective:** To assess the repercussions of SARS-CoV-2 infection (suspected or confirmed) and the context of the pandemic on the birth route and humanized assistance during childbirth.

**Method:** Cross-sectional epidemiological study, nested within a cohort and comparative with the research "Birth in Belo Horizonte: Survey on Childbirth and Delivery". The medical records of three reference maternity hospitals in Belo Horizonte were assessed, with a final sample of 1,682 pregnant women, in the months of May, June and July 2020. A descriptive analysis was carried out, with absolute and relative frequency, and a comparative one, with a Pearson's chi-square test.

**Results:** It was observed that 2.02% of pregnant women were infected with SARS-CoV-2. Before the pandemic, out of a total of 390 pregnant women, 74.10% gave birth vaginally. During a pandemic, among infected women, 51.61% gave birth via cesarean section and 48.39% via vaginal delivery; among uninfected, 26.99% cesarean sections and 73.01% vaginal deliveries.

**Conclusion:** There was an increase in the percentage of cesarean sections and a possible influence of the pandemic on the rates of indication of cesarean sections at the time of admission to the maternity ward.

**Descriptors:** COVID-19. Pregnancy. Parturition. Cesarean section. Natural childbirth.

## RESUMO

**Objetivo:** Avaliar as repercussões da infecção por SARS-CoV-2 (suspeita ou confirmada) e do contexto da pandemia na via de nascimento e na assistência humanizada ao parto.

**Método:** Estudo epidemiológico transversal, aninhado a uma coorte e comparativo com a pesquisa "Nascer em Belo Horizonte: Inquérito sobre o Parto e Nascimento". Avaliou-se prontuários de três maternidades-referência em Belo Horizonte, com amostra final de 1.682 parturientes, nos meses de maio, junho e julho de 2020. Realizou-se análise descritiva, com frequência absoluta e relativa, e comparativa, com teste Qui-quadrado de Pearson.

**Resultados:** Observou-se que 2,02% das gestantes estavam infectadas por SARS-CoV-2. Antes da pandemia, em um total de 390 gestantes, 74,10% pariram via vaginal. Durante a pandemia, nas mulheres infectadas, 51,61% pariram pela via cesariana e 48,39% pela vaginal; nas não infectadas, 26,99% cesarianas e 73,01% vaginais.

**Conclusão:** Observou-se aumento percentual de cesarianas e possível influência da pandemia nas taxas de indicação de cesarianas no momento da admissão na maternidade.

**Descritores:** COVID-19. Gravidez. Parto. Cesárea. Parto normal.

## RESUMEN

**Objetivo:** Evaluar las repercusiones de la infección por SARS-CoV-2 (sospechosa o confirmada) y el contexto de la pandemia en la vía del parto y la asistencia humanizada durante el parto.

**Método:** Estudio epidemiológico transversal, anidado en una cohorte y comparativo con la investigación "Nacimiento en Belo Horizonte: Encuesta sobre Parto y Parto". Se enviaron los prontuarios de tres maternidades de referencia en Belo Horizonte, con una muestra final de 1.682 gestantes, en los meses de mayo, junio y julio de 2020. Se realizó un análisis descriptivo, con frecuencia absoluta y relativa, y comparativo. uno, con una prueba de Chi, cuadrado de Pearson.

**Resultados:** Tenga en cuenta que el 2,02% de las mujeres embarazadas estaban infectadas con SARS-CoV-2. Antes de la pandemia, en un total de 390 gestantes, el 74,10% daba a luz por vía vaginal. Durante una pandemia, entre las mujeres infectadas, el 51,61% dio a luz por cesárea y el 48,39% por parto vaginal; en las no infectadas, 26,99% cesáreas y 73,01% vaginales.

**Conclusión:** Hubo un aumento en el porcentaje de cesáreas y una posible influencia de la pandemia en las tasas de indicación de cesáreas al momento del ingreso a la sala de maternidad.

