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ORIGINAL ARTICLE

Maternal mental health and impact on the newborn during the COVID-19 pandemic

Salud mental materna y efectos en el recién nacido durante la pandemia por COVID-19

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What do we know about the subject matter of this study?

Difficulties in maternal mental health during the postpartum period are prevalent and have negative consequences for women and their families. International studies show that during the COVID-19 pandemic, these difficulties significantly increased, also affecting the childbirth experience.

What does this study contribute to what is already known?

This study provides national evidence on the increase of postpartum depression symptoms in mothers during the pandemic compared with the pre-pandemic period, as well as the negative impact of the crisis on the length and gestational age of newborns. It also shows differences in the birth experience of mothers according to the public or private health centers where they are seen.

Abstract

The deterioration of mental health in the general population has been one of the main consequences of the COVID-19 health crisis, with differences in diverse groups. Specifically, recent studies report an increased risk for the development of symptoms of anxiety and depression during the perinatal period, as well as a negative impact on the newborn. **Objective:** The objective of this study was to examine the differences in mental health, infant and obstetric variables, and childbirth experience in the public and private health systems in Chilean primiparous women before and during the COVID-19 pandemic. **Subjects and Method:** This quantitative study compared two cohorts. The first one included mothers with babies born before the COVID-19 pandemic (N = 81) and the second one involved mothers who delivered during the pandemic (N = 71). Sociodemographic and obstetric history, depression, anxiety, and stress were evaluated in both groups using self-report questionnaires (EPDS, DASS-21). Differences between groups were assessed with ANCOVA, t-tests, and chi-square

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tests. **Results:** Women who delivered during the pandemic reported greater depressive symptoms and their babies were smaller and had less weeks of gestation than babies born before the COVID-19 pandemic. However, this group maintained exclusive breastfeeding for a longer period. There were no differences in the experience of childbirth between the groups, but there were differences in relation to the public or private nature of the hospital where the mothers were seen. **Conclusions:** The pandemic negatively affected the mental health of mothers, posing significant challenges to promoting the emotional well-being of mothers and their infants.

Introduction

The COVID-19 pandemic has dramatically impacted human health. Since the onset of the crisis, restrictions have been imposed to limit interpersonal contact and reduce the spread of the virus[1]. These have negatively impacted the transition to motherhood by decreasing the possibility of companionship during childbirth, receiving visitors during hospitalization, and practical and emotional support during the postpartum period[2,3]. In relation to maternal and child health, medical complications during pregnancy and rates of postpartum depression and anxiety have increased[4,5]. A study of 900 women[6] showed that the prevalence of postpartum depressive symptomatology increased from 15% before the pandemic to 40.7% during the health emergency and regarding anxiety, 39% versus 72% of women reported high levels of anxiety before and during the pandemic, respectively.

This is consistent with studies on the impact of disasters on maternal perinatal health. Disasters involve an abrupt disruption in the normal functioning of a community, associated with deaths, losses, and various negative consequences, where its magnitude is beyond the coping capacity of the affected group[7]. Evidence shows that experiencing disasters during the perinatal period negatively impacts fetal growth and maternal mental health, with negative consequences on subsequent child development[8].

In Chile, the population was not only affected by the COVID-19 pandemic but also - since October 2019 - by a period of social crisis[9] characterized by political and economic instability. The combination of social, economic, and health factors has shaped a "triple crisis", where the first cases of COVID-19 occurred in a context of high instability. This triple crisis has affected the general well-being of the population and has intensified physical and mental illness among vulnerable groups, including low-income families, women, and children[10]. The crisis has also impacted parenting, with a national study of pregnant women reporting a significant decrease in perceived support from friends and family and a deterioration in daily functioning since the onset of the health crisis[11,12]. Likewise, another Chilean study with 6,149 caregivers of children aged 0 to 11 years reported a high concern of caregivers for the socioemotional well-being of their children during the crisis[13]. The lack of knowledge of the virus has led to consider children and pregnant women as risk groups. This has prompted the use of health protocols to reduce the risk of contagion, without necessarily considering its impact on mental health[10].

Even in the absence of disasters, the perinatal period constitutes a stage of potential risk[14,15,16]. Mental health problems during the peripartum period are serious and negatively impact mothers and their families. Postpartum depression affects approximately 13% and 25% of mothers in developed and developing countries, respectively[17]. Maternal depression is associated with several risk factors, including hormonal changes, low socioeconomic and educational status, previous history of mental health, low social support, and child characteristics, among others[18].

During the transition to motherhood, women may also experience symptoms of anxiety, reporting a prevalence that ranges from 13% to 40%[19]. In Chile, a recent study shows that depression and high anxiety symptoms affect 16.5% and 46.9% of mothers at 3 months postpartum, respectively[20].

