

The effect of the Covid-19 pandemic on the quality of prenatal care in a Brazilian city

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Extended abstract

Work in progress

Background

As the number of direct deaths due to Covid-19 approaches 5,1 million worldwide and 611k in Brazil (WHO, 2021), scientists finally have enough evidences to show that pregnant women present increased risk of complications and ICU admission as well as greater need for mechanical ventilation (ELLINGTON et al., 2020; HANTOUSHZADEH et al., 2020), but the rates of maternal death remained unchanged in most countries. However, maternal deaths continued to rise in low and middle income countries, which is a reflection of a combination of health system failures and higher rates of existing conditions (SOUZA; AMORIM, 2021).

The association of Sar-Cov-2 severe cases with pre-existing conditions is a characteristic that increased general mortality in the country (BORGES; CRESPO, 2020; NEPOMUCENO et al., 2020). Not only Brazilians present a higher proportion of comorbidities at younger ages, but the living arrangements - number of individuals living in the same household with persons in the risk group - increase exposure to infections. Research estimated that 68.7% of Brazilians were living with at least one person in the risk group (elderly or adult resident with preexisting medical conditions). The situation is worse in places where there is greater circulation of people and more precarious general conditions, like favelas and other less developed regions of major cities. Those areas, in addition to lacking sanitation, also present lower employment status, both conditions that challenge the individual protection and social distancing measures needed to contain the disease. As a conclusion, the effects of COVID-19 have varied according to the socioeconomic and demographic profile (CORDES; CASTRO, 2020; FIOCRUZ, 2020).

As far as the health system is concerned, two aspects are important to take into account. The first one is the strategy implemented by the federal government which consisted in fighting

Covid-19 by intentionally achieving herd immunity (VENTURA et al. 2021). The government has advocated for drugs with unproven efficiency, denying facts and scientific evidence (WERNECK; CARVALHO, 2020), delayed in purchasing supplies such as syringes and needles, failed to incentive social isolation and the use of masks (VENTURA et al. 2021) and more recently, a internal investigation is showing how the federal government has refused proposals for vaccine acquisitions while still in 2020 (GALVANI, 2021). In addition to the delay in the onset of vaccination for the general population, the vaccination of pregnant women was hampered by extreme conservative public authorities who feared “side effects” (Amorim et al. 2021).

Another aspect that concerns the health system is related to the effects of the pandemic on maternal and child health conditions. The overload imposed on health services by the increased demand may have been reflected in the quality and supply of reproductive health care, from the availability of contraceptive methods in health centers to the quality of prenatal care provided to both mother and child. In an ecological study which analyzed data from 5,564 (99.9%) Brazilian municipalities, CHISINI et al. (2021) found, when compared to 2018 and 2019, in the year 2020 there was a significant reduction in the rates of prenatal procedures and consultations. According to the results, which used official data from Primary Health Care, the reduction in the rates of prenatal procedures and consultations dropped 36%, with the greatest reduction in the month of May and maintained until December (CHISINI et al. 2021).

The mental health of pregnant and postpartum women also suffered effects of the pandemic, affecting both maternal and neonatal outcomes. Comparative analyses between rates of depression, suicidal ideation, and anxiety before and during the lockdown, highlight the increased incidence of the events (KOYUCU; KARACA;. 2021; PAIXÃO; CAMPOS; CARNEIRO;. 2021; WU et al. 2020). Moreover, the feeling of fear and anguish regarding the possibility of contamination during pregnancy or of the baby during delivery were associated with worse maternal and neonatal outcomes (SOLTO; ALBUQUERQUE;. 2020). In this context, associated with the decline in quality and reduction of prenatal care, emotional issues may have prevented these women from accessing prenatal care and follow-up. As a result, in some regions, there was an increase in the rates of neonatal mortality and stillbirths (KOYUCU; KARACA;.2021)

Nationally and internationally, discussions about the impact of COVID-19 prevention measures on neonatal health are also present (FAVRE et al., 2020; SCHMID et al., 2020). If a pregnant woman becomes infected with COVID-19, a study shows how she becomes a victim of a number of case failures, receiving less ventilatory assistance and having lower chances of being admitted to an intensive care unit (TAKEMOTO et al.2020). An important

intersection disrupts the chances of already vulnerable women: a study in the United States found that black women were hospitalized in worse conditions, which doubled their chance of death (TAI et al. 2020).