**Descriptorios:** COVID-19. Embarazo. Parto. Cesárea. Parto normal.

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## ■ INTRODUCTION

At the end of 2019, in the city of Wuhan, there was the emergence of a new virus called Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), and its clinical manifestation is called Coronavirus disease (COVID-19), classified as a pandemic in 2020 by the World Health Organization (WHO)<sup>(1)</sup>. Since then, with the advancement of the disease, controversies or actions in the opposite direction of the evidence regarding assistance during labor, delivery and birth have been observed, making this scenario challenging<sup>(2)</sup>.

Until February 24, 2023, 24,212 cases of Severe Acute Respiratory Syndrome (SARS) due to COVID-19 were reported in Brazil in pregnant and postpartum women in a non-pregnant population of 2,168,166 individuals, which corresponds to 1% of cases in pregnant and postpartum women<sup>(3)</sup>. Regarding the state of Minas Gerais, 1,918 cases of pregnant women with SARS caused by COVID-19 were reported, and in Belo Horizonte, there were 195 cases<sup>(4)</sup>. However, it is believed that these rates may be higher due to underreporting, low performance of laboratory tests and possible false negatives<sup>(5)</sup>. Furthermore, in Brazil, universal testing was not adopted as a health policy during the pandemic, which leads to a lower number of cases in relation to the infected population<sup>(6)</sup>.

Initially, it was believed that pregnant women had an infection similar to that developed in the non-pregnant population, however, a study shows that pregnant women are at increased risk of developing complications and needing assistance in the Intensive Care Unit (ICU), in addition to death rates increase, especially in places with flaws in the health system and lower income<sup>(5)</sup>. According to the evidence found so far, implications of SARS-CoV-2 in pregnancy, childbirth and the postpartum, even if the infected pregnant woman remains asymptomatic, may be associated with an increased risk of clinical complications during pregnancy<sup>(7)</sup>.

Throughout pregnancy, the woman's body undergoes several changes in its physiology, to maintain homeostasis and protection for the woman and the fetus<sup>(8)</sup>. Some of these changes may be related to the worsening of the COVID-19 condition in pregnant women<sup>(8)</sup>. This fact could explain the high mortality rates due to COVID-19 in pregnant women and postpartum women in Brazil<sup>(9)</sup>, with 2,055 deaths reported in the Brazilian population of pregnant and postpartum women up to February 2023<sup>(3)</sup>.

Regarding labor and delivery, in Brazil, there have been intense investments, public policies and the training of professionals to change the delivery and birth care model in the COVID-19 pre-pandemic period<sup>(10)</sup>. However, the advances achieved in the Brazilian obstetric scenario before the

COVID-19 pandemic may have suffered setbacks as a result of the pandemic period also experienced in Brazil, with the increasing use of interventional methods without evidence of clinical indication during delivery, such as labor induction and cesarean section as the adopted birth route<sup>(11)</sup>.

On the other hand, in Brazil, the Brazilian Federation of Gynecology and Obstetrics Associations (*Federação Brasileira das Associações de Ginecologia e Obstetrícia – FEBRASGO*) advised that the route of birth should be decided according to the clinical conditions of the pregnant woman and the fetus, and infection by SARS-CoV-2 should not be a determinant in the choice of birth route and cesarean section should only be used in pregnant women with a severe clinical condition<sup>(12)</sup>.

Due to the COVID-19 pandemic, it was necessary to adapt health services in the world and also in Brazil, since the epidemiological situation and the natural history of the disease required the modification of protocols, the organization of services and flows<sup>(13-14)</sup>. Among the different lines of care, pregnant women, puerperal women and newborns also suffered with the impacts of these changes, especially because the disease is new and does not allow a clear view of its outcomes<sup>(14)</sup>.

