



The experience of pregnant women and their families who were infected with covid-19 before vaccination: A qualitative approach within a multicenter study in Brazil

Rachel E Soeiro^a, Renato T Souza^{a,*}, Silvana F Bento^a, Jose G Cecatti^a, Fernanda G Surita^a, Juliana Vasconcellos Freitas-Jesus^a, Rodolfo C Pacagnella^a, Carolina C Ribeiro-Do-Valle^a, Adriana G Luz^a, Giuliane J Lajos^a, Guilherme M Nobrega^a, Thayna B Griggio^a, Charles M Charles^a, Carla Silveira^a, Maria J Miele^a, Ricardo P Tedesco^b, Karayna G Fernandes^b, Sérgio HA Martins-Costa^c, Frederico JA Peret^d, Francisco E Feitosa^e, Evelyn Traina^f, Edson V Cunha Filho^g, Janete Vettorazzi^{c,g}, Samira M Haddad^h, Carla B Andreucciⁱ, José P Guida^j, Mario D Correa Junior^k, Marcos AB Dias^l, Leandro G Oliveira^m, Elias F Melo Juniorⁿ, Marília GQ DA Luz^o, Maria Laura Costa^a, for the REBRACO Study Group¹

^a Department of Obstetrics and Gynecology, University of Campinas, Campinas, SP, Brazil

^b Jundiaí School of Medicine - HU/FMJ, Jundiaí, SP, Brazil

^c Clinics Hospital of Porto Alegre, Porto Alegre, RS, Brazil

^d UNIMED Maternity - UNIMED/BH, Belo Horizonte, MG, Brazil

^e Federal University of Ceará - MEAC/UFC, Fortaleza, CE, Brazil

^f Federal University of São Paulo - UNIFESP/EPM, São Paulo, SP, Brazil

^g Moinhos de Vento Hospital - HMMV, Porto Alegre, RS, Brazil

^h Jorge Rossmann Regional Hospital - Sócrates Guanaes Institute, Itanhaém, SP, Brazil

ⁱ Federal University of São Carlos/UFSCAR, São Carlos, SP, Brazil

^j Sumaré State Hospital - HES, Sumaré, SP, Brazil

^k Federal University of Minas Gerais - HC/UFMG, Belo Horizonte, MG, Brazil

^l Fernandes Figueira Institute - IFF/Fiocruz, Rio de Janeiro, RJ, Brazil

^m São Paulo State University School of Medicine, Botucatu, SP, Brazil

ⁿ Federal University of Pernambuco - HC/UFPE, Recife, PE, Brazil

^o Santa Casa de Misericórdia of Pará, Belém, PA, Brazil

ARTICLE INFO

Keywords:

Pregnant women
COVID-19 pandemic
Experience

ABSTRACT

Background: Pregnant and postpartum women infected by COVID-19 are at increased risk of adverse outcomes, including negative effects on their mental health. Brazilian maternal mortality rate due to COVID-19 is 2.5 times higher than overall mortality rates. This study aimed to understand how pregnant/postpartum women experienced the COVID-19 suspicion/investigation or confirmed infection in different Brazilian cities, the pandemic's consequences to women and their families, and their needs to improve maternal health services during public health emergencies.

Methods: We conducted a qualitative study with 27 women with COVID-19 and 6 of their family members, as part of a multicenter study among 15 maternity hospitals in Brazil. We applied in-depth interviews through telephone calls when women received the diagnostic or had a suspect infection and after 60 days. Another semi-structured interview was applied to their close family members. The interviews were considered through thematic analysis.

Results: From the thematic content analysis three major themes emerged from the first and second interviews: (Cucinotta and Vanelli, 2020) assistance received by the woman and newborn in the medical services; (World

* Corresponding author at: Department of Obstetrics and Gynecology, The University of Campinas, 101 Alexander Fleming St; Campinas, SP, Brazil.

E-mail address: rt Souza@unicamp.br (R.T. Souza).

¹ The full list of participants of the REBRACO study group is provided in the acknowledgements.

Health Organization (WHO) 2021) stigma/fear of contamination from health workers and from family and friends reported by the women; (Allotey et al., 2020) the COVID-19 pandemic impact.

Conclusion: Before the availability of the COVID-19 vaccine, pregnant women experienced fear of death, hospitalization, quarantine, loss of family members, and financial repercussions, resulting in physical, psychological, and socioeconomic impacts on these women's lives.

Introduction

Since March 2020, the world has been facing a public health emergency due to the coronavirus pandemic (COVID-19), responsible for nearly seven million deaths (Cucinotta and Vanelli, 2020; World Health Organization (WHO) 2021).

Pregnant and postpartum women were identified as being at increased risk for severe COVID-19, intensive care unit (ICU) admission, and invasive ventilation compared to non-pregnant women of reproductive age (Allotey et al., 2020; Karimi et al., 2021; Hantoushzadeh et al., 2020). SARS-CoV-2 infection during pregnancy is associated with adverse outcomes, including preterm delivery, stillbirth, caesarean section, and maternal death (Ramanathan et al., 2020; Di et al., 2020). This risk is even higher in those with underlying comorbidities such as obesity, diabetes, and chronic hypertension (Allotey et al., 2020).

The restrictions on social isolation imposed by the COVID-19 pandemic have also affected pregnant women, causing increased anxiety, stress, and depression (Salehi et al., 2020; Sahin and Kabakci, 2020; Mei et al., 2021). In addition to the acute COVID-19 infection, it has been observed that some symptoms may persist for weeks or months, constituting the so-called "post-acute COVID-19 syndrome", which also affects the quality of life (Mohiuddin Chowdhury et al., 2021; Montani et al., 2022).

Brazil was one of the most affected countries in terms of the total number of deaths due to COVID-19 (World Health Organization (WHO) 2021), most likely due to a combination of factors: its large size (the fifth largest country in the world), huge socioeconomic inequalities and political crisis, and inadequate government policies (Baqui et al., 2020; Moreira et al., 2020). The Brazilian maternal mortality rate due to COVID-19 is 2.5 times higher than the overall mortality rate, with the impact of delayed care, including lack of access to health services, ICU admission, and invasive ventilation (Cruz, 2023; Santos et al., 2021; Takemoto et al., 2020).

Since the beginning of the pandemic, the Brazilian Network of Studies in Reproductive and Perinatal Health (a collaborative initiative of more than 30 institutions that has been conducting multicenter studies on maternal and perinatal health for more than ten years) (Costa et al., 2021) has established a collaborative multicenter investigation called REBRACO (Brazilian Network of COVID-19 during pregnancy, in Portuguese: REde BRAsileira em estudos do COVID-19 em Obstetrícia). The purpose of the REBRACO study was to evaluate several conditions associated with SARS-CoV-2 infection during pregnancy and postpartum, considering clinical, epidemiological and laboratory aspects, along with a quantitative and qualitative assessment of how women and health professionals experienced this situation, to describe maternal and perinatal outcomes, and to collect relevant information to allow rapid responses and proper organization of health services to face the COVID-19 pandemic (Costa et al., 2021).

