CHALLENGES TO MATERNAL HEALTH AND PERINATAL CARE AMID COVID-19: A SCOPING REVIEW

Dissertation Submitted to

The IIHMR University, Jaipur

for the partial fulfillment for the award of the degree of

Master of Business Administration (MBA)

in

Hospital and Health Management

by

Ms. Gitika Singh - 1099

Master of Business Administration (MBA) in Hospital and Health Management 2020 -2022

Under the Supervision and Guidance of

Dr. Seema Mehta

Professor IIHMR University, Jaipur

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DECLARATION BY STUDENT

I hereby declare that this dissertation titled "Challenges to Maternal Health and Perinatal Care Amid Covid-19: A Scoping Review" is the bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

Gitika Singh

Date: 30.06.2022

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This is to certify that **Gitika Singh**, Student of MBA - Hospital and Health Management at **IIHMR, Jaipur** has successfully completed 03 (Three) months internship with our company from 1st April 2022 to 30th June 2022.

During this period of internship, her performance was good.

We wish her every success for the future.

Regards,
For **ExpressRCM Private Limited**

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CERTIFICATE

This is to certify that dissertation titled "Challenges to Maternal Health and Perinatal Care Amid Covid-19: A Scoping Review" is a record of the research work undertaken by Gitika Singh in partial fulfillment of the requirements for the award of the degree of MBA Hospital and Health Management from the IIHMR University, Jaipur under my guidance and supervision and his/her approach to the research study has been sincere, scientific, and analytical.

Dr. Seema Mehta

Faculty Guide

IIHMR University, Jaipur

School Dean

IIHMR University, Jaipur

Date Date

Abstract

Study Objectives

The COVID-19 pandemic has a profound impact upon the physiological, psychological, and social health domains for pregnant and lactating women, which may have long-term consequences on the child. This study was undertaken to majorly examine and describe the challenges of COVID-19 pandemic on maternal and perinatal care, discuss relevant interventions to overcome the challenges and understand the way forward.

Methodology

More than 60 articles associated with the impact of COVID-19 on maternal and perinatal physiological, psychological, and social health, maternal immunization status, and strategies

for strengthening maternal and perinatal healthcare systems were reviewed. The review was done using the biopsychosocial framework to understand the challenges to maternal health.

Key Results

Major findings include several factors within the framework such as decreased social interaction, disturbed perinatal healthcare, stress that is directly or indirectly associated with the pandemic and many others that have additively resulted in poor perinatal health and healthcare around the globe.

Conclusion

As a call for action, various interventions to overcome some of the prevalent issues, including the challenges related to vaccination of pregnant and lactating women have been discussed. Counseling and seeking vaccination for pregnant women on a case-to-case basis is the need of the hour.

Keywords: Maternal health, perinatal care, maternal mental health, biopsychosocial model, COVID-19, psychosocial well-being, access to healthcare, maternal vaccination, lactating women

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I thank my colleagues, seniors, and mentors at ExpressRCM. Through constant guidance, they made this training a huge learning experience for me. I was introduced to valuable hard and soft skills. I was in the hands of capable industry leaders who brought out the best in me.

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Table of Contents

List of Figures

List of Tables

Abbreviations

COVID-19 - Coronavirus disease 19

ACOG - American College of Obstetricians and Gynecologists

CDC- Centers for Disease Control and Prevention

LMICs - Low- and middle-income countries

ACIP - Advisory Committee on Immunization practices

WHO - World Health Organization

Chapter - I

Introduction

The perinatal period ranges from the 23rd week of gestation through the first week after birth and transitions into the postnatal or postpartum period (until six weeks after birth). This phase of immense transition and development requires adequate care for the fetus and the newborn's healthy development. Coronavirus disease 2019 (COVID-19) has been particularly challenging for pregnant women and lactating mothers, thus impacting fetal and infant health (Madigan, 2018).

The biopsychosocial model (Engel, 1977,1980) is best suited to study the impact of COVID-19 on multiple physiological, psychological, and social domains of maternal health and perinatal care (Diamond, 2020).

In pregnancy, the physiological changes include changes in the body structure and hormone levels, suppression of the immune system, and other occasional challenges such as shortness of breath and disturbances in sleep (Diamond, 2020). The psychological changes include emotional changes, stress, and even frequent episodes of mood disorders in some. The social changes include altered relationship dynamics, increased need, and support from social networks, and impacts on the quality of care provided by perinatal care providers (Diamond, 2020).