Thus, the hypothesis of this work is that the COVID-19 pandemic caused interference in labor and in the birth route of all parturients, especially in pregnant women infected with SARS-CoV-2. There was a gap in the literature on the subject, which showed the need for research that could clearly demonstrate the Brazilian reality regarding repercussions of COVID-19 on birth routes during the pandemic. Therefore, the present study aims to assess the repercussions of SARS-CoV-2 infection (suspected or confirmed) and the context of the pandemic in the birth routes and in the humanized assistance to childbirth.

## ■ METHOD

This is a study based on the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines, conducted with preliminary data from the survey "Childbirth and breastfeeding in children of mothers infected with SARS-CoV-2", a cross-sectional study, nested in a cohort and comparison with data from the research entitled "Birth in Belo Horizonte: Inquiry on Labor and Birth", conducted in the pre-pandemic period of COVID-19.

### **Inquiry "Childbirth and breastfeeding in children of mothers infected with SARS-CoV-2"**

The research was conducted in three reference maternity hospitals in the city of Belo Horizonte – Minas Gerais (MG),

with data collection in 2021 and 2022. These institutions were chosen because they are references in the care for women and newborns and, for having as a philosophy the humanized care of labor and birth.

Regarding the sample selection, the period with the highest incidence of COVID-19 cases was chosen for the analysis of medical records, which were the months of May, June and July 2020. Among these medical records, those that met the inclusion criteria were selected, which included all singleton pregnant women who gave birth in a hospital and had newborns (NB) with a gestational age of 22 weeks or more, weighing more than 500 grams at birth and being alive; women under the age of 18 were excluded. Finally, the parturients were randomly selected from the birth record book and, subsequently, their medical records, available at the hospitals, were evaluated.

Regarding sample calculation, the cohort study design was used, considering a ratio of nine pregnant women for the control group (pregnant women not exposed to COVID-19) for each pregnant woman in the case group (woman exposed to COVID-19), due to the infection rate of 10% during the epidemic period<sup>(15)</sup>. To obtain a confidence level of 95% and power of 80%, an Odds Ratio of 1.5 was estimated. Thus, based on these parameters, an estimated sample of 1,893 pregnant women was obtained, with the distribution of pregnant women by maternity based on the total number of births in each selected maternity hospital. The final sample consisted of 1,682 pregnant women. In addition, regarding the demonstration of the data obtained, in some variables, the total value of the sample may not be equal to 1,682, as there was a lack of information in some variables in the collected medical records.

Data were collected from selected medical records of each institution under study by trained professionals. A structured physical questionnaire adapted from the research "Birth in Belo Horizonte: Inquiry on labor and birth" was used as a collection instrument. The activity of collection supervision was conducted by the team of researchers of the project and there was no payment for this purpose.

The collection instrument for the inquiry "Birth and breastfeeding of children of mothers infected with SARS-CoV-2" was composed of variables such as: clinical-obstetric background, assistance during labor and delivery at the participating institutions, birth routes, maternal clinical changes throughout hospitalization, breastfeeding in the first hour of life and suspected or confirmed COVID-19 infection. Therefore, the following variables were used in this study: mother infected with SARS-CoV-2, parity, history of abortion, history of previous cesarean section, presence of

clinical-obstetric complications, indication of cesarean section during hospitalization, presence of a companion during labor, use of non-pharmacological methods for pain relief, use of anesthesia, birth route and type of intercourse. The variables parity, history of abortion and history of previous cesarean section were used only to describe the obstetric profile. In addition, the other variables were chosen, as they allow observing the correlation between the birth route and infection by SARS-CoV-2, in addition to demonstrating the level of obstetric interventions performed during labor and delivery<sup>(10,16)</sup>.

The status of the woman's SARS-CoV-2 infection was verified based on the medical records available in the hospitals, and in symptomatic women, the confirmatory test performed at the institution and its result were sought. In cases where this test was not available, pregnant women who presented symptoms suggestive of the infection at the time of admission were considered as suspect cases. It is worth noting that, in the Brazilian context, due to the reduced number of COVID-19 tests, only parturients who were admitted to hospitals with signs or symptoms of COVID-19 underwent confirmatory tests<sup>(6)</sup>.