Among some still unanswered questions about COVID-19 infection in pregnant/postpartum women, we know even less about how the women experienced the COVID-19 infection, the quarantine, the social isolation period and the impact on their lives and their families' lives, especially for those infected in the first year of the pandemic, when vaccination as a preventive intervention was not yet available.

The present analysis is based on the qualitative approach within the REBRACO study. It aimed to report how pregnant/postpartum women from different regions of Brazil experienced COVID-19 infection/suspicion before the COVID-19 vaccine was available.

This study also aimed to describe the experiences of these women's family members during COVID-19 infection/suspicion.

Materials and methods

Study design

This qualitative study was part of the multicenter study REBRACO with quantitative (a cross-sectional study, a cohort study, an ecological study, qualitative approaches, and a crisis management committee in the COVID-19 Research Network) carried out in 15 Brazilian referral maternity hospitals (Costa et al., 2021).

As at the beginning of the pandemic, the COVID-19 prevalence and incidence for pregnant women were unknown, the sample size for the REBRACO study was stipulated by convenience: all pregnant or postpartum women who met the inclusion criteria (presented at maternity hospitals with flu-like symptoms or COVID-19 test positive) were invited to participate on the study.

After they signed the informed consent were collected sociodemographic data, medical history, and telephone numbers. It was also informed that they would be further contacted for a telephone interview.

In this paper, we focused on investigating the experience of pregnant/postpartum women who presented COVID-19 suspicion/investigation or confirmed infection and their families' experience in different maternity hospitals in Brazil during the first and second wave of the pandemic in Brazil (from August 2020 to March 2021).

We conducted in-depth interviews and we thematically analyzed data, building categories. The manuscript was written according to the COREQ checklist (Booth et al., 2014).

Study participants, recruitment and setting

The participating centers were from four of the five Brazilian macro-regions of the country (North, Northeast, Southeast, and South) from university and non-university hospitals, and from both public and private sectors.

From 1st February 2020 to 28 February 2021, all pregnant or postpartum women aged between 13 and 49 years and with COVID-19 symptoms (presenting at least one of the following symptoms fever, cough, shortness of breath, sputum production, nasal or conjunctival congestion, difficulty swallowing, sore throat, runny nose, O₂ saturation <95 %, signs of cyanosis, flapping of the nose and dyspnea or other symptoms such as diarrhea, anosmia, and dysgeusia) who attended the maternity services at the participating centers were invited to participate in the Rebraco study.

At admission eligible women received an explanation about the study and, in case of agreement, they signed the Informed Consent Form (for women older than 18 years old and legally responsible for women under 18 years old) and the Assent Form (for women under 18 years old).

They were also informed they could be contacted later by phone or WhatsApp message for an in-depth interview.

The REBRACO study included 729 women, for the main study. For the current qualitative study, three women over 18 years old and one woman below 18 years old from each center were randomly selected ($n = 60$). The research team further contacted those women by phone calls or WhatsApp messages asking if they agreed to participate in an in-deep interview by phone. At the first contact, the study protocol was

explained to the women and all the questions were answered. The women could think about and answer later by WhatsApp message if they agreed to participate, they could also ask for further information, before scheduling the interview.

In case of refusal, the women were replaced by another one (randomly selected) from the same center. Due to the refusals, the research team reached out to 136 women (Fig. 1) until achieving the saturation sampling method (Denzin and Lincoln, 2017).

We also included the women's close family members or partners, as indicated by them during the interview, to understand how the COVID-19 pandemic impacted the pregnant women's families. As the family members or partners' interviews depended on the women's indication, there was no initial sample size considered.

We collected data remotely through telephone calls from August 2020 to March 2021. The initial contact was made by phone call or WhatsApp message inviting the women to participate in the study. It was established that three attempts would be made to contact each woman on different days and times before discarding the selected case.

Data collection

We applied in-depth semi-structured interviews through open-ended questions about their COVID-19 pandemic experience related to treatment and information received, quarantine period, concerns related to self-care or baby care and the impact in their daily lives. Another in-depth semi-structured guide was applied to their close family members or partners encompassing questions about the impact of the COVID-19 diagnosis in the women's lives, family, the medical information received and their major concerns. For all the women, a second interview 60 days after the first one was also proposed to follow up the women after the COVID-19 suspicion/infection. For that interview, a new questionnaire was designed with a focus on the recovery period and meanings of the COVID-19 in their lives. All the interviews were audio-recorded and transcribed *verbatim* for data analysis.

At the beginning of the interview, the interviewer recommended that the participants should be in a private place where they would feel comfortable talking about the subjects approached. At the end of the interview, the interviewer asked the participants if they would like to add any other additional information. There were two interviewers for this study, a medical doctor and a social researcher with previous

experience with qualitative research and specific training towards this study.

The first interviews with women and family members lasted from 10 to 58 min.

Data analyses

All semi-structured interviews were recorded on audio, subsequently, recordings were transcribed through Reshape Software, and the text obtained was checked with the recording. Then texts were inserted into the NVivo V.12 computer program to help with the analysis.

Based on Braun and Clark's (Braun and Clarke, 2006; Braun and Clarke, 2023) recommendations the transcriptions have been read several times and individually codified. Two researchers initially generated codes and after discussion defined themes, and subthemes, developing analytical connections for the thematic content analysis (Patton, 1990), concepts from health psychology were used for interpretation. Health psychology (RO., 2019) considers not only biological, social, and psychological factors that may influence the health-disease process and physical and emotional well-being but also the physical and psychosocial environment, the sociocultural support systems, and the political systems that influence health and health care, including risks and protective factors. Therefore, for the thematic analysis, health psychology aspects (psychological distress, physical consequences of COVID-19 infections, social impact of the pandemic) were considered in the interpretation of the feelings and behaviors described by the women and their families.

Ethical issues

The research followed the determinations of the Hensinki Declaration, as well as the norms that regulate the research involving human beings in Brazil. Ethical approval for the coordinating center was given by the Institutional Review Board of the State University of Campinas (Unicamp) and for each participating center was obtained (Letter of Approval number 31590120.7.0000.5404). The informed consent was not signed. Since the interviews were conducted by telephone and recorded, the Institutional Review Board authorized that after the process of obtaining the informed consent, if woman/family members accepted to participate, their acceptance should be recorded. A specific

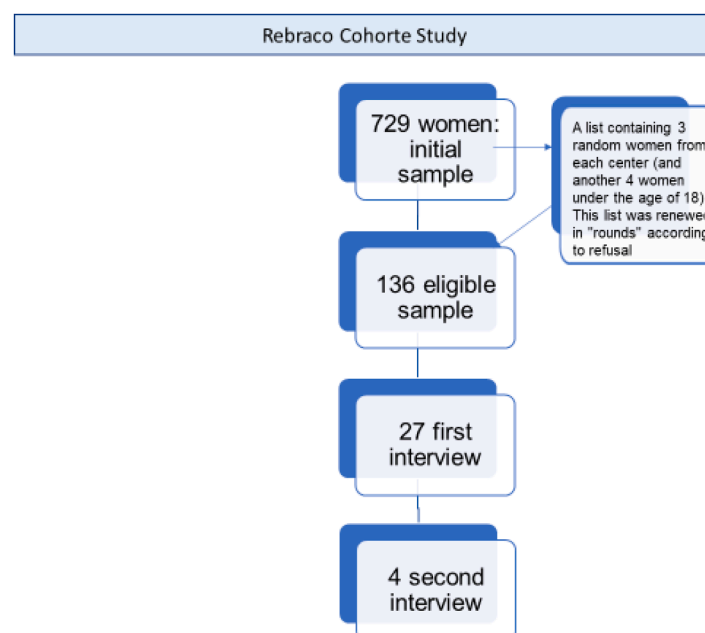


Fig. 1. Study participants selection*, *In total there were carried out 549 attempts to contact the 136 women until the final outcome (interviewed, lost, refusal, etc.).

informed consent was prepared for each category of participants (women/ family members and adolescents and their parents).