Maternal mental health problems affect child development. Children of depressed mothers are more likely to develop emotional, behavioral, and/or cognitive difficulties during childhood and adolescence[21,22], and these effects are more serious when maternal depression is persistent and severe[23]. Likewise, maternal anxiety in the postpartum period has been related to shorter breastfeeding, sleep disturbances in the newborn, and difficulties in cognitive development[19]. Current studies suggest that the quality of mother-child interactions may mediate the association between maternal mental health and child development[24]. Depressed mothers may be less responsive to their child's cues, while anxious mothers may be intrusive during interactions with their child[25]. These patterns may contribute to suboptimal child development.

Given this context, it is relevant to evaluate how health and social circumstances have impacted maternal mental health during the perinatal period. Most

studies in this area have been conducted in North America and Europe, so it is necessary to study Latin American populations. The objective of this study is to examine differences in maternal mental health, obstetric and child variables, and the experience of childbirth (from the mother's perspective) in the public and private health systems, pre-pandemic and during the pandemic in Chile.

Subjects and Method

A quantitative approach was used to compare measurements from two cohorts of mothers with children born before and during the COVID-19 pandemic.

Participants and Procedures

This study derives from two projects that evaluated postpartum maternal mental health in Chile. The first was conducted between May 2018 and March 2020 with 246 participants. A subsample of 81 first-time mothers (34.3% of the total sample) was selected who were assessed between June 2018 and October 2019, before the onset of the crisis, forming the pre-pandemic cohort. Recruitment was conducted face-to-face at two public primary healthcare centers in Santiago and Concepción. Trained psychologists contacted participants at the health center while they were waiting for their antenatal appointments. The questionnaires were completed in person at the health center or by telephone.

The cohort of mothers who delivered their newborn during the pandemic included 77 first-time mothers (60.2% of the total sample) and derived from a second study started in March 2021 to evaluate a digital intervention to promote postpartum maternal mental health. Trained psychologists assessed the women between March and November 2021. Data were collected before participation in the intervention. Recruitment was conducted by telephone at two public primary healthcare centers in Santiago, which provided contact details of first-time mothers to the research team. Self-report questionnaires were completed online by the participating mothers.

The inclusion criteria for both samples were being at least 18 years old, speaking Spanish, and having a healthy child. Exclusion criteria were the presence of cognitive disability or serious illness in the mother, multiple pregnancy, and preterm delivery.

This study was approved by the Ethics Committees of the *Universidad del Desarrollo*, Concepción Health Service, and Southeast Health Service of Santiago. Women who reported high levels of depression or anxiety were referred to the corresponding healthcare services for evaluation and treatment.

Instruments

Edinburgh Postnatal Depression Scale (EPDS)[26,27]: It is a self-report instrument that evaluates depressive symptomatology during the last week with 10 items on a 3-point Likert scale. A score greater than or equal to 13 indicates risk of depression during gestation and during postpartum the suggested cut-off point is 10. The EPDS has been validated in Chile[27]. Cronbach's alpha in this study was 0.85.

Depression Anxiety Stress Scale (DASS -21)[28,29]: It is a self-report questionnaire of 21 items divided into three subscales of 7 items each to evaluate recent symptoms during the last week of depression, anxiety, and stress using a 3-point Likert scale. Higher scores indicate greater symptomatology. The DASS-21 has been used in perinatal samples and is validated for the Chilean population[29]. The anxiety subscale was used in this study.

Demographic and obstetric information: a questionnaire was developed to evaluate sociodemographic characteristics, history of psychopathology, and obstetric and breastfeeding variables. Through specific questions with a 7-point Likert scale, the degree of satisfaction with the childbirth experience, fear and pain experienced, and satisfaction with the care provided by health professionals were addressed.

Data analysis

Differences in the demographic characteristics of participants in the pre-pandemic and pandemic groups were analyzed using the chi-square test and the t-test for independent variables. These analyses showed significant differences in age, educational level, and maternal occupation (paid vs. unpaid work). Given this, differences in mental health between the two groups were examined with an analysis of covariance (ANCOVA) to control for the described variables. Possible differences in obstetric and breastfeeding variables were analyzed with the chi-square test and the t-test for independent variables. These tests were also used to examine possible differences in obstetric variables according to the place of birth of the newborn (public hospital vs. private clinic). The analyses were performed using the SPSS software[25].

Results

The participants were on average 25.8 years of age [Standard Deviation (*SD*) 4.3 years], and most were Chilean (80.38%). 62% of the participants reported being married or living with their partner and 50% had a paid job (table 1).