### Research "Birth in Belo Horizonte: Inquiry on labor and birth"

The research "Birth in Belo Horizonte: Inquiry on labor and birth" is a retrospective cohort, that had its data collection conducted from November 2011 to March 2013 (pre-pandemic) and was performed with women who were assisted in seven maternity hospitals in the public network and four in the supplementary network in Belo Horizonte, Minas Gerais<sup>(17)</sup>.

The study "Birth in Belo Horizonte: Inquiry on labor and birth" adopted the same criteria as the "National Research: Birth in Brazil: national survey into labor and birth<sup>(16)</sup>". The sample selection of the study "Birth in Belo Horizonte: Inquiry on labor and birth" included women hospitalized at the time of delivery and their fetuses, alive or dead, with birth weight  $\geq 500$  g and/or gestational age  $\geq 22$  weeks of gestation. Women who did not understand Portuguese, indigenous, with severe intellectual disability, deaf, homeless or convicted by court decision were excluded<sup>(17)</sup>. Among the maternity hospitals in the study "Birth in Belo Horizonte: Inquiry on labor and birth", only data related to the same maternity hospitals selected in the study "Birth and breastfeeding in children of mothers infected with SARS-CoV-2" were used, the final sample consisted of 390 puerperal women who had their children in the three public hospitals<sup>(18)</sup>.

In this research, data collection was conducted from November 2011 to March 2013 by previously trained nurses. The interviews were conducted during the period of hospitalization of the woman, at least six hours after delivery, which was defined as the minimum time necessary for the puerperal woman to rest<sup>(17)</sup>.

For comparison purposes, this study used data on the variables: birth route, use of anesthesia, use of non-pharmacological methods for pain relief (NPM), presence of a companion during labor and indication of cesarean section at the time of admission.

## Data analysis

The data consistency was verified from a primary typing process, to find atypical data through the descriptive analysis of data and, if necessary, a conference was made in the data collection instrument. After this process, statistical analyzes were performed, which were initially characterized by a descriptive analysis using absolute and relative frequencies to describe the variables evaluated in the study. Differences between groups (uninfected and suspected or confirmed cases) were assessed using Pearson's chi-square statistical test.

Subsequently, a comparison test was made between the variables from the Research Birth in Belo Horizonte database and the variables from the study "Birth and breastfeeding in children of mothers infected with SARS-CoV-2", through Pearson's chi-square statistical test, evaluating the variables only in the hospitals selected for this research in both databases. A comparison was made between the variables related to birth route and the humanized assistance to childbirth, namely: birth route, use of anesthesia, use of non-pharmacological methods for pain relief, presence of a companion during labor and delivery, and indication of cesarean section upon admission. The analyses were produced with Statistical Software for Professional (Stata), version 16.0.

## Ethical aspects

The study "Birth and breastfeeding in children of mothers infected with SARS-CoV-2" was approved by the Ethics Committee of the *Universidade Federal de Minas Gerais* (UFMG) with protocol CAAE: 32378920.6.1001.51409, the use of FICF was not necessary due to the study design and period of data collection in the medical records.

The project "Birth in Belo Horizonte: Survey on Labor and Birth" was approved by the Ethics Committee of the *Universidade Federal de Minas Gerais* (UFMG), (Opinion no. CAAE – 0246.0.203.000–11). All puerperal women and directors of each maternity hospital signed the Free and Informed Consent Form, complied with the ethical guidelines described in Resolution no.466, December 12, 2012, of the National Health Council, which provides for research with human beings.