At the time of the telephone interview, the informed consent was read before data collection, all questions from the participants were elucidated and they were informed they could interrupt their participation at any time without consequences and they were also assured their identity would be kept confidential. The participants were asked if they agreed to participate in the study and if they allowed the interview to be recorded. The verbal consent was audio-recorded. After the interview, a copy of the informed consent was sent to each of the participants by e-mail or text message/WhatsApp.

Psychology support

There was a psychology referral system from each center, in cases where the research team noticed that women or their families presented concerning symptoms of emotional distress during the interviews, or if requested by them.

One woman was referred to psychology support.

Results

We interviewed 27 women and 6 family members. Table 1 shows the sociodemographic characteristics of the pregnant women. Women included were 18 years old or more. From an initial list of eligible women, we tried contact with other 109 women before reaching saturation with the last interview, most of them never answered the phone or messages. In the second interview, 60 days after the first one, four women participated, the others did not answer their phones neither the WhatsApp messages. The second interviews lasted from 6 to 12 min. Fig. 1 represents the process of selecting participants, 11 participating women indicated close family members or partners. We used the same approach detailed above and after three attempts, six people accepted to participate.

Table 1
Sociodemographic characteristics of the pregnant women.

Number	Age	Scholarship	Ethnicity	Marital Status	Number of Pregnancies	Confirmed COVID-19 infection	Hospitalization	ICU	Region*
1	38	High School	Non-white	Married	2 Yes		Yes	No	
2	45	High School	White	Cohabitation	3 Yes		No	No	4
3	22	Elementary	Non-white	Cohabitation	1 No		Yes	Yes	4
4	33	Higher education	White	Married	2 Yes		No	No	3
5	40	Higher education	White	Married	1 Yes		No	No	4
6	29	High School	Non-white	Single	1 No		Yes	No	4
7	35	High School	Non-white	Widow	3 Yes		Yes	Yes	3
8	38	High School	Non-white	Married	2 Yes		Yes	Yes	1
9	36	Elementary	White	Married	1 Yes		No	No	4
10	24	High School	Non-white	Married	1 Yes		No	No	4
11	36	Elementary	Non-white	Married	7 Yes		Yes	Yes	4
12	33	High School	Non-white	Married	2 Yes		Yes	No	4
13	NI**	Elementary	Non-white	Cohabitation	3 Yes		No	Yes	4
14	24	Higher education	White	Single	1 Yes		No	No	4
15	48	Higher education	White	Cohabitation	1 Yes		No	No	3
16	34	Higher education	White	Single	1 Yes		Yes	No	4
17	20	High School	Non-white	Married	1 Yes		Yes	No	2
18	25	High School	White	Married	4 Yes		No	No	4
19	39	High School	Non-white	Single	1 Yes		Yes	No	3
20	39	High School	Non-white	Married	2 Yes		Yes	No	4
21	NI	High School	Non-white	Cohabitation	1 No		No	No	3
22	20	High School	White	Cohabitation	1 No		No	No	4
23	37	High School	Non-white	Cohabitation	2 Yes		Yes	Yes	2
24	21	High School	Non-white	Cohabitation	1 No		Yes	No	2
25	24	High School	NI	Married	2 Yes		No	No	3
26	22	High School	Non-white	Cohabitation	3 No		No	No	2
27	24	Higher education	Non-white	Married	1 No		No	No	4

*1. North.

2. Northeast.

3. South.

4. Southeast.

*NI: Not informed.

Three major themes emerged from the analyses of the first and second interviews: assistance received by the woman and newborn in the medical services (antenatal care, emergency room, hospitalization, childbirth, and neonatal care); stigma/fear of contamination from health workers and from family and friends reported by the women; and the COVID-19 pandemic impact. Fig. 2 demonstrates the process of thematic content analysis.

1. Assistance received by the woman and baby in health services

In this category, three subcategories were defined regarding the access to, and quality of medical care received in antenatal care, emergency room, hospitalization, childbirth, and neonatal care, including COVID-19 testing and diagnosis.

1a. COVID-19 delayed diagnosis

The women's first access to health care differed among the region. The health services sought were the Basic Health Units (Primary care centers), doctor's offices (public and private), emergency care and hospitals. Some women sought care in other communities because they thought they had more medical resources.

Nevertheless, they reported that COVID-19 symptoms were confused with the flu or pregnancy symptoms, especially in those with high-risk pregnancies. For those in late pregnancy, there were cases where the COVID-19 symptoms had been confused with the signs of the end of pregnancy. In addition, during the first months of the pandemic, most services in Brazil did not perform confirmatory COVID-19 testing (in many facilities, there were restrictions, and only admitted or severe cases were tested).

The women felt that the diagnosis delay affected their health and their baby, leading to the worst outcomes. This is because some were only admitted to the hospital when the disease symptoms were very advanced, requiring admission to intensive care.

"... I told the doctor that I was short of breath and could not breathe. She answered it was normal due to the pregnancy, but I was twenty-two weeks pregnant, and I did not have a giant belly..." (Interview 2)