Using this framework, a scoping review to understand the impact of COVID-19 on maternal health during the perinatal period was conducted. Various intervention approaches and the importance of vaccine research and vaccination in expectant and lactating women has also been discussed.

Aim of the Study:

To understand and describe the challenges of COVID-19 on Maternal and Perinatal Care during COVID-19.

Objectives of the Study:

The objectives of the study are as follows:

- To examine the challenges of COVID-19 pandemic on maternal and perinatal care using a biopsychosocial framework

- To discuss effective interventions in overcoming the challenges to maternal and perinatal care
- To examine the way forward through research and development of vaccination for pregnant and lactating women

Chapter - II

METHOD

More than 60 articles associated with the impact of COVID-19 on maternal and perinatal physiological, psychological, and social health, maternal immunization status, and strategies for strengthening maternal and perinatal healthcare systems were reviewed. Further, the findings have been discussed using a Biopsychosocial Framework to comprehensively

understand the challenges to maternal and perinatal health. According to this framework, the culmination, it is the culmination of Physiological, Psychological and Social factors that best help to understand health and diseases.

The articles were retrieved from PubMed and the official websites of the Centers for Disease Control and Prevention (CDC), the American College of Obstetricians and Gynecologists (ACOG), and Frontiers. Non-peer reviewed journals and articles published in languages other than English were excluded. All the papers contributing to understanding the challenges of COVID-19 on maternal and perinatal care were included.

The keywords used for building the search strategies included maternal, mother, vertical transmission, pregnan*, prenatal, perinatal, maternal health, lactat*, fetal, foetal, fetus, foetus, neonatal, neo-natal, coronavirus*, COVID*, SARS*, SARS-CoV-2, impact of COVID-19, social impact*, physiological impact*, and risk*. Additionally, relevant references of the reviewed articles were evaluated for inclusion.