## RESULTS

This study consisted of 1,682 pregnant women and, of these women, 2.02% were suspected or infected with SARS-CoV-2; 61.65% were multiparous; 71.31% had no history of abortion; 72.80% had no history of previous cesarean sections; 53.78% had no clinical/obstetric complications; 85.34% had no indication for cesarean section during hospitalization; 88.83% were with a companion during labor; 66.54% used non-pharmacological methods; 71.70% did not use anesthesia; in addition, 72.75% of women delivered vaginally (Table 1).

Regarding clinical-obstetric complications, it was observed that 0.13% had placenta previa, 0.27% had placental abruption (PA) and 0.27% had HIV infection (Table 2).

Regarding comparison of data with the research "Birth in Belo Horizonte: Inquiry on labor and birth", it was observed that, among the 390 births recorded in the hospitals in this research, 25.90% were by cesarean section. On the other hand, in the research conducted during the pandemic, among women infected by COVID-19, 51.61% had their children by cesarean section and, among those not infected, 73.01% gave birth vaginally, with a statistically significant difference ( $p=0.010$ ).

Regarding the variable indication of cesarean section at delivery, in the research "Birth in Belo Horizonte: Inquiry on labor and birth", 66.34% had no indication for cesarean section. In the present research during the pandemic, regarding infected women, 64.29% had no indication and, among uninfected women, 85.63% had no indication ( $p<0.001$ ) (Table 3).

Furthermore, higher proportions of women who used non-pharmacological methods for pain relief in women with COVID-19 were observed when compared to non-infected women and women from the database "Birth in Belo Horizonte: Inquiry on labor and birth" ( $p<0.00$ ).

**Table 1** – Obstetric profile and SARS-CoV-2 infection of the parturient sample. Belo Horizonte, Minas Gerais, Brazil, 2021-2022

Sample profile	n (%)	95%CI
<b>SARS-CoV-2 Infection<sup>1</sup></b>		
Yes	34(2.02)	01.44 – 02.81
No	1,648 (97.98)	97.18 – 98.55
<b>Obstetric Profile</b>		
<b>Parity</b>		
Primiparous	645 (38.35)	36.09 – 40.75
Multiparous	1,037 (61.65)	59.24 – 63.90
<b>History of abortion</b>		
No	803 (71.31)	68.56 – 73.86
Yes	323 (28.69)	26.13 – 31.43
<b>History of previous cesarean section</b>		
No	787 (72.80)	70.12 – 75.44
Yes	294 (27.20)	24.55 – 29.87
<b>Clinical/obstetric interurrence</b>		
Yes	691 (46.22)	43.61 – 48.68
No	804 (53.78)	51.31 – 56.38
<b>Indication of cesarean section on admission</b>		
No	1,275 (85.34)	83.45 – 87.04
Yes	219 (14.65)	12.95 – 16.54
<b>Presence of a companion during labor</b>		
Yes	1,185 (88.83)	87.92 – 90.41
No	149 (11.17)	09.58 – 12.97
<b>Use of non-pharmacological methods for pain relief</b>		
Yes	703 (66.54)	63.63 – 69.32
No	354 (33.46)	30.67 – 36.36
<b>Use of anesthesia</b>		
No	864 (71.70)	69.08 – 74.17
Yes <sup>2</sup>	341 (28.30)	25.82 – 30.91
<b>Birth route</b>		
Vaginal	1,204(72.75)	69.04 – 74.14
Cesarean section	451(27.25)	25.85 – 30.95

Source: Data collected by the researchers.