Brazil is the country with the highest number of maternal deaths from COVID-19 and in 2020 accounted for 8/10 of all maternal deaths worldwide (BRAZIL, 2021; NAKAMURA-PEREIRA et al.; 2020). According to the Brazilian Obstetric Observatory COVID-19 (OOBr Covid-19), there were 1926 deaths due to Covid-19 of pregnant and postpartum women registered in the country, with 461 cases in 2020 and 1465 in 2021. Photos of smiling pregnant women who died from Covid-19, either before or after delivery, were featured in headlines across the country.

Although some women delayed pregnancy because of Covid-19, many decided to pursue their dreams at some point in the pandemic or had unplanned pregnancies (Coutinho et al. 2020; Marteleto and Dondero, 2020). The process of pregnancy and childbirth in the pandemic, in addition to suffering structural obstacles, was impacted by uncertainty that caused anxiety, fear and concerns and should be further investigated (Souto et al 2020; Rahman et al. 2021; Lucas and Bamber, 2021).

The aim of this study is to explore the impact of COVID-19 on the experience of prenatal care by comparing mothers of a cohort of babies born in the 12 months before the epidemic began with a cohort of babies born up to 12 months after the pandemic began. We investigate how the COVID-19 pandemic shaped the experience of pregnancy and childbirth in a Brazilian city, shedding light on mechanisms of inequality that may have contributed to different health outcomes.

Data

We will use novel data from the project entitled *Percepção das mulheres sobre a assistência obstétrica e suas consequências para a saúde da mulher e da criança em Belo Horizonte* [Perceptions about obstetric assistance and their consequences for women's and child's health in Belo Horizonte]. The study was conducted by the Centro de Planejamento e Desenvolvimento Regional (Cedeplar/UFMG) and has been approved by UFMG Research Ethics Committee (CAAE: 99674718.1.0000.5149).

The survey questionnaire was online, anonymous, self-administered, and took an average of 20 minutes for completion. It contained closed and opened questions about pregnancy and reproductive history, pregnancy intentions, and for their most recent pregnancy: prenatal care consultations, obstetric care, postpartum care, pediatrics care following birth, as well as a

series of validated questions to evaluate the existence of obstetric violence in any part of the process of gestation, birth or abortion

Belo Horizonte was chosen for the study field because it has been a pioneer in the search for the reduction of maternal and neonatal death, much earlier than the international agreements to reduce maternal mortality that reshaped the policies in the country (OMS, 2009). This search includes services of maternal death investigation (LANSKY, 2010), a municipal hospital that is an international reference in humanized births (WERNECK, 2017), and an interesting scenario in which the private health system has not actively searched for improving morbimortality rates of women and children, as well as the public, insisting in the use of practices that are no longer recommended routine for birth assistance, like unnecessary C-sections, and other procedures.

Women aged 19-47 responded to the survey. The analytical sample of this study uses only data from women who had live births anytime between 1 January 2018 and 30 April 2021 in the city of Belo Horizonte-MG (n=851).

Methods

In order to explore the impact of COVID-19 on prenatal care experience, we will compare mothers of a cohort of babies born alive in the 12 months prior to the beginning of the pandemic with a cohort of babies born alive up to 12 months after the beginning of the pandemic. The beginning of the pandemic is set to March 18th 2020, which marks the beginning of the first lockdown imposed in the city of Belo Horizonte, one week after the WHO announcement that Covid-19 had turned into a pandemic (PAHO, 2020).

After building two sample sets of women (those who had birth prior to the onset of the pandemics and those who had birth after), in order to reduce the effect of confounders in observational studies, a propensity score matching (PSM) was applied using the nearest neighbor method with a 1:1 ratio, without replacement. The PSM matched women according to their sociodemographic profile. The independent variables utilized for matching are: Age (18-24; 25-29; 30-34; 35-39; 40-44; 45-55); Education level (Less than high school; high school; some college); Race (White, Brown, Black); In a marital union (dummy); Health insurance (dummy); Social assistance recipient (dummy); High risk pregnancy (dummy); Type of birth (vaginal; c-section); Prenatal care assistance (Public SUS; Insurance; Private); Birth delivery assistance (Public SUS; Insurance; Private).