Chapter - III

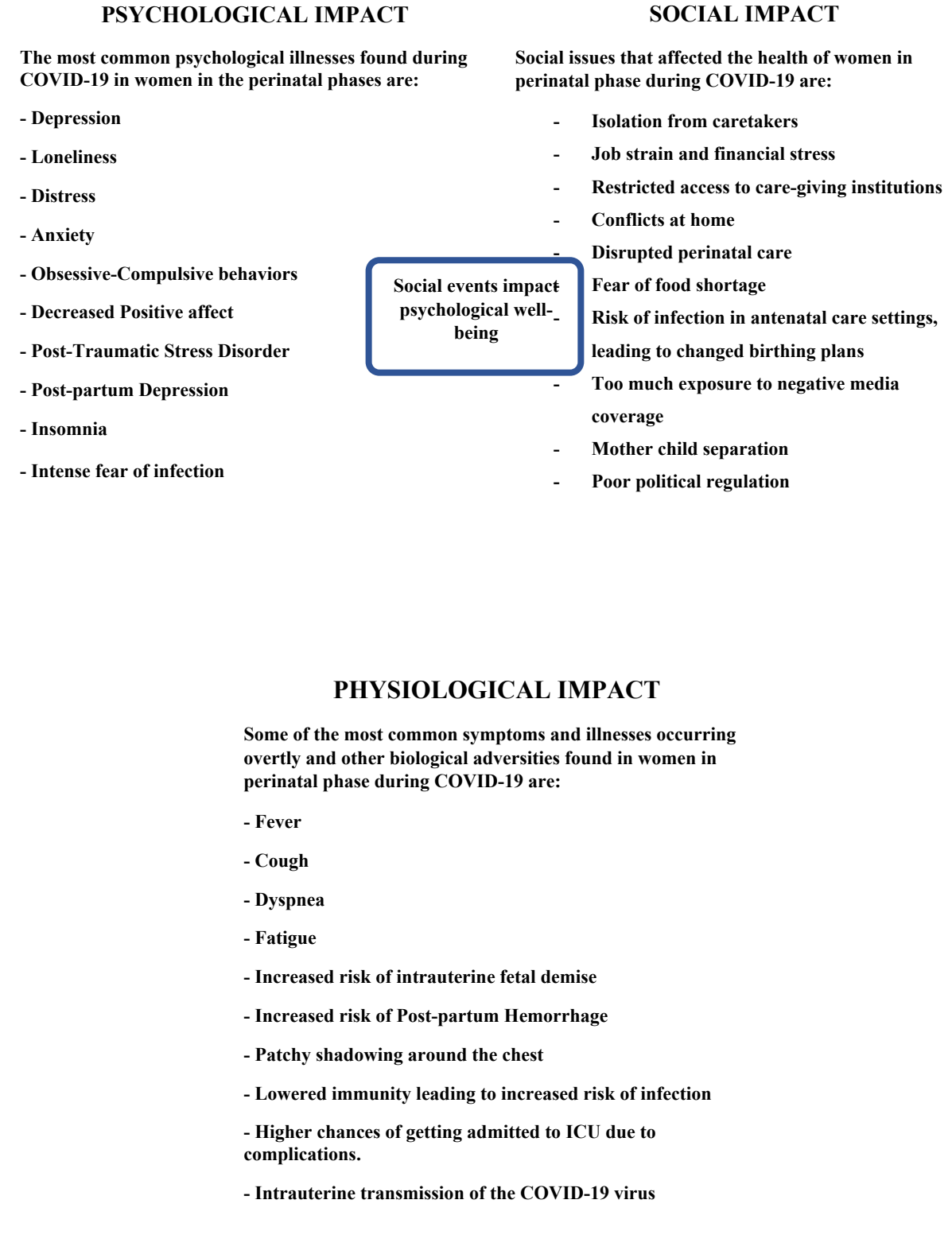
DISCUSSION

Biopsychosocial Analysis of Challenges to Maternal and Perinatal Care

The COVID-19 pandemic has not only aggravated concerns in all three biopsychosocial domains, but also introduced new challenges. A brief biopsychosocial

description of the pandemic's impact on maternal health and perinatal care is summarized in Figure 3.1.

Figure 3.1. A biopsychosocial analysis of the health of women in their perinatal phase during COVID-19



Source: Original

In the following sections, each dimension of the framework to help understand women's perinatal health status during the COVID-19 pandemic has been discussed.

3.1 Physiological Challenges during Perinatal Period

Multiple studies have evaluated the impact of COVID-19 on the physiological aspects of maternal and child health (Bülbül, 2020; Hcini, 2021; Juan, 2020). Since severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) is a novel virus, little was known at the outset of the pandemic about the spectrum of symptoms that an infected person may experience. A study in India reported one symptomatic case to every nine asymptomatic pregnant women (Waghmare, 2021). Juan reported common COVID-19 symptoms during pregnancy, including fever, cough, dyspnea, and fatigue. In addition, most cases have patchy shadowing around the chest, normal or low leukocyte count, and raised C-reactive protein levels (Juan, 2020). Recent findings suggest that on rare occasions, both symptomatic and asymptomatic pregnant women may undergo more adverse outcomes such as intrauterine fetal demise and postpartum hemorrhage (Hcini, 2021).

Pregnancy-associated physiological changes adversely affect the mother's immunity leading to an increased likelihood of developing severe pneumonia (Jamieson, 2006; Naccasha, 2001), and an increased risk of infections, especially of the upper and lower respiratory tracts (Barrero-Castillero, 2020; Dashraath , 2020). Given that pregnant women may experience symptoms during pregnancy that may mimic the early symptoms of COVID-19, the possibility of having SARS-CoV-2 infection may result in additional stress and anxiety. Moreover, it is important to rule out the infection because pregnancy-related physiological changes combined with contracting COVID-19 make it 1.5 times likely that a pregnant woman would get admitted to the intensive care unit when compared to a nonpregnant woman (Ellington, 2020).

There is limited data on COVID-19-associated maternal mortality. A study revealed that out of nine pregnant women, in their second or third trimester, with severe COVID-19, seven had fatal outcomes, one remained critically ill, and another needed a ventilator. (Hantoushzadeh, 2020). Another review has revealed that globally an overall increase in maternal mortality, stillbirth, maternal

Another major concern was the risk of vertical SARS-CoV-2 infection during pregnancy, at the time of delivery, through breast milk, or during perinatal care (Bülbül, 2020; Karimi-Zarchi, 2020; Kotlyar , 2021). A recent study documented a case of fetal death in which the blood from the placental tissue and umbilical cord tested positive for SARS-CoV-2, confirming transplacental transmission (Hcini , 2021; Stonoga , 2021). However, contradictory findings have also been reported, thus warranting further research (Karimi-Zarchi , 2020; Kotlyar , 2021; Salem , 2020).