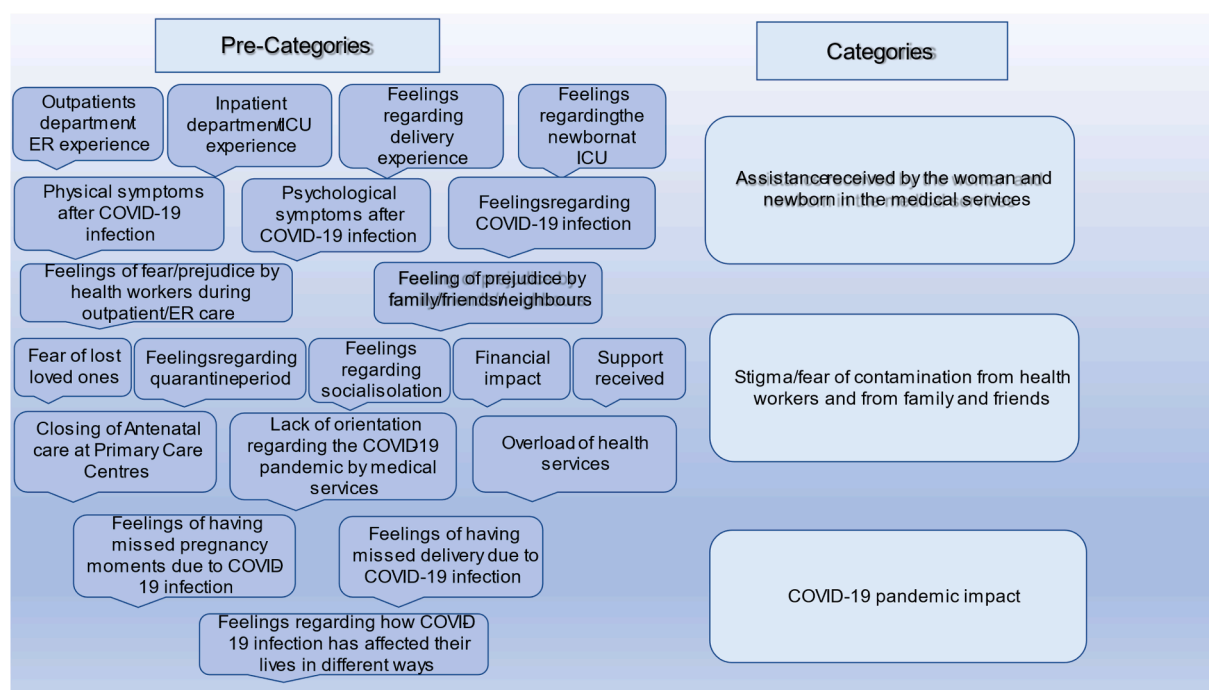


Fig. 2. The process of thematic content analysis (n = 27).

"My first test was negative [...]. The days went by, and my shortness of breath started to increase [...] I was taken to hospital and admitted [to intensive care], the next morning I was intubated" (Interview 7)

"I went to the hospital several times. As I was almost eight months pregnant, they told me it was back pain and that it was normal during pregnancy. [...]. So, they sent me home with painkillers". [...]

"When I arrived [after several medical consultations], the doctor suspected it was Covid [...] I couldn't speak. I couldn't breathe by myself. Then they gave me oxygen [...] I was in a severe condition." (Interview 11)

1b. Hospital care

The period of hospitalization was reported as a time of fear and anxiety, as the effects of COVID-19 infection on pregnant women were still unknown in the first year of the pandemic.

The hospital protocols differed among the Brazilian regions; some allowed a caregiver (who should stay in the hospital during the hospitalization period), while others did not (the communication with family was only through a cell phone).

Some hospitals had an intensive care unit for pregnant women; in others, women were put in the same room with other severe COVID-19 patients. Some women lived in cities with no intensive care unit and had to be transferred to other municipalities, some far away. This increased the stress of these pregnant women hospitalized in the ICU in a city far from their families. These differences had an impact on the women's hospitalization experience.

"My mother gave me all the support, [...] this helped me to control the fear, the panic". (Interview 13)

"I was desperate, they put me in the room... with an old woman and an old man, both with tracheostomies, on feeding tubes, all intubated...". (Interview 13)

The women with severe COVID-19 infection who were admitted to intensive care, and the young women reported more intense feelings about themselves, the fetus/baby and other children they had left at home. In addition to the fear of dying, there was concern about the fetus's health with so many procedures being carried out.

"I thought I would die; I would not be able to meet the baby..." (Interview 13)

"I thought I would not be able to see my children again". (Interview 11)

The women who had been intubated were terrified when they awoke from the coma, put their hands on their bellies, and found that their bellies were gone.

The health workers explained that they had to deliver the baby and even showed the baby's photos to the mothers. One of the women's husbands died while she was intubated, and this information was given to the woman when she woke up, along with the news that the baby had been born (Fig. 3).

"... on the third day that I was intubated, they took the baby out, because he was in fetal distress, they said he was at risk, he and I. Then they took the baby and when I woke up it was a shock! I woke up still unable to speak, I was very weak, and I put my hand on my belly and said where is my baby? I thought: where is my baby? Then I started crying, desperate, and then they increased the oxygen, I got nervous, and my oxygenation dropped again. They put me on oxygen, increased it and told me "If you don't stay calm, we'll intubate you again...". (Interview 11)

On average, it took about ten days for the women to see their babies; either they were intubated or very weak to leave the bed. In extreme cases, this time was extended to two months because the women were in severe health conditions. The women felt devastated, sad and worried about not being able to see their babies for several days.

For those who were recovering, in some hospitals, the baby could stay in the ward with their mother and others where they could not, due to the isolation protocol of each institution. It was the same for breastfeeding. In cases where mothers were allowed to stay in the room with their babies, they were given instructions on wearing a mask, washing their hands and using alcohol. Women who could not breastfeed due to their health problems or those of their babies felt very bad.

"... crying every day at home, I could see the baby [after 22 days] who was already very fat, she had changed so much, I cried and said, 'my daughter will not recognize me'. She will not know who I am". (Interview 8)