In Brazil, full obstetric assistance including all recommended tests can be accessed free of charge at the Sistema Único de Saúde (SUS) anywhere in the national territory. Despite that,

it is common to purchase health insurance, especially women who have higher socioeconomic status.

On top of that, many women opt to visit out-of-network doctors, hire doulas or pay for tests of their own choice in a private manner. These kinds of services are usually contracted and billed directly to the women and may or may not be covered by existing insurance.

In this paper, for both prenatal and birth assistance, women will only be categorized as “SUS” if the Public System is her only choice for medical appointment and tests. Likewise, she was coded as “Insurance” if she only used her health insurance to cover her expenses (includes co-payments). However, we will consider “private”:

a) any woman who got billed for her entire prenatal care or birth care in a private manner (no SUS, no Insurance).

b) any women who, regardless of having used SUS or Health insurance combined, has made any type of private payment for services out-of-network, such as paid for an extra lab test or hired a doula.

c) any women who had had any combination of services that includes paying for a service.

Logistic regression models were applied to model women’s responses in three dependent variables: Satisfaction with birth delivery (yes=1, no=0); Satisfaction with prenatal care (yes=1, no=0); Baby born well (did not need any intervention) (yes=1, no=0).

Regular poisson regressions were applied to model women’s responses in three other dependent variables: Number of prenatal care appointments; Number of ultrasound tests; Birth weight (in grams).

The sample size varied slightly according to the regression model (~764).

Women who gave birth after lockdown also answered the question: “After remembering your experience during prenatal care and birth, do you consider that Covid-19 has impacted the way you lived through your pregnancy? How?”. We coded and classified 306 responses using appropriate qualitative techniques (Creswell et al. 2007)

Main Results

Quantitative analysis

Before presenting the results, it is important to explain that we allowed sample sizes to vary according to the dependent variables (from 731 to 764 observations). We did so as to use the database to its maximum extent as this is the first time it is being analyzed.

After applying the PSM strategy, we did not observe statistically significant differences regarding birth weight, number of prenatal appointments and number of ultrasound tests. We also did not observe statistically significant differences regarding satisfaction with prenatal care, but we noticed that women who had birth after the lockdown had almost twice the odds (or 80% increase in the odds) of being satisfied with delivery when compared with women who gave birth before the lockdown (odds ratio: 1.83, $p < 0.05$). One possible reason for why women after the lockdown would think about their birth experience in a more positive way is due to the fact that as these women faced higher risks of adverse outcomes (such as death) during pregnancy, once the baby was born, their level of satisfaction with delivery was immediately changed to accommodate their subjective notion of what could have happened.

Women who had birth after the lockdown also had lower odds of responding that their babies were born well. However, this difference is not statistically significant.

Compared with women who used the Public Health System (SUS), free of charge but that was overloaded because of Covid, women who used health insurance or paid for these services privately had a higher number of appointments and ultrasounds tests during prenatal care (0,12 $p < 0.05$ for appointments and 0,38 $p < 0.001$ for ultrasound of women who used health insurance and 0,11 $p < 0.10$ for appointments and 0,26 $p < 0.001$ for ultrasound for private payment).

The type of financing of prenatal care is not associated with either birth or prenatal care satisfaction. However, the type of financing of delivery is highly associated with satisfaction with prenatal care. Women who paid privately (3,82 $p < 0.001$) or used health Insurance (2,35 $p < 0.05$) had much higher odds of being satisfied with prenatal care when compared to women who used the public system (SUS) for delivery.

Having a higher number of ultrasound tests was also associated with having a risk pregnancy (0,26 $p < 0.001$) or having a c-section (vaginal: -0,11 $p < 0.001$). Satisfaction with birth was associated with vaginal birth (51% higher odds of being satisfied compared to c-section $p < 0.10$).