3.2 Psychological Considerations during Perinatal Period: Maternal Mental Health and Impact on the Child

Pregnancy is a fragile period for the emotional and mental well-being of a woman. Studies in low-and-middle-income countries have reported that mental and psychopathological disorders are more prevalent among women during the perinatal period as compared to nonpregnant women. (Abdoli, 2020; Dong, 2020; Durankus & Aksu, 2020; Fisher , 2012; Kotabagi , 2020; Liu , 2020; Sawyer , 2010) (Yassa , 2020). High anxiety and post-traumatic stress disorder symptoms (Ravaldi, 2020) have been reported apart from a pronounced increase in depression, anxiety, and negative affect during the pandemic (Lopez-Morales, 2021) (Preis , 2020). Several studies yielded similar results in India, United Kingdom, and Ethiopia (Karavadra , 2020; Kassaw & Pandey, 2020; Subramanyam , 2020; Waghmare , 2021).

Pregnant women are susceptible to emotional instability (Stein, 2014) and stress due to reasons such as job strain and pregnancy complications (Brandt & Nielsen, 1992; Chen, 2000; Loomans , 2013; Oths , 2001). These adverse conditions may increase the risk of preterm delivery, illnesses and even death in infants. (Gemmill, 2019; Hoffman, 2016) (Kinsella & Monk, 2009) (D'Onofrio, 2013). Their consequences could extend from childhood to adolescence (Huizink, 2003; O'Donnell, 2014). Some other potential effects of maternal psychosocial illness on the child have been described in Table 3.1.

Table 3.1. Fetal and neonatal outcomes associated with maternal psychosocial illnesses observed during the COVID-19 pandemic

Maternal Psychological Disorders observed during COVID-19	Fetal and Neonatal Outcomes associated with the same	Social Factors Affecting Maternal Mental Health during COVID-19
Depression (Antenatal/ Postnatal)	- Heightened risk for premature delivery (<37 weeks' gestation) (Grigoriadis , 2013; Grote , 2010; Stein , 2014) - Low birthweight: a substantial factor in low-and-middle-income countries (Grote, 2010; Stein, 2014) - Increased risk for child emotional problems (Gerardin, 2011; Leis, 2014; Velders , 2011) especially children of mothers with postnatal depression (Goodman , 2008) - Self-reported symptoms associated with heightened risk of clinical depression in late adolescence (Pawlby, 2009; Pearson, 2013) - Poor motor and regulation skills in toddlers up to 12 months (Gerardin, 2011) - Internalizing behavior in children up to 3 years (Velders , 2011) and in children up to 10–15 years of mothers with postnatal depression (Verbeek , 2012) - Antenatal depression associated with increased depression risk in children at 16 years of age and antenatal and postnatal depression have both been associated with low social competence in the same age group boys (Korhonen, 2012; Pawlby , 2009) - Increased risk of depression in offspring followed up at 16 years (Murray, 2011; Naicker, 2012) - Antenatal depression has been associated with children's	Socioeconomic status, maternal education, financial strain, race, ethnicity, substance use history, obstetric factors, household income, chronic maternal and child health problems, social adversity, and sex of the child. Conduct disorders have been mediated by marital conflicts.

	externalizing behavior (Barker, 2011; Korhonen, 2012; Van Batenburg-Eddes , 2013; Velders , 2011) - Perinatal depression associated with underweight and stunting in infancy, predominantly in low-and-middle-income countries (Avan, 2010; Stewart, 2007; Surkan, 2012)	
Antenatal Anxiety	- Slight associations with pre-term birth and low birthweight (Ding, 2014; Stein, 2014) - Child internalizing behavior (Barker, 2011) and externalizing disorders in childhood associated with self-reported symptoms of maternal anxiety (Glasheen , 2010)	
Psychotic Disorders	Increased risk for preterm-delivery, still birth, low birthweight, and infant mortality within first year of birth (Howard, 2004)	Smoking, poverty, poor nutrition, substance use (Howard, 2004)
Maternal Post-Traumatic Stress Disorders	Infants show emotional regulation (at 6 months) and internalization and externalization dysregulation symptoms at 13 months (Bosquet Enlow, 2011)	Maternal age, education, financial strain, race, and ethnic origin.

The psychosocial issues have compounded during the COVID-19 pandemic. Social isolation makes expectant mothers vulnerable to loneliness and periods of depression (Leigh-Hunt, 2017).