The women's length of hospitalization was from two days up to more

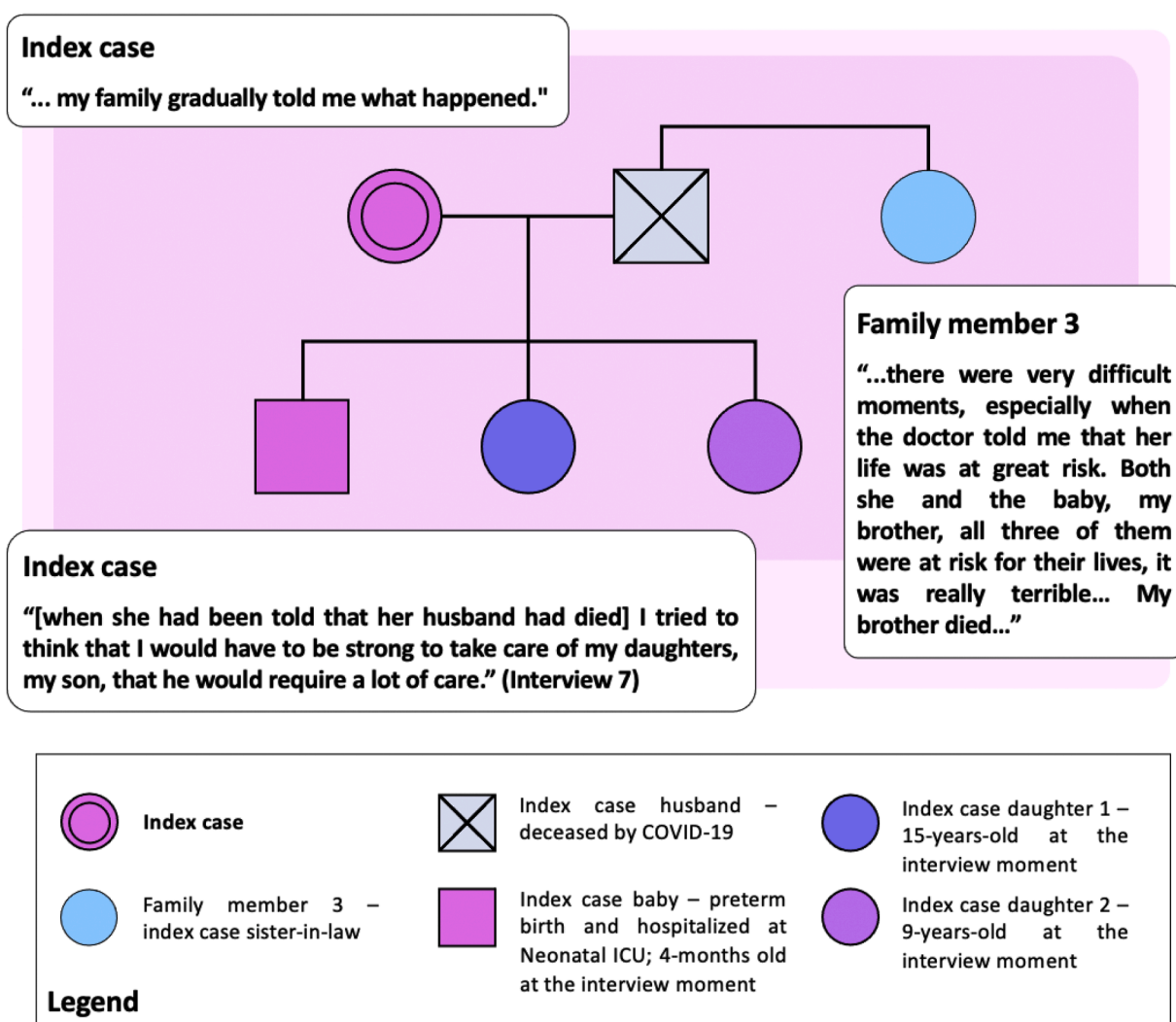


Fig. 3. An example of how COVID-19 infection has affected patients and their families. This figure represents a selected interview from a pregnant woman who got COVID-19 at the same time as her husband. Both were hospitalized, and he died. When she woke up from intubation, she realized a C-section had been performed, the baby was in NICU, and she was told her husband had died. Her sister-in-law, who also participated in this study as a family member, stayed at home taking care of the other two children.

than 60 days; few of them were discharged with severe sequels, such as the inability to walk or control the sphincters.

After the discharge, health professionals from some hospitals called the woman to ask about their health condition, to provide information about the baby and support them. Women who received this treatment were satisfied.

The women mentioned that the support given by the family was essential to strengthen and recover, regardless of the severity of their clinical condition.

“...I had full support from my mother, from my father, from my closest relatives”. (Interview 18)

“He (the husband) was really concerned about me. [...] He did not step away from me. He took care of me all the time, if it was not for him, I would not have been able to overcome the COVID-19 infection”. (Interview 21)

1c. Antenatal care

Antenatal care services differed among the Brazilian regions. In the large cities, ANC continued to be offered at the primary health care centers; nevertheless, in the remote areas (North and Northwest), the primary health care centers only accepted COVID-19-suspected patients and closed all other medical services, including ANC care. Women

reported being informed the primary health care centers were closed due to the COVID-19 pandemic or having their ANC appointment rescheduled several times, having five or six appointments during pregnancy. One woman said that even after filing a complaint against the health center, she was unable to get an ANC appointment.

The women whose ANC appointments were not suspended complained their partners could not accompany them to the appointments.

Few women reported they feared getting the COVID-19 virus and did not attend their ANC appointments or missed some.

“[I thought] a lot [about not showing up] because I could get the virus at the doctor’s appointments. I stopped going to antenatal consultations in the last 3 months...” (Interview 21)

“[I] had a lot [of difficulty to get an appointment] at the beginning of the pregnancy, [...] they [primary health care center] were not offering care (ANC)...” (Interview 21)

2. Stigma/fear of contamination

In this category, two subcategories were defined, the first concerning the feelings of mistreatment that the women reported experiencing from health care professionals, mainly in the emergency room and in the outpatient department, and the second concerning the feelings of prejudice from family members, neighbors, and friends reported by the

women due to being diagnosed with COVID-19.

2a. Mistreatment from health workers

The women reported had suffered prejudice from health workers at the emergency rooms, medical officers, wards and ICU because of their fear of getting COVID-19 from them. Health professionals refused to enter the women's room, give medication, deliver food, and take the formula to feed the baby (when they were together in the ward); it was also reported they were mistreated and shouted at.

There was no consensus among the women regarding whether or not health workers had the right to fear contracting the virus. Some said there was prejudice since it was a new disease. However, others said they could not be afraid precisely because they were working on the front line. Many women cried during the interview when they remembered the treatment they received: "It was the worst experience of my life.", "It felt like that time of leprosy".

Some women did not suffer prejudice and considered that they had received excellent treatment.

Probably, the women who suffered the most prejudice were those who got COVID-19 at the beginning of the pandemic; at that time, in Brazil, there was a lack of personal protection equipment, and little was known about the COVID-19 infection.

"The nurse didn't want to pick me up, lift me up... He was afraid of contaminating himself. ... they did not want to touch me". (Interview 17)

"I felt that no one wanted to have contact with me [...] I felt like an "ET" [...]. I felt [they were] afraid of the disease, I felt it. I perfectly understood what was happening, they had to protect the other patients". (Interview 4)

2b. Fear from family members/neighbors

Nine women reported that they suffered with the fear felt from their family members and people they knew.

Some relatives avoided any contact with the woman or her family (husband and children) for fear of getting COVID-19. The women reported some neighbors changed sides of the street when they saw the woman walking. Others said that after the isolation ended, people questioned whether they could leave the quarantine.

The women felt very bad about people's prejudice, but they understood their fear of being contaminated as it was a new disease, without concrete information about its contagiousness and treatment.

"... Some people were afraid (of getting COVID-19), even my brother, [...], he did not even want to have contact with my children or my husband, because he was afraid..." (Interview 11)

"People from my street [had prejudice] yes. I was on a sidewalk, they went to another, I called, and they answered from afar". (Interview 13)

3. COVID-19 pandemic impact

Among the women's answers, the COVID-19 pandemic has affected their lives differently. Some had severe symptoms, others suffered from fear and social isolation, others had financial losses, and others had family member losses. Fig. 3 shows how COVID-19 infection has affected one pregnant woman's life and all her family. Therefore, concerning the COVID-19 pandemic's impact on women's lives, we divided it into four subcategories.

3a. Quarantine period/social isolation

It was considered the quarantine period due to the COVID-19 infection and the social isolation imposed by government regulations.

Experiencing quarantine during the COVID-19 infection was considered very difficult for the women due to the deprivation of having contact with other people. The ones with mild symptoms were isolated alone at home and found it difficult not to have contact with family (mainly their children) and other people; those with moderate symptoms or before hospitalization needed closer support from the family and reported concern about contaminating their families.

Total isolation at home was not always possible, as several people lived in the same house; nevertheless, some precautions were mentioned, such as separating towels and cutlery.

"... my other son is nine years old, and I couldn't be with him. ... I talked to him through the window. My son practically sleeps with me... I was very, very sad and worried because I could transmit [the COVID-19 to the family]". (Interview 1)

"... it was terrible because staying for 15 days at home and not being able to go out is terrible. I slept, ... I was very stressed about being locked in the house". (Interview 22)

The period of social isolation was seen as a good opportunity for the whole family to stay together for 24 h, which is impossible in daily life. However, the women with newborns had no support from their family members (mother, mother-in-law) due to the isolation restrictions.