Notes: <sup>1</sup>Yes: suspected or confirmed case; <sup>2</sup>Yes: epidural anesthesia/spinal anesthesia/epidural and spinal anesthesia/general anesthesia

**Table 2** – Clinical-obstetric complications. Belo Horizonte, Minas Gerais, Brazil, 2021-2022

Types of complications	n (%)
<b>Istmocervical incompetence (IIC)</b>	
Yes	4 (0.27%)
No	1505 (99.73%)
<b>Intrauterine Growth Restricted (IUGR)</b>	
Yes	41 (2.72%)
No	1466 (97.28%)
<b>Oligohydramnios</b>	
No	1493 (99.01%)
Yes	15 (0.99%)
<b>Polyhydramnios</b>	
No	1489 (98.74%)
Yes	19 (1.26%)
<b>RH isoimmunization</b>	
Yes	28 (1.86%)
No	1479 (98.14%)
<b>Placenta previa</b>	
No	1507 (99.87%)
Yes	2 (0.13%)
<b>Placental abruption (PA)</b>	
Yes	4 (0.27%)
No	1501 (99.73%)
<b>Premature amniorrexe</b>	
Yes	113 (7.47%)
No	1399 (92.53%)
<b>Hypertensive syndromes<sup>1</sup></b>	
No	1199 (79.46%)
Yes	310 (20.54%)
<b>Eclampsia/seizures</b>	
No	1497 (99.20%)
Yes	12 (0.80%)

**Table 2** – Cont.

Types of complications	n (%)
<b>Threat of Premature Childbirth</b>	
No	1430 (94.76%)
Yes	79 (5.24%)
<b>Fetal distress</b>	
No	1496 (99.40%)
Yes	9 (0.60%)
<b>Syphilis</b>	
No	1434 (95.03%)
Yes	75 (4.97%)
<b>Urinary Infection</b>	
No	1331 (88.44%)
Yes	174 (11.56%)
<b>HIV Infection</b>	
No	1496 (99.73%)
Yes	4 (0.27%)
<b>Toxoplasmosis<sup>2</sup></b>	
No	1493 (99.20%)
Yes	12 (0.80%)
<b>Positive test for Streptococcus in the vagina and/or anus</b>	
No	1448 (98.04%)
Yes	29 (1.96%)
<b>Congenital malformation</b>	
No	1491 (98.94%)
Yes	16 (1.06%)
<b>Other problems</b>	
No	1354 (90.75%)
Yes	138 (9.25%)

Source: Data collected by the researchers.

Notes: <sup>1</sup>Hypertensive syndromes: chronic AH, preeclampsia, HELLP syndrome; <sup>2</sup>Toxoplasmosis treatment

**Table 3** – Comparison between obstetric variables between the research “Birth in Belo Horizonte: Inquiry on labor and birth” (pre-pandemic) (n: 390) and the inquiry “Birth and breastfeeding of children of mothers infected with SARS-CoV-2” during the pandemic period (n: 1.682). Belo Horizonte, Minas Gerais, Brazil, 2021-2022

Variables analyzed	Birth in Belo Horizonte: Inquiry on labor and birth	Birth and breastfeeding of children of mothers infected with SARS-CoV-2		p-value
		COVID-19 infected women	Uninfected women	
<b>Birth route</b>				
Cesarean	101 (25.90)	16(51.61%)	441(26.99)	<b>0.010</b>
Vaginal	289 (74.10)	15(48.39%)	1,193(73.01)	
<b>Use of anesthesia</b>				
No	250 (85.62)	13(81.25)	851(71.57)	0.090
Yes	128 (43.84)	3(18.75)	338(28.48)	
<b>Use of non-pharmacological methods for pain relief</b>				
No	164 (56.162)	1(7.14)	353(33.84)	<b>&lt;0.001</b>
Yes	128 (43.84)	13(92.86)	690(66.16)	
<b>Presence of a companion during labor</b>				
Yes	374 (95.90)	19(86.36)	1,166(88.87)	0.060
No	67 (4.10)	3 (13.64)	146(11.13)	
<b>Indication of cesarean section upon admission?</b>				
Yes	34(33.66)	10(35.71)	212(14.37)	<b>&lt;0.001</b>
No	67(66.34)	18(64.29)	1263(85.63)	

Source: Data collected by the researchers.