Although telehealth and telemedicine service utilization grew during the pandemic, access to mental health services has been limited, especially in the low-and-middle-income countries or regions facing geographical and political barriers (Shoib, 2020) and its unacceptance due to cultural differences. A review of 47 studies observed improved obstetric and gynecological outcomes because of synchronous telehealth; however, maternal depression outcomes were not included (DeNicola, 2020). Moreover, subtle cues such as poor grooming, body odor, or disorganized clothing that indicate inadequate self-care cannot be accurately observed through phone or online appointments.

3.2.1 ***COVID-19 and Maternal Mental Health***. An improved understanding of the COVID-19 pandemic has revealed its psychological impact on expectant mothers, such as an increase in the symptoms of depression (Dong , 2020; Durankus & Aksu, 2020; G. Sun , 2020) and

anxiety (Kotabagi , 2020; Liu , 2020; F. Sun , 2020), lower quality of mental life (Ahorsu , 2020), increase in perceived levels of distress (Berthelot , 2020), and moderate psychological impact due to isolation (Saccone , 2020). Furthermore, high prevalence rates of insomnia and psychological distress have been reported, especially during the first and third trimesters of pregnancy (Yan, 2020).

Stress related to preparation for giving birth during the pandemic and worries about getting infected with SARS-CoV-2 or transmitting it to the newborn can elevate a woman's risk of experiencing moderate-to-severe anxiety (Preis, 2020). Studies reported that COVID-19-related issues were strongly associated with notable changes in perceived pregnancy-related anxiety. Some of these issues prevent face-to-face prenatal visits, lead to changes in birth plan (i.e., not delivering in the hospital), fear of food running out, and increase conflicts at home (Moyer, 2020) apart from news related to COVID cases and daily deaths (Zhou, 2020). Anxiety due to primigravida (i.e., first pregnancy) with more pronounced generalized anxiety disorder among urban women than rural women with poor social support (Kassaw & Pandey, 2020) was seen. Consequently, peripartum women may demonstrate behavioral changes such as excessive washing or sanitizing and repetitively checking temperature to prevent infecting themselves or the baby and showed more pronounced obsessive-compulsive symptoms when compared to non-pregnant women (A. Kumari, 2020) (Yassa, 2020)

Interestingly, a decrease in anxiety and depressive symptoms was observed when isolation measures were suspended (Kotabagi, 2020).

The COVID-19 pandemic has revealed a predisposition to psychological disorders that got exacerbated due to increased vulnerability of such individuals to COVID-19 stress (Ravaldi, 2020). Women who self-reported a history of anxiety and depression were at a

higher risk for developing anxiety and post-traumatic stress disorder due to COVID-19 than other women (Ravaldi, 2020).

A case series from India reported three cases of postpartum psychosis with common symptoms including delusion of persecution and reference and for two of the cases, the delusion surrounded the SARS-CoV-2 infection (Subramanyam, 2020).

Some studies say that the measures undertaken and implemented by the authorities to avoid the spread of the virus can have indirect negative effects on pregnant women, due to the concomitant financial problems, interruption of prenatal cares, and concerns regarding their own health and that of the fetus or other family members (Corbett, 2020; Thapa, 2020; Zhang & Ma, 2020). For instance, separation of the parent and child by the hospital due to COVID-19 positive mother or father without any prior discussion, has been a major ethical concern. Such incidents dent the trust in healthcare systems, leading to unsupervised decisions regarding homebirths and subsequently abstinence from breast-feeding (Barrero-Castillero, 2020). Moreover, the early mother-child separation poses risks of negative effect on the infant brain development and may lead to later impairments in their learning abilities and physical and mental well-being (Ces, 2018; Flacking, 2012; Holdren , 2019).

3.3 Social Considerations during Perinatal Period – Social Interactions and Perinatal Care Access during the Pandemic

The social impacts on maternal and perinatal health include changes in the conventional way of obtaining care (Karavadra, 2020) and decision to give birth at home or under institutional care (Moyer, 2020), a disheveled social environment due to isolation from the loved ones (Saccone , 2020), and reduced access to basic services due to lockdown and containment measures (Davenport , 2020). Pandemic-related factors that resulted in stress among pregnant women were concerns about food running out conflict among household members, losing a

job or fear of it and fear of losing household income (Moyer, 2020), fear of the unknown, disruption in routine and social loves, and not being able to understand the seriousness of the spread of the disease (Mizrak Sahin & Kabakci, 2020).