Women younger than 30 years old and women who were highly educated had higher satisfaction with prenatal care when compared to their older counterparts or women of lower levels of education during Covid-19.

Qualitative findings

In regards to the qualitative findings, we were able to code and group women's responses about how Covid-19 impacted their experiences into five themes: lack of information, Emotional, Impacts on physical wellbeing and on health, Obstetric assistance and Consequences for the baby.

First, in regards to lack of information, women complained about the cancellation of pregnant women's groups, prep courses and other in-person events that were important information resources regarding childbirth and baby care. We also found several quotes related to the emotional impacts of the pandemic, from loneliness to depression, and also fear of dying or losing the baby or loved ones.

Impacts on physical wellbeing and on health were also noticed, with many women reporting being either sedentary during pregnancy (which is a risk factor for obesity, diabetes and hypertension) or exhausted for not being able to hire or find help with domestic work or childcare of their older children.

An impressive amount of women report having trouble accessing health services during the pandemic, mainly due to cancelation of services or change in personnel available to help. They also report not being able to visit the maternity before birth, not being able to have guests in the maternity room, or even doulas and other health professionals who aid women in having a positive birth experience. They also report feeling discomfort due to measures of isolation and having late diagnoses due to delays in medical appointments and tests like ultrasounds for blood tests.

We found and coded several responses regarding consequences for child health, such as delayed appointments with pediatricians, difficulty in breastfeeding and restriction in visits to babies in the Intensive Care Unit.

Conclusion

The pandemic has caused changes in prenatal care and childbirth, increasing the general feeling of loneliness and fear and effectively decreasing the number of appointments and prenatal exams for women who depended exclusively on the SUS in relation to those who have health insurance or those who have actively paid in the private system.

Women who gave birth through health insurance or private networks are more likely to be satisfied with prenatal care than women who gave birth exclusively through the SUS.

This finding shows how paying for prenatal care was the only way for women to mitigate the negative effects of Covid-19, which is a clear example of a pervasive social inequality in health. The fact that satisfaction with delivery in the matched model is 83% higher after Covid-19 suggests a mismatch between the quantitative and the qualitative indicators of satisfaction, as women seem to relativize the experience against the risks they took.

Ongoing analysis is adjusting the quantitative analysis for timing of pregnancy during lockdown as part of their prenatal care might have been made before the onset of the pandemic. We are also looking into improving our measures of satisfaction and also testing more variables related to the quality of the obstetric care. In regards to the qualitative findings, we are now working on stratifying our findings by socio demographic groups in order to observe possible inequalities such as the one observed in the quantitative analysis.

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Table 1: Logistic Regression of Satisfaction with Prenatal Care, Satisfaction with Birth, and if Baby was Born Well and Poisson Regression of Number of Prenatal appointments, Number of Ultrasounds and Birth Weight by selected independent variables. Propensity Score Matching. Belo Horizonte 2021.