There were no significant differences in the demographic characteristics of the participants between

Table 1. Participants´ sociodemographic and obstetric charateristics

	Pre-pandemic (N = 81)	Pandemic (N = 77)		
	$\bar{x}$ ± DE	$\bar{x}$ ± DE	*t*	*p*
Age	26.5 ± 4.3	25.1 ± 4.2	2.08 (155)	0.04
Gestation weeks	39.1 ± 1.28	38.4 ± 1.29		
	N (%)	N (%)	χ^2	p
Nationality				
Chilean	61 (75. 3%)	66 (85.7%)	*2.71(1)*	*1*
Other (Latina)	20 (24.7%)	11 (14.3%)		
Relationship status				
Married – de facto	46 (56.8%)	52 (67.5%)	2.04 (3)	0.56
Single	13 (16%)	9 (11.7%)		
Separated - divorced	2 (2.5%)	1 (1.3%)		
Other	20 (24.7%)	15 (19.5%)		
Highest education attained			15.89 (2)	0.00
Incomplete school	2 (2.5%)	10 (13%)		
Complete school	10 (12.3%)	23 (29.9%)		
Tertiary education	69 (85.2%)	44 (57.1%)		
Paid occupation			7.32 (1)	0.01
No	32 (39.5%)	47 (61%)		
Yes	49 (60.5%)	30 (39%)		
Type of delivery			1.35(2)	0.51
Vaginal	31 (38.3%)	33 (42.9%)		
Assisted	6 (7.4%)	3 (3.9%)		
Cesarean	44 (54.3%)	41 (53.2)		
Type of hospital*			0.26 (1)	0.17
Public	56 (69.1%)	60 (77.9%)		
Private	24 (29.6%)	17 (22.1%)		

Note. * = This information is not available from one participant in the pre-pandemic group.

the pre-pandemic and pandemic groups, except for age and educational level. Participants in the pre-pandemic group were approximately one year older than participants in the pandemic group (t (155) = 2.08; $p = 0.04$) and reported more frequent higher education and less frequent complete and incomplete schooling as the highest level of education attained (χ^2 (2) = 5.89; $p < 0.001$).

Mental health

The pandemic group showed a higher frequency of cases above the EPDS cut-off point (χ^2 (1) = 9.46; $p < 0.001$) than the pre-pandemic group, indicating a risk of presenting a depressive disorder. The ANCOVA indicated that mothers in the pandemic group reported greater depressive and anxious symptomatology compared with mothers in the pre-pandemic group, controlling for age, educational level, and maternal occupation (table 2). In the pre-pandemic group, 16.5% of the participants had scores above the cut-off point for the DASS scale and 40.3% of the women in the post-pandemic group. Given that the DASS scale does not have cut-off points validated in our population, it was not possible to make this comparison. No significant differences were observed in mental health according to the type of health facility (public or private) and type of delivery.

Obstetric and birth experience variables

Most of the mothers delivered their newborns in a public hospital (73.9%) and 53.8% underwent a cesarean delivery. Of the newborns, 52.5% were females. Participants reported, on average, a positive birth experience ($\bar{x}$ = 5.44; *SD* = 1.93) and a good evaluation of the health care team ($\bar{x}$ = 6.2; *SD* =1.41). In addition, they reported a moderate subjective experience of pain ($\bar{x}$ = 4.8; *SD* = 2.26) and fear of childbirth ($\bar{x}$ = 4.31; *SD* = 2.12).

Table 2. ANCOVA assessing differences in mental health between the pre-pandemic and the pandemic groups, controlling for maternal age, education and ocupation.

	Pre-pandemic $\bar{x}$ ± DE	Pandemic $\bar{x}$ ± DE	*F(df)*	*p*
ÉPDS	4.94 ± 4.59	8.49 ± 5.17		
Group			10.88 (1)	< 0.001
Covariables				
Age			0.13 (1)	0.72
Education			3.04 (1)	0.08
Ocupation			0.28 (1)	0.60
DASS anxiety	1.75 ± 2.82	3.43 ± 4.42		
Gou			4.4 (1)	0.04
Covariables				
Age			0.3 (1)	0.87
Education			2.44 (1)	0.12
Ocupation			1.96 (1)	0.16

Nota: EPDS = Edimburgh Postpartum Depression Scale. DASSanxiety = Anxiety subescala de ansiedad of the Depression, Anxiety and Stress Scale.

Table 3. Independent simples t-test assessing diferences in infant characteristics at birth and birth experience between the pre-pandemic and pandemic groups.