3.3.1*Perinatal Care Access during the Pandemic*. Inathematicanalysisofsurveyresponses from 1,451 women in the UK, who were pregnant or had a delivery during the pandemic, 59% women felt that there were several barriers in access to healthcare during the lockdown. Virtual consultations, reluctance to virtually discuss mental health issues, role of media, and changes in the manner of service delivery were some of the many reasons reported by the women. Women in rural areas faced increased difficulties in physical access to healthcare. The use of the Personal Protective Equipment kit also resulted in difficult communication for some people, especially among the hearing-impaired individuals (Karavadra, 2020). Thus, the protective responses and measures are potentially jeopardizing pregnant and postpartum women's health (Molgora & Accordini, 2020).

An Indian study compared pre-lockdown and post-lockdown pregnancy related trends and found a 43.2% reduction in hospitalization during the lockdown as compared to the pre-lockdown phase and a 49.8% reduction as compared to previous year (V. Kumari, 2020). Such statistics help reflect upon the number of deliveries that have gone unattended during this period.

Onset of the pandemic altered many conventions of pre-COVID-19 living. In many cultures, a help is usually hired or called from one's extended family to assist during the postpartum phase, allowing the postpartum woman some time to recover (Goyal, 2016; Ta Park, 2015).

In a geographically varied country like India, there is unequal distribution of the healthcare workforce too (Ransing, 2020). Pregnant women in Kashmir experienced immense

psychological distress during the pandemic due to reduced access to healthcare. The telehealth industry in the state suffered immensely with communication blackouts in the state stemming from the unstable political situation further compounding the problems (Shoib, 2020).

It is now clear that there is no dearth of evidence related to psychological, physical, and social consequences of the pandemic on pregnant women (Bülbül, 2020; Hcini , 2021; Juan , 2020). Several health bodies around the world sounded alarm and gave guidelines to reduce the risk of transmission to the vulnerable population.

To prevent the fetus from the impact of maternal stress, an important step towards maternal well-being would be to include an assessment of their psychological health in their routine check-ups (Caparros-Gonzalez & Alderdice, 2020).

3.4 Maternal Mental Health Interventions during COVID-19

Maternal depression can be both prevented as well as treated successfully (Dennis, 2009). Participation of mothers with postnatal depression in psychotherapies has been associated with fewer toddler behavioral problems at the age of 18 months as compared with toddlers whose mothers received only routine care (Murray, 2003). Further, a 12-week dosage of antidepressant drugs in mothers was associated with an improved mother-infant interaction (Goodman, 2008). When treated with cognitive behavioral therapy, the improvements in depressive symptoms of mothers were found to correlate with infants' developmental outcomes (Hayden, 2012).

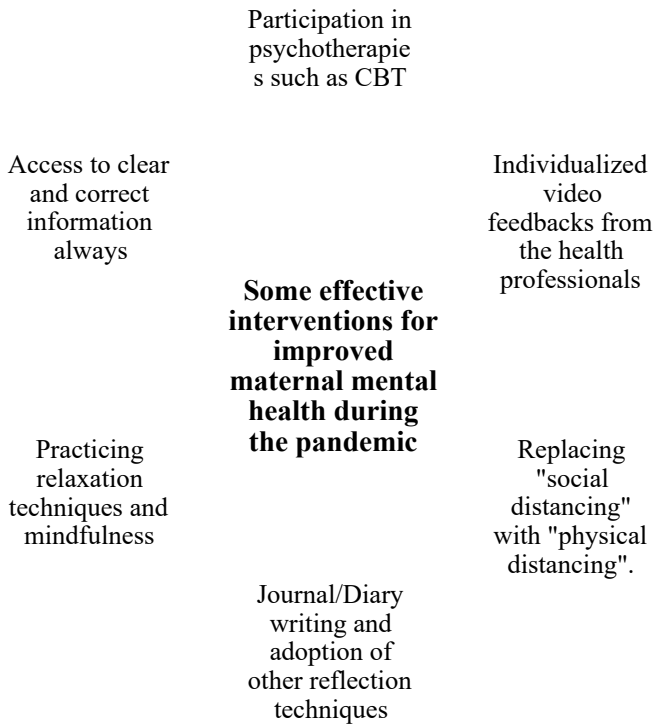
In women with depression, individualized video feedback improved quality of interactions and infants' attachment security and social competence when compared with women who received telephonic support. It helped in improving maternal sensitivity to infant

cues and benefitted women with schizophrenia in improving mother-infant interactions (Dennis, 2009).

Simple cognitive behavioral strategies such as using a diary to recognize the intensity of one's thoughts and emotions, practicing mindfulness and body relaxation techniques have had mixed effects on perinatal health, nevertheless, these are relatively easier measures to implement during self-isolation (Lever Taylor, 2016; Matvienko-Sikar, 2020).