## ■ DISCUSSION

This study allowed an assessment of the potential repercussions caused by COVID-19, in suspected and confirmed cases, on birth routes. There was a significant increase in the percentage of cesarean sections in infected women compared to pre-pandemic women. Especially at the beginning of the pandemic, there were no robust studies that discussed the increased risks of the pregnant woman and the fetus, which classified the pregnant woman at a risk equal to of a

non-pregnant woman, and little subsidized the assistance aimed at them<sup>(19)</sup>. Therefore, it can be inferred that the scarcity of robust evidence regarding the consequences of infection in pregnant women may have led to an intensification of the cesarean section scenario.

In the obstetric context, the COVID-19 pandemic has overloaded health systems worldwide, especially in places where they have already experienced previous weaknesses, such as Brazil<sup>(20)</sup>. In this sense, these historical weaknesses in the Brazilian scenario, potentiate the excessive use of

non-recommended practices and without scientific evidence during labor, delivery and birth, in addition to the high cesarean rates, although the WHO recommends that these rates not exceed 15% of assisted deliveries<sup>(21,22)</sup>.

The cesarean section is a surgery that should be based on real clinical indications, and aims to reduce maternal and perinatal morbidity and mortality if well recommended<sup>(23)</sup>. It should be noted that the use of false indications often supports this procedure<sup>(24)</sup>. Based on this aspect, the real indications can be divided into absolute and relative. Regarding the absolute indications, cord prolapse is indicated; placental abruption with live fetus; partial or total placenta previa; vasa previa rupture; and genital herpes with an active lesion at labor<sup>(25)</sup>.

In view of these indications based on scientific evidence, it is necessary to carefully assess whether the high rate of indication for cesarean section in infected women at admission is related to the presence of COVID-19, since the infection should not be a justification for carrying out the birth through this birth route, but the general picture of the mother and the fetus<sup>(11)</sup>. This need for assessment can be reinforced by the fact that 53.78% of the women in the group observed during the pandemic had no history of clinical-obstetric complications, which corroborates the suspicion that the pandemic context may be related to the increase in rates of cesarean section indication. Another factor that strengthens this hypothesis is the fact that few women had an absolute or relative clinical-obstetric intercurrent indicative of a cesarean section, such as HIV infection, fetal distress, placenta previa and/or placental abruption (PA).

In 2018, the WHO released the document of recommendations for care during labor, delivery and childbirth called Intrapartum care for a positive childbirth experience, with the aim of making the experience of childbirth positive, to improve physical, mental, and psychological outcomes for the woman, newborn, and family. This document places this core at the center of the care provided, by including them in conscious decision-making throughout the process<sup>(16,21)</sup>.

In this sense, before the pandemic, in Brazil, there was a predominance of inadequate obstetric care during labor, delivery and childbirth, which resulted in the excessive use of interventions and the high number of elective cesarean births<sup>(25)</sup>. Although assistance in labor and delivery of parturients positive for COVID-19 recommends more rigorous monitoring during the labor and delivery process, this does not mean that the behavior of professionals who assist them should be interventionist more than what is recommended in the scientific literature during this period and necessary according to the condition of the pregnant woman.

It is known that recommended practices during labor, delivery and newborn care is directly related to the improvement of obstetric outcomes<sup>(22)</sup>. However, in the pandemic, the focus of care changed from that centered on women to their safety needs<sup>(20)</sup>. In Brazil, and in several countries, maternity hospitals (or normal delivery centers) have been defined as the best place to treat suspected and/or confirmed cases of SARS-CoV-2. They were chosen because they provide specific environments for vaginal delivery, cesarean sections, neonatal isolation in the Intensive Care Unit (ICU) or intermediate care and rooming-in<sup>(26)</sup>.

Other variables in this study can also be considered as indicative of the process of instrumentalization and humanization of childbirth, such as the use of anesthesia; use of non-pharmacological methods for pain relief; and presence of a companion during labor. Regarding the use of anesthesia, authors associate it with some undesirable outcomes, such as the extension of the second stage of labor, increased need for oxytocin during labor, deficit in maternal motor function and rotational dystocia, although the evidence is not uniform and the statistical and clinical relevance are variable<sup>(27)</sup>.