"...I leave home [to work] at 6 a.m. and come back at 7pm. So, we only have time for my son at night, and now [during the social isolation], we have all day long together." (Interview 1)

3b. Support received

Women generally received support from partners, family members, friends, and peer support groups. They received help with shopping, housework, childcare (if the couple was hospitalized separately), care-giving (if the hospital allowed it), and financial support; even people who lived in the same building but had no previous contact with the women helped when she was isolated. One woman mentioned a WhatsApp group for pregnant women as support.

There were cases where the pregnant woman and her partner were admitted to intensive care, and when they returned home, both were weak and needed support.

One woman's husband died of COVID-19 infection; when she left the hospital with sequelae, a premature baby, and two other children (with the husband's family), her house had a severe infrastructure problem. So, the community organized and built a house for this family.

All this support was essential for the women to get through this challenging period; they felt supported.

"He helped me a lot because when I had no more strength, he gave me strength". (Interview 9)

"...I had full support from my mother, from my father, from my closest relatives". (Interview 18)

"He was really concerned about me. [...] He did not step away from me. He took care of me all the time, if it was not for him, I would not have been able to overcome the COVID-19 infection". (Interview 21)

3c. Financial impact

Some women had paid jobs, others were unemployed, and some were homemakers. Those with managerial positions and other bonuses mentioned that their salaries were reduced after pregnant women were considered at risk and had to work remotely. Some women also reported that their husbands lost wages.

The financial loss negatively affected the women's lives. Some had to make several cuts in their financial budget, such as their children's school; others needed financial support from family members. Those who worked independently had an even more significant decrease in salary.

"... When I found out I was pregnant, I was put on leave from my work [...] we already had a financial impact". (Interview 4)

"Mainly financial impact, because I work on my own and I had to stop working [due to social isolation]". (Interview 21)

3d Sequels after COVID-19 infection

Eight women who had been hospitalized reported symptoms after COVID-19 infection (post-recovery from acute infection), such as headache, joint pain, and memory loss. There was a consensus they were not completely recovered. Nevertheless, the health professionals did not confirm the relation between the symptoms and the COVID-19 infection. At that moment, the information regarding post-COVID-19 symptoms

was scarce. In addition, some women already had other comorbidities which decompensated after the COVID-19 infection, hindering the post-COVID-19 syndrome diagnosis.

Was also reported psychological symptoms, mainly by those who had a prolonged hospitalization and the woman who lost her husband to COVID-19 infection.

In general, these women experienced a loss of quality of life.

"After you get the coronavirus, it takes six months to get back to normal. Sometimes I feel a strong headache, body ache, [...]. I became a bit forgetful about things". (Interview 11)

"I don't know if it is from COVID-19 (some symptoms), [...] knee pain, joint pain, lack of energy, [...] the doctor said probably it is..." (Second interview 5)

Family perception

The close family members/partners interviewed reported they had a very difficult time during the pregnant women's COVID-19 suspicion/infection. All the partners reported having felt fear and anxiety for the women and babies' lives, and as was reported by the women, they also mentioned the family support received was very important during the women's COVID-19 infection/hospitalization.

One of the interviewed family members reported his brother passed away from COVID-19 at the same her sister-in-law was intubated in ICU, and she had to take care of her two nephews who were at home, waiting for their parents. Fig. 3 shows some phrases expressing the feelings described by her.

"... I was taken by surprise because she was hospitalized during the night [...] and in the other day, [...] I found out that she had delivered... [...] This was far the worst of all". (Family member 4)

"... Some friends helped a lot, [...] And the family members of both my family and hers. [...] so, the family was fundamental". (Family member 4)

"Oh, it was very bad for me, [...] she was hospitalized, [...], what I felt was fear". (Family member 5)

Discussion

This study provides evidence that the COVID-19 pandemic has affected the lives of pregnant/postpartum women, their babies and their families in several ways: COVID-19 delayed diagnosis, difficulty accessing ANC, feelings of stigma, post-COVID-19 symptoms, family losses, and financial difficulties. All interviews were conducted in the first year of the pandemic, before the availability of the COVID-19 vaccine; at that time, Brazil was facing an increase in the daily number of hospitalizations and deaths due to COVID-19 infection, and at the same time, there were governmental social isolation measures in several states, which affected the lives of these pregnant women psychologically and financially.

The delay in COVID-19 diagnosis reported by some women could be explained by the uncertainties related to COVID-19 diagnosis and clinical management at the beginning of the pandemic, the lack of diagnostic tests, or false-negative results; this scenario has been described in other Brazilian studies of pregnant women (Santos et al., 2021; Takemoto et al., 2020; Takemoto et al., 2020). COVID-19 misdiagnosis, false-negative tests or delays in performing the test have been described in other studies as a cause of severe perinatal morbidity or preterm delivery in COVID-19-infected pregnant women, confirming the perception of the women in this study (Ramanathan et al., 2020; Graham et al., 2020; Papageorgiou et al., 2021).

Although most of the pregnant women kept going to their antenatal appointments, there were some reports about not attending antenatal

care due to fear or because the primary health care had cancelled it during the pandemic. Those different answers could be a consequence of the inequities in Brazil: the cities far from the large centers, mainly in the North and in the Northwest, had reduced access to health care (Baqui et al., 2020; Moreira et al., 2020). Other low and middle-income countries also had a disruption in maternal healthcare services during the COVID-19 pandemic (Ramanathan et al., 2020; Aranda et al., 2022).

Some women reported stigma from part of health workers, family and friends. This could be explained as a fear of contamination from the health workers because, at the beginning of the pandemic, in many Brazilian cities, there was a clear lack of training and individual protection equipment (Moreira et al., 2020); moreover, the stigma during the COVID-19 pandemic has been discussed in other studies (Sotgiu and Dobler, 2020; Villa et al., 2020; Bagcchi, 2020). This stigma could cause more stress for pregnant and post-partum women, leading to depression and anxiety as they are at increased risk of developing these diseases (Sahin and Kabakcib, 2020; Fan et al., 2021).

In both the first and second interviews, symptoms related to post-COVID-19 syndrome were reported but not properly diagnosed. So far, post-COVID-19 syndrome has been described with various clinical manifestations, such as fatigue, dyspnea, pain, dizziness, headache, cognitive impairment, depression, anxiety, and post-traumatic symptoms, causing a decrease in quality of life, which may lead to an increase in suicide risk (Mohiuddin Chowdhury et al., 2021; Sher, 2021). It is important to observe that the impact of the COVID-19 pandemic, such as the lack of COVID-19 knowledge, problems related to work and family incomes, and grief for missing pregnancy milestones or family losses, remained in the second interview; these feelings added to the post-COVID-19 syndrome symptoms that also described by the women need to be addressed to avoid the long-term burden in these women's mental health.

All women acknowledged the support of family members as a protective factor, as did close relatives/partners. Support from family members, including through WhatsApp calls, was described as an important coping mechanism for pregnant women during the pandemic (Hong et al., 2021).