Apart from staying connected with loved ones through virtual means and replacing the "social distancing" with "physical distancing," pregnant women should always have access to clear and correct information through constant communication regarding their risks, their diet and exercise, to have a sense of understanding and control over their situation (Matvienko-Sikar, 2020).

Figure 3.2. Some effective interventions during the pandemic for better mental health in women during the perinatal phase.



Source: Original

Proposed phases of psychological interventions to cope with the pandemic-caused mental distress have been previously described (Orrù , 2020). To tackle the crises, multiple

institutions around the world have activated online social media platforms and counseling portals where the required help can be provided (Xiao, 2020).

A sense of reduced physical risk from the disease is important for the expectant mothers to feel mentally sound and vaccination is the way forward.

3.5 COVID-19 Vaccination of Pregnant and Lactating Women

As the clinical trials for COVID-19 vaccine begin, several professional bodies around the world are voicing their concerns over exclusion of pregnant women from the research trials, despite them being a vulnerable section (Maykin, 2021). According to recent evidence, pregnant people have a three-fold adjusted relative risk of needing intensive care, mechanical ventilation and an increased risk of hospitalization as compared to same-aged, non-pregnant individuals (Bianchi, 2021) (Zambrano, 2020). Maternal immunization has great potential to provide protection against harmful diseases to not just the mother, but also to the infant through transfer of maternal antibodies across the placenta (Sobanjo-Ter Meulen, 2015; Verweij, 2016). Recently, Gilbert (2021) presented the first known case of detection of SARS-CoV-2 IgG antibodies in the cord blood of the newborn after her mother had received the first dose of the mRNA vaccine for SARS-CoV-2 three weeks prior to delivery. Another study found that comparable levels of vaccine induced hormonal responses were induced in the pregnant and lactating women to non-pregnant women (Gray, 2021). These findings provide hope and instances of solid evidence that vaccination of pregnant women is important and can protect the mother and child.

So far, the data on safety of COVID-19 vaccine for pregnant women is severely limited and the studies done on rats have not demonstrated any safety concerns (CDC, 2019). (Rasmussen, 2021 (US Food & Drug Administration, 2020). The data for Emergency Use

Authorizations for Pfizer and Moderna vaccines, that has been provided by the manufacturers excludes pregnant women. Pregnant women did not constitute the high-priority group in the strategic framework presented by the WHO to ensure equitable allocation of COVID-19 resources and vaccines (Dashraath, 2020) (WHO, 2020). This lack of data or working on sub-optimally designed studies has left large gaps in understanding of vaccine safety and efficacy for pregnant women (Maykin, 2021). Without timely research, access to effective prophylactic and therapeutic drugs for pregnant women is severely restricted and it is essential to design safe clinical trials for them (Heath, 2020) (Bianchi, 2021).

The American College of Obstetricians and Gynecologists (ACOG) recommended that COVID-19 vaccine should not be withheld from pregnant and lactating women who met the criteria as per the norms issued by Advisory Committee on Immunization practices (ACIP) for priority groups (ACOG, 2020). According to the report, the side-effects of the vaccine are not expected to be any different for pregnant women than non-pregnant women, unless they have some other complications. Women who were trying to conceive also need not avoid pregnancy once they have received the mRNA COVID-19 vaccine (CDC, 2020). However, a recent study identified that 36 of 50 US states do not have pregnant individuals among their phase-I priority list for COVID-19 vaccination (GrUnebaum, 2021).

Verweij said they seek for informed consent from the mothers and elaborate upon the role that community involvement and integration can play in maternal immunization by calling for attention to diverse needs for antenatal care. Informed consent is also a way to make mothers feel cared for as individuals. (Verweij, 2016)

Bianchi provided important information that pregnant and lactating women may need to base their decision on participation in clinical trials (Bianchi, 2021). They suggest that the decision be tailored according to the individual risks which are dictated by one's home or work environments, their demographics characteristics along and their medical history and

condition, these points of information combined with evidence on the safety and effectiveness of the vaccine can certainly help the pregnant women make the right informed decision. Hence, vaccines can be made available to the pregnant and lactating women on a case-to-case basis, meaning that after a thorough analysis of personal profile of each woman, their personal complications and risks, the decision regarding their vaccination can be made (Craig, 2020), (CDC, 2020,2021).