	Pre-pandemic (N = 81)	Pandemic (N = 77)	*F(df)*	*p*
Infant Characteristics	$\bar{x}$ ± DE	$\bar{x}$ ± DE		
Gestational age	39.1 ± 1.28	38.4 ± 1.29	16.73 (153)	< 0.001
Infant length at birth (cms.)	50.14 ± 1.98	49.4 ± 2.22	2.19 (157)	0.03
Infant weight at birth (grs.)	3343 ± 409	3305 ± 464	0.54 (154)	0.59
Perception of birth experience				
Maternal satisfaction with the global birth experience	5.26 ± 2.15	5.64 ± 1.67	-1.58 (141)	0.12
Pain during labor	4.63 ± 2.37	4.91 ± 2.17	-0.9 (139)	0.37
Fear during labor	4.07 ± 2.29	4.55 ± 1.92	-0.98 (136.7)	0.33
Valuation of health team	6.19 ± 1.46	6.22 ± 1.38	-0.66(141)	0.51
Perception of postpartum physical recovery	5.06 ± 2.07	5.70 ± 1.52	-1.94 (140)	0.05

Women in the pre-pandemic group had more continuous accompaniment during labor (χ^2 (2) = 7.09; p = 0.03), were more frequently accompanied by people other than their partner and their own mother (χ^2 (1) = 11.47; p < 0.001) and reported greater postpartum health complications (χ^2 (1) = 6.38; p = 0.02) than mothers in the pandemic group. There were no significant differences between these groups in relation to the presence of the partner (χ^2 (1) = 2.47; p = 0.09) and the woman's mother during delivery (χ^2 (1) = 2.59; p = 0.08), type of delivery (vaginal, assisted, or cesarean) (χ^2 (2) = 1.35; p = 0.51), skin-to-skin contact between mother and newborn (χ^2 = 0.05(1); p = 0.5), child health complications (χ^2 (1) = 0.44; p = 0.54), and child feeding (exclusive breastfeeding, mixed, or formula) (χ^2 (2) = 1.91; p = 0.38).

We did not find significant differences between the groups in their overall perception of delivery, but we did observe significant differences with respect to the gestational age and length of their newborn (Table 3). At the time of evaluation, the newborns in the pre-pandemic group were 4.5 weeks older than those of the pandemic group mothers (*t* (153) = 16.73; p < 0.001), despite that all newborns in the study were born at term.

Differences according to the type of Healthcare Center (public-private)

Mothers who gave birth in public hospitals reported a less satisfactory birth experience, greater perception of pain, and less satisfaction with the healthcare team than mothers who gave birth in private clinics. There were no differences in reports of fear during childbirth. Mothers in public hospitals reported having more partial (v/s continuous) accompaniment during labor (χ^2 (2) = 21.29; p = 0.00) and less skin-to-skin contact with their newborn (χ^2 (2) = 4.53; p = 0.03) than mothers in private clinics. There were no significant differences in the type of delivery (χ^2 (2) = 3.72; p = 0.15), presence of the father (i.e., biological father) (χ^2 (1) = 0.5; p = 0.36) or the woman's mother during delivery (χ^2 (1) = 0.02; p = 0.54), complications of the mother (χ^2 (1) = 0.08; p = 0.49) or child (χ^2 (1) = 2.93; p = 0.9), or child feeding (χ^2 (2) = 0.57; p = 0.75) according to the type of facility.

Discussion

The results indicate that the health crisis in Chile had a negative impact on the mental health of women during their transition to motherhood. Compared to the pre-pandemic group, women evaluated during the pandemic reported higher symptoms of depression and anxiety in the first months postpartum. This is consistent with previous studies describing increased depressive and anxious symptomatology in the peripartum period since the onset of the pandemic[6,30,31]. However, in certain contexts, the pandemic did not negatively affect maternal mental health[32]. For example, a study in Israel[33] showed that women who gave birth during the pandemic were at lower risk of developing postpartum depression compared with those who delivered their newborns before the pandemic. This highlights the need to study the impact of this health crisis in different cultural contexts and in women with different risk profiles in order to respond to their specific health needs.

Although all children involved in the study were born at term, children born during the pandemic had on average lower gestational age and slightly shorter length at birth, no differences in newborn weight were observed between the two groups. Previous studies have shown the impact of natural disasters on newborn characteristics such as birth weight, length, and gestational age, however, there are mixed results regarding the combination of characteristics that are affected[8].