Our study has a limitation that we could not enroll the adolescents under 18 years old, our list had nine adolescents, but they never answered the phone or WhatsApp messages. The increased refusal of adolescents to participate needs to be further investigated. It should be considered a limitation in understanding the impact of the pandemic on their lives. Future studies need to focus on different communication skills to capture such experiences among young and adolescent women. However, the strengths of our study include the fact that we were able to interview the same women at two different points in time, and we were also able to interview their close family members/partners to provide an overview of how they experienced COVID-19 infection and the pandemic.

Conclusion

Prior to the availability of the COVID-19 vaccine, pregnant women in different regions of Brazil experienced delays in diagnosis, the unknown associated with COVID-19 infection and its consequences, lack of access to ANC, stigma, physical and psychological sequelae, loss of family members, and socioeconomic impact. There was a need for multidisciplinary and comprehensive care, addressing specific care in social and psychological support for those affected by COVID-19 during pregnancy and postpartum.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

The author is an Editorial Board Member/Editor-in-Chief/Associate

Editor/Guest Editor for *[Biomed Research International and BMC Pregnancy and Childbirth]* and was not involved in the editorial review or the decision to publish this article.

Funding

The study was supported by FAEPEX-Unicamp (Fundo de Apoio ao Ensino, à Pesquisa e à Extensão) under grant number 2300/20. Dr Renato T Souza received funding from the HRP Alliance, part of the UNDP-UNFPA-UNICEF-WHO-World Bank Special Programme of Research, Development and Research Training in Human Reproduction (HRP), a cosponsored programme executed by the World Health Organization (WHO), to complete his studies. This article represents the views of the named authors only and does not represent the views of the World Health Organization.

Contributors

MLC, RTS, RCP and JGC developed the concept of the primary study. The other members from the coordinating center including SBF, CCRV, AGL, GJL, LGB, FGS, and post-graduate students RES, GMN, TBG, CMC, MJM, JPG worked to implement the study. Then the idea of increasing the initiative to a network for a multicenter study arose and RPT, KGF, SMC, FJP, FEF, RM, ET, EVCF, JV, SMH, CBA, MDCJ, MABD, LGO, EFMJ, CASM and MGOL were invited and contributed with information for building the proposal. All of them read and agreed on the final version of the manuscript. SFB conducted the analysis. RES wrote the manuscript which was revised and approved by all co-authors.

Acknowledgements

We would like to thank the remaining members of the REBRACO Study Group: Sherly Metelus, Lester Castro, Stephanie Pabon, Amanda D Silva, Paulo S R Junior, Thais G Sardinha, Rodolfo R Japenga, Erica R F Urquiza, Maíra R Machado, Marcela Maria Simões, Larissa M Solda, Sue Yazaki-Sun, Priscilla Mota, Arimaza C Soares, Ellen Machado, Anne Bergmann, Gustavo Raupp dos Santos, Patrícia B Peres, Cristiane L Arbeli, Rafael M Quevedo, Carolina F Yamashita, Julia D Corradin, Isabella Bergamini, José Geraldo L Ramos, Maria Lúcia R Oppermann, Laís S Quadro, Lina Marins, Érika V Paniz, Thaís Vicentini Xavier, Bruna E Parreira, Aline Tosetto, Sabrina Savazoni, Aline C Costa, Marina HL Almeida, Bruna FV Moura, Lidiane R França, Hanna Vieira, Rafael B Aquino, Débora F Leite, Isabella Monteiro, Marcos Nakamura-Pereira, Bruna O Guerra, Gabriela Gorga, Daisy Pinheiro, Denise Cordeiro, Priscila L Miná, Carol Dornellas, Kevin FA Oliveira, Mariana Emi Varicoda Makyama, Caio Leal, Rayra Amana, Cristiane O Santos, Marina M dos Santos, Carlos Neto, and Thiago Gomes, Isabela R Pereira, Clélia Andrade Salustrino, Valéria B Pontes, Roberto Allen da Silva Franco, João Paulo Bilibio, Gislânia P F Brito, Hana Paula C Pinto, Danielle Leal de Oliveira, Andreza A Guerra, Andrea O Moura, Natasha Pantoja, Fernanda David, Alina Silva.

References

Allotey, J., Stallings, E., Bonet, M., Yap, M., Chatterjee, S., Kew, T., et al., 2020. Clinical manifestations, risk factors, and maternal and perinatal outcomes of coronavirus disease 2019 in pregnancy: living systematic review and meta-analysis. *BMJ* 370.

Aranda, Z., Binde, T., Tashman, K., Tadikonda, A., Mawindo, B., Maweu, D., et al., 2022. Disruptions in maternal health service use during the COVID-19 pandemic in 2020: experiences from 37 health facilities in low-income and middle-income countries. *BMJ Glob. Heal.* 7 (1), 1–10.

Baggechi, S., 2020. Stigma during the COVID-19 pandemic. *Lancet Infect. Dis.* 20 (7), 782.

Baqui, P., Bica, I., Marra, V., Ercole, A., van der Schaar, M., 2020. Ethnic and regional variations in hospital mortality from COVID-19 in Brazil: a cross-sectional observational study. *Lancet Glob. Heal.* 8 (8), e1018–e1026. [https://doi.org/10.1016/S2214-109X\(20\)30285-0](https://doi.org/10.1016/S2214-109X(20)30285-0). Available from.

Booth, A., Hannes, K., Harden, A., Noyes, J., Harris, J., Tong, A., 2014. COREQ (Consolidated Criteria for Reporting Qualitative Studies). EW. In: Moher, D., Altman, D.G., Schulz, K.F., Simera, I., Wager, E. (Eds.), *Guidelines For Reporting*

Health Research: A User's Manual. John Wiley & Sons, Ltd, Oxford, UK, pp. 214–226. Available from. <https://onlinelibrary.wiley.com/doi/10.1002/9781118715598.ch21>.

Braun, V., Clarke, V., 2006. Qualitative Research in Psychology Using thematic analysis in psychology using thematic analysis in psychology. *Qual. Res. Psychol.* 3 (2), 77–101. Available from. <http://www.tandfonline.com/action/journalInformation?journalCode=uqrp20%5Chttp://www.tandfonline.com/action/journalInformation?journalCode=uqrp20>.

Braun, V., Clarke, V., 2023. Toward good practice in thematic analysis: avoiding common problems and becoming a knowing researcher. *Int. J. Transgender Heal.* 24 (1), 1–6. <https://doi.org/10.1080/26895269.2022.2129597>. Available from.

Costa, M.L., Souza, R.T., Pacagnella, R.C., Bento, S.F., Ribeiro-do-Valle, C.C., Luz, A.G., et al., 2021. Brazilian network of COVID-19 during pregnancy (REBRACO: a multicentre study protocol). *BMJ Open.* 11 (12), e051284.

F.O. Cruz. Observatório COVID-19 [Internet]. [cited 2023 Jun 11]. Available from: <https://agencia.fiocruz.br/boletim-destaca-marco-de-500-mil-mortes-por-covid-19-no-brasil>.

Cucinotta, D., Vanelli, M., 2020. WHO declares COVID-19 a pandemic. *Acta Biomed.* 91 (1), 157–160.