In that regard, the need for tools with fewer negative impacts and risks of undesirable outcomes is evident, which can reduce the pain and discomfort of the pregnant woman, such as NPMs, which are behaviors administered throughout labor and delivery with the objective of reducing the pain of the laboring woman, seeking to perform the minimum of interventions and reduce the use of drugs<sup>(28)</sup>. These methods are essential for the comfort of women during labor and the reduction of traumatic experiences, in addition to reducing interventions, which are responsible for more experience of pain and discomfort<sup>(29)</sup>.

Thus, the data from the present study allowed us to observe that, despite the negative impacts caused by COVID-19, the use of good practices in assisting pregnant women, in terms of pain relief, did not suffer considerable impacts, which may have mitigated the harmful effects of the medicalization of labor and delivery.

Finally, regarding the variable presence of a companion during labor, having emotional and physical support leads to a reduction in the feeling of loneliness; promotion of humanized delivery and birth; reduction of pharmacological methods for pain relief, the duration of labor, the number of cesarean sections and cases of postpartum depression, in addition to increasing women's confidence and safety<sup>(29,30)</sup>.

Before the COVID-19 pandemic, 95.90% of the women had a companion and, during this period, 88.83% were accompanied, and among infected women, 86.36% had a companion and 88.87% of those not infected were accompanied.

However, considering that Law No.11,108/2005 guarantees pregnant women the right to have a companion during labor and delivery, a percentage close to 100% is expected both in the pre-pandemic period and during the pandemic<sup>(31)</sup>.

Therefore, there was an increase in the number of cesarean sections in women infected with SARS-CoV-2, which can be explained, among other things, by the indication of cesarean sections as the first choice of birth route for infected women, without considering the clinical picture presented<sup>(32,33)</sup>.

Finally, some limitations of this study are highlighted, such as the non-representativeness of the population of pregnant women in Belo Horizonte. However, a rigorous methodology with the conduction of the study in three maternity hospitals specialized in childbirth care can minimize this limitation and contribute to generalizing the results.

It is understood that this study shows the impacts of the pandemic context in the assistance and care for pregnant women, parturients and puerperal women, which contributes to the knowledge advancement, in the perception of the fragility and susceptibility of assistance to women to the contexts faced, causing a negative impact on the care for pregnant women, parturients and postpartum women during the COVID-19 pandemic. Additionally, it contributes to the perspective of acting as a scientific framework for health professionals, as they pay attention to these issues and seek strategies that avoid the exacerbated use of practices without scientific evidence in the labor and delivery scenario.

Added to this, there are innovations for teaching, to show the need for investment in health education and permanent and continuing education, to reduce interventionist practices and to value the implementation of good practices in delivery and labor; for research, to be a ground instrument for the development of new, more comprehensive studies and to serve as a basis for comparison with data from other studies; for management, to allow the understanding of the professionals' performance scenario and the improvement of financial and human resources; and for nursing and health care, to act as a scientific framework to defend good practices and encourage the search for scientific evidence to improve professional practice, respecting the centrality of obstetric care for women, newborns and families.

## ■ CONCLUSION

There was an increase in the percentage of cesarean sections in the maternity hospitals observed, as well as a possible influence of the pandemic on the rates of cesarean sections upon admission to the maternity hospital and on the use of non-pharmacological methods for pain relief.

In this context, it becomes necessary to strengthen health education practices, both for women (especially during prenatal care) and for professionals (especially those who provide labor and birth care), to provide the deconstruction of the hospital-centered model of health care; the reduction of unnecessary interventions; and the promotion of women's active participation as the main agent in their care. It is hoped that this study can further strengthen the process of labor and delivery as physiological, in order to achieve the best outcome for the mother-baby binomial.

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