Interestingly, mothers assessed during the pandemic introduced formula into their child' diets somewhat later than mothers assessed before the pandemic. National and international studies[34,35] have shown that women with anxiety and depression are at risk of discontinuing exclusive breastfeeding earlier than women with greater emotional well-being; however, our results stand in contrast to these findings. Although the bidirectional association between breastfeeding and maternal mental health is widely recognized[36], mothers assessed during the pandemic may have extended exclusive breastfeeding longer, despite their mental health symptoms, due to confinement. A recent study in Brazil of 1344 mother-child pairs showed that working outside the home is a risk factor for discontinuing exclusive breastfeeding early[37]. Mothers evaluated during the pandemic experienced restrictions that limited activities outside the home. While confinement may be associated with stress and emotional discomfort, it may have safeguarded exclusive spaces dedicated to child care, away from social and extrafamilial activities, which had a positive impact on breastfeeding.

Women who delivered their newborns during the pandemic reported having less companionship at delivery by someone other than their partner or their own mother, which is consistent with the health measures that were implemented to reduce the risk of COVID-19 transmission. A recent article[38] highlights the concerns of mothers and fathers during the perinatal period, particularly fear of not having company during medical check-ups and childbirth, fears of contagion, and anxiety about a possible risk of death. The study also highlights the fear of separation of mothers and newborns, with possible consequences for bonding and positive breastfeeding patterns. In this regard, peripartum care protocols must promote contact between mother and newborn and allow the involvement of fathers or other significant figures, so that mothers and newborns receive the necessary support and companionship. This is especially relevant in cases of mothers with COVID-19 infection, where it is advisable to facilitate contact between the newborn and another caregiver[14].

In relation to the type of delivery during the pandemic, a significant increase in inductions and cesarean sections has been reported internationally[38] which indicates a high medicalization of the procedures and the implementation of protocols that favor control, despite not being adjusted to the real risks presented by the women in some cases[39,40]. In this study, we did not observe differences in the number of cesarean sections between the two groups, which may be associated with the fact that Chile has a very high rate of cesarean deliveries (46% of deliveries)[41], despite international recommendations[42] and initiatives to promote respectful obstetric practices[43]. Overvaluation of medical procedures can negatively affect the experience of mothers and their newborns[14] and impact maternal mental health and secure bonding which, at the same time,

can limit maternal involvement in newborn care[39,44,45]. Therefore, it is relevant to inform health procedures and policies that favor the well-being of mothers and newborns, limiting the over-medicalization of labor and birth. Likewise, it is essential to promote the well-being of health teams, who in circumstances of professional burnout, could favor disrespectful obstetric practices[40].

There were no differences in the mothers' perception of the birth experience before and during the pandemic; however, there were differences associated with the public and private healthcare systems. Mothers in public hospitals reported less satisfaction with the birth experience, less continuous accompaniment, and less skin-to-skin contact with their newborns. Recently, Pantoja et al[46] observed that, although in Chile exist guidelines to promote respectful care during the peripartum, they are not always implemented satisfactorily, especially in public facilities. It is alarming that, despite the overload of the health system due to health circumstances, the type of facility that provides healthcare - and not the crisis context - is more determinant in the differences in the perception of childbirth experience among the women in our study. This, added to the high rate of cesarean sections at the national level, highlights the need to advance in the implementation of public policies that promote the use of respectful obstetric practices.

The results of this study have certain limitations, particularly the sample size, which may limit the generalizability of the results, and the use of self-reporting instruments. Data collection was carried out differently in the two samples (by telephone and online), which could affect the comparability of the data. Despite these limitations, this is the only study conducted in the Chilean population and one of the few Latin American studies with evaluations before and during the health crisis, thus offering relevant information on its impact on first-time mothers in the country.

Conclusion

This study evidences the negative consequences for the emotional well-being of first-time mothers during the pandemic in Chile. However, it highlights the positive effect that confinement may have on breastfeeding since restrictions on activities outside the home allow for the safeguarding of exclusive spaces dedicated to newborn care. Also, it highlights the need to inform and promote evidence-based governmental and local decisions that balance the health safeguards associated with COVID-19 with the promotion of the well-being of mothers, fathers, and newborns, both in the private and public health system, recognizing that the vulnerability of this period is given by the high sensitivity and permeability of the processes involved in pregnancy, childbirth, and puerperium.

Ethical Responsibilities

Human Beings and animals protection: Disclosure the authors state that the procedures were followed according to the Declaration of Helsinki and the World Medical Association regarding human experimentation developed for the medical community.

Data confidentiality: The authors state that they have followed the protocols of their Center and Local regulations on the publication of patient data.

Rights to privacy and informed consent: The authors have obtained the informed consent of the patients and/or subjects referred to in the article. This document is in the possession of the correspondence author.

Conflicts of Interest

Authors declare no conflict of interest regarding the present study.

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