Denzin, N.K., Lincoln, Y.S., 2017. *The SAGE Handbook of Qualitative Research*, 5th ed. SAGE Publishing.

Di, Mascio D, A, Khalil, Saccone, G., Rizzo, G., Buca, D., 2020. Outcome of coronavirus spectrum infections (SARS, MERS, COVID-19) during pregnancy: a systematic review and meta-analysis. *Am. J. Obs. Gynecol. MFM* 2 (2), 10010, 1–9.

Fan, H.S.L., Choi, E.P.H., Ko, R.W.T., Kwok, J.Y.Y., Wong, J.Y.H., Fong, D.Y.T., et al., 2021. COVID-19 related fear and depression of pregnant women and new mothers. *Public Health Nurs.* (November).

Graham, W.J., Afolabi, B., Benova, L., Campbell, O.M.R., Filippi, V., Nakimuli, A., et al., 2020. Protecting hard-won gains for mothers and newborns in low-income and middle-income countries in the face of COVID-19: call for a service safety net. *BMJ Glob. Heal.* 5 (6), 1–5.

Hantoushzadeh, S., Shamshirsaz, A.A., Aleyasin, A., et al., 2020. Maternal death due to COVID-19. *Am. J. Obs. Gynecol.* 223 (109), e1–16.

Hong, S., Kim, H., Park, M.K., 2021. Impact of COVID-19 on post-traumatic stress symptoms in the general population: an integrative review. *Int. J. Ment. Health Nurs.* 30 (4), 834–846.

Karimi, L., Makvandi, S., Vahedian-Azimi, A., Sathyapalan, T., Sahebkar, A., 2021. Effect of COVID-19 on mortality of pregnant and postpartum women: a systematic review and meta-analysis. *J. Pregnancy* 2021.

Mei, H., Li, N., Li, J., Zhang, D., Cao, Z., Zhou, Y., et al., 2021. Depression, anxiety, and stress symptoms in pregnant women before and during the COVID-19 pandemic. *J. Psychosom. Res.* 149 (9), 965–970.

Mohiuddin Chowdhury, A.T.M., Karim, M.R., Ali, M.A., Islam, J., Li, Y., He, S., 2021. Clinical characteristics and the long-term post-recovery manifestations of the COVID-19 patients—a prospective multicenter cross-sectional study. *Front. Med.* 8 (August), 1–10.

Montani, D., Savale, L., Noel, N., Meyrignac, O., Colle, R., Gasnier, M., et al., 2022. Post-acute COVID-19 syndrome. *Eur. Respir. Rev.* 31 (163), 601–615.

Moreira, R.M., Villa Montoya, A.C., Silveria Araujo, S.L., Trindade, R.A., da Cunha Oliveira, D., de Oliveira Marinho, G., 2020. How prepared is Brazil to tackle the COVID-19 disease? *J. Glob. Health* 10 (2), 020321.

Papageorgiou, AT, Deruelle, P, Gunier, RB, Rauch, S, García-May, PK, Mhatre, M, Usman, MA, Abd-El salam, S, Etuk, S, Simmons, LE, Napolitano, R, Deantonio, S, Liu, B, Prefumo, F, Savasi, V, do Vale, MS, Baafi, E, Zainab, G, Nieto, R, Maiz, N, Aminu, MB, Cardona-Perez, JA, Craik, R, Winsey, A, Tavchioska, G, Bako, B, Oros, D, Rego, A, Benski, AC, Hassan-Hanga, F, Savorani, M, Giuliani, F, Sentilhes, L, Rizzo, M, Takahashi, K, Vecchiarelli, C, Ikenoue, S, Thiruvengadam, R, Soto Conti, CP, Ferrazzi, E, Cetin, I, Nachinab, VB, Ernawati, E, Duro, EA, Kholin, A, Firlit, ML, Easter, SR, Sichiitiu, J, Bowale, A, Casale, R, Cerbo, RM, Cavoretto, PI, Eskenazi, B, Thornton, JG, Bhutta, ZA, Kennedy, SH, Villar, J, 2021. Preeclampsia and COVID-19: results from the INTERCOVID prospective longitudinal study. *Am J Obstet Gynecol* 225 (3), 289.e1–289.e17. <https://doi.org/10.1016/j.ajog.2021.05.014>.

Patton, M., 1990. Qualitative evaluation and research methods. *Qual. Res. Pract.* 169–186.

Ramanathan K., Antognini D., Combes A., Paden M., Zakhary B., Ogino M., et al. Effect of the COVID-19 pandemic response on intrapartum care, stillbirth, and neonatal mortality outcomes in Nepal: a prospective observational study. 2020;(January): 19–21.

RO, S., 2019. *Health Psychology: A Biopsychosocial Approach*, 6th ed. Worth Publishers, New York.

Sahin, B.M., Kabakci, E.N., 2020. The experiences of pregnant women during the COVID-19 pandemic in Turkey: a qualitative study. *Aust. Coll. Midwives* (January), 1871–1912.

Salehi, L., Rahimzadeh, M., Molaei, E., Zaheri, H., Esmaelzadeh-Saeieh, S., 2020. The relationship among fear and anxiety of COVID-19, pregnancy experience, and mental health disorder in pregnant women: a structural equation model. *Brain Behav.* 10 (1), 1–8.

de Souza Santos, D., de Oliveira Menezes, M., Andreucci, C.B., Nakamura-Pereira, M., Knobel, R., Katz, L., de Oliveira Salgado, H., Ramos de Amorim, M.M., Takemoto, M. L.S., Komura, M., Kasai, M., Horikoshi, Y., Shinjoh, M., et al., 2021. Disproportionate Impact of Coronavirus Disease 2019 (COVID-19) among pregnant and postpartum black women in Brazil through structural racism lens. *Infect. Control Hosp. Epidemiol.* 72 (11), 2068–2069.

Sher, L., 2021. Post-COVID syndrome and suicide risk. *QJM.* 114 (2), 95–98.

- Sotgiu, G., Dobler, C.C., 2020. Social stigma in the time of coronavirus disease 2019. *Eur. Respir. J.* 56 (2), 23–25. <https://doi.org/10.1183/13993003.02461-2020>. Available from.
- Takemoto, M.L.S., Menezes M de, O., Andreucci, C.B., Nakamura-Pereira, M., Amorim, M.M.R., Katz, L., et al., 2020a. The tragedy of COVID-19 in Brazil: 124 maternal deaths and counting. *Int. J. Gynecol. Obstet.* 151 (1), 154–156.
- Takemoto, M.L.S., Menezes, M.O., Andreucci, C.B., Knobel, R., Sousa, L.A.R., Katz, L., et al., 2020b. Maternal mortality and COVID-19. *J. Matern. Neonatal. Med.* 0 (0), 1–7. <https://doi.org/10.1080/14767058.2020.1786056>. Available from.
- Villa, S., Jaramillo, E., Mangioni, D., Bandera, A., Gori, A., Raviglione, M.C., 2020. Stigma at the Time of the COVID-19 Pandemic.
- World Health Organization (WHO), 2021. WHO Coronavirus (COVID-19) Dashboard [Internet] [cited 2021 Jan 13]. Available from. <https://covid19.who.int/>.