Characteristics	Dependent variable:					
	Satisfaction with Prenatal care odds ratio	Satisfaction with birth odds ratio	Born well odds ratio	Number of prenatal appointments β	Number of Ultrasounds β	Birth weight β
lockdown: Yes	1,27 (0,77; 2,13)	1,83** (0,77; 2,13)	0,69 (0,17; 1,20)	-0,03 (-0,07; 0,02)	0,02 (-0,03; 0,07)	24,75 (-53,86; 103,35)
Age (Ref: 19 to 29)						
<i>age 30 to 35</i>	0,5 (0,20; 1,21)	1,12 (0,20; 1,21)	0,57 (-0,34; 1,49)	0,01 (-0,07; 0,09)	-0,07 (-0,16; 0,02)	206,25*** (72,60; 339,90)
<i>age 35 to 39</i>	0,43` (0,16; 1,03)	1,75 (0,16; 1,03)	0,59 (-0,34; 1,51)	-0,02 (-0,10; 0,05)	-0,16*** (-0,25; -0,06)	168,96** (34,10; 303,81)
<i>age 40 to 49</i>	0,40` (0,13; 1,16)	1,36 (0,13; 1,16)	0,61 (-0,52; 1,73)	-0,02 (-0,12; 0,07)	-0,12** (-0,23; -0,01)	177,36** (12,07; 342,65)
Education (Ref: High School incomplete or lower)						
<i>Complete High School</i>	0,34* (0,10; 1,05)	3,01* (0,10; 1,05)	0,75 (-0,53; 2,03)	-0,06 (-0,18; 0,06)	0,02 (-0,12; 0,16)	-83,33 (-287,02; 120,36)
<i>Some college</i>	0,92 (0,26; 2,80)	1,7 (0,26; 2,80)	0,76 (-0,42; 1,94)	-0,06 (-0,17; 0,05)	0,03 (-0,10; 0,16)	-182,51* (-371,01; 5,98)
Married (dummy)	1,4 (0,52; 4,92)	1,06 (0,52; 4,92)	0,53 (-0,33; 1,38)	-0,04 (-0,14; 0,05)	-0,08 (-0,18; 0,03)	-49,84 (-211,26; 111,57)
Risk Pregnancy (dummy)	0,71 (0,39; 1,32)	1,35 (0,39; 1,32)	0,56** (-0,02; 1,13)	0,08*** (0,03; 0,14)	0,26*** (0,20; 0,32)	-253,74*** (-354,46; -153,01)
Health Insurance (dummy)	1,3 (0,52; 3,18)	0,99 (0,52; 3,18)	1,42 (0,47; 2,38)	0,06 (-0,04; 0,15)	0,08 (-0,04; 0,20)	-79,69 (-241,83; 82,46)
Race						
<i>Brown</i>	1,42 (0,79; 2,67)	1,38 (0,79; 2,67)	0,98 (0,41; 1,56)	-0,01 (-0,06; 0,04)	-0,04 (-0,10; 0,02)	-38,67 (-129,09; 51,75)
<i>Black</i>	0,85 (0,38; 2,03)	0,98 (0,38; 2,03)	2,15 (1,02; 3,28)	-0,01 (-0,10; 0,07)	0,02 (-0,08; 0,12)	38,44 (-106,84; 183,73)
Social assistance recipient (dummy)	1,3 (0,68; 2,61)	0,85 (0,68; 2,61)	0,67 (0,06; 1,27)	-0,03 (-0,09; 0,03)	0,01 (-0,06; 0,08)	-7,29 (-109,24; 94,66)
Prenatal financing (Ref: SUS, Public System)						
<i>Health Insurance</i>	0,68 (0,22; 1,98)	0,81 (0,22; 1,98)	0,64 (-0,59; 1,87)	0,12** (0,01; 0,24)	0,38*** (0,23; 0,52)	99,29 (-96,76; 295,34)
<i>Private</i>	0,95 (0,36; 2,39)	0,8 (0,36; 2,39)	0,6 (-0,49; 1,70)	0,11` (-0,001; 0,21)	0,26*** (0,13; 0,40)	132,29 (-47,31; 311,88)
Birth/delivery financing (Ref: SUS, Public System)						
<i>Health Insurance</i>	2,35** (1,10; 4,98)	0,56 (1,10; 4,98)	1,46 (0,63; 2,28)	-0,01 (-0,09; 0,06)	0,12*** (0,03; 0,21)	6,03 (-123,19; 135,26)
<i>Private</i>	3,82*** (1,72; 8,69)	1,36 (1,72; 8,69)	1,59 (0,78; 2,40)	0,03 (-0,04; 0,10)	0,16*** (0,07; 0,25)	8,85 (-117,78; 135,47)
Type of Birth (vaginal)	0,96 (0,55; 1,65)	1,51* (0,55; 1,65)	1,51 (0,98; 2,04)	0,01 (-0,04; 0,05)	-0,11*** (-0,16; -0,05)	-7,6 (-92,31; 77,12)
Constant				2,26*** (2,13; 2,39)	1,46*** (1,29; 1,62)	3.214,22*** (2.987,42; 3.441,02)
Observations	764	764	754	756	752	731
Log Likelihood	-228,15	-264,53	-227,8	-1.751,67		-5.609,25
Akaike Inf. Crit.	492,29	565,06	491,61	3.539,34		11.254,50