Several issues that can be considered while counseling pregnant persons about the COVID-19 vaccine have been described in Table 3.2. (Rasmussen, 2021).

Table 3. 2. Considerations for counseling pregnant persons regarding coronavirus Disease 2019 vaccination (Rasmussen, 2021).

- Data from animal studies (once developmental and reproductive toxicology studies become available)
- Lack of data on pregnancies during vaccine clinical trials
- Risks of vaccine reactogenicity, including fever; treatment with antipyretic medications (e.g., acetaminophen) might reduce this risk
- Timing of planned vaccination during pregnancy
- Extensive evidence for safety of other vaccines during pregnancy
- Risk of COVID-19 complications due to pregnancy (increased risk to pregnant person of severe disease and death)
- Risk of COVID-19 complications due to underlying conditions (e.g., diabetes, obesity, heart disease)
- Risk of COVID-19 to fetus or newborn (intrauterine transmission is rare, but preterm birth appears to be increased)
- Risk of exposure to SARS-CoV-2 and potential for mitigation with working from home, wearing masks, and physical distancing

Presently, maternal immunization is offered in response to only risks that are concrete and severe in nature to the mother and fetus and when the vaccine benefits outweigh the potential risks (Verweij, 2016). By following strict precautionary measures, it is important to immunize when the risk of pathogen infecting the mother and her fetus far outweighs the risks of any possible adversity from the vaccine. Therefore, it is important to strengthen the surveillance and disease reporting systems that offer concrete evidence associated with maternal immunization (Delahoy, 2020; Zambrano, 2020)

Chapter - 4

Summary, Recommendations & Conclusion

4.1 Summary of the Review

Through an extensive review, this paper has been directed towards summarizing the challenges of COVID-19 on a highly vulnerable section of the population: Pregnant women. Discussed below are some of the challenges and other major findings through the review and a reflection upon the future direction of research in the area.

1. **Biopsychosocial Framework**. Taking a cue from Diamond (2020), a biopsychosocial framework is necessary to analyze the impact of COVID-19 on maternal and perinatal health. The predominant physiological, psychological, and social effects on pregnant females, observed and associated with the pandemic have been summarized in ***Figure 3.1***.

2. **Adverse potential consequences for maternal health.** Earlier last year, Roberton provided early estimates of the indirect impact of the pandemic on maternal and child

mortality in low- and middle-income countries and the figures were astonishing. So far, the data on mortality is limited but if we look back at the past pandemics, the picture looks grave. The consequences are associated with rise in mortality and morbidity. Some potential consequences of COVID-19 on perinatal health have been highlighted in ***Table 3.1***.

3. **Limitations of Telemedicine.** Telemedicine and other revolutions in the health-care industry work on the basic assumption that everyone, always, has access to decent internet connection and the devices necessary for the virtual exchange to occur. However, such is not the case in many places. Further, cultural differences provide very different perspectives to virtual consultations. The pandemic required people to adjust quickly to rapid changes in health systems, which was a major hiccup. Therefore, these are important lessons upon which health systems can be strengthened to deal with such calamities at present and for posterity.

4. **Interventions**. Maternal mental health interventions need to become part of an expectant mother's routine check-up. Several studies have found positive results associated with cognitive-behavioral therapies, regular feedback and most importantly, keeping the mothers informed regarding their risks and providing them with a clarity and a plan can help beat a lot of potential stress related disorders. Some useful interventions have been mentioned in ***Figure 3.2.***

5. **Lack of research on safe vaccine trials.** A major concern is scarcity of research related to safe vaccine trials for pregnant and lactating women. The consolidated research work related to the issue highlights weighing the costs of the illness with the potential risks

associated with the vaccine. In the present times such as the COVID-19 pandemic, the costs of not immunizing the mothers far outweigh any risk associated with vaccination and therefore inclusion of pregnant women, through informed consent and on a case-to-case basis is highly recommended.

4.2. Recommendations for future research

Multitude of research at present is directed towards understanding the psychosocial impact of COVID-19 on maternal and child mental health. Longitudinal study designs and follow-up studies with a scope for understanding the future and long-term impacts of the pandemic on the health of the mothers and the infants born during the pandemic can certainly help to establish a clearer impact of the pandemic. Further, as pointed out by many organizations, research grounds for maternal immunization need to be strengthened so that this high-at-risk population can be submitted to the safety of vaccines. Pregnant women should not be protected *from* participating in research, instead, they should be protected *through* research (Bianchi, 2021).

As the world proceeds to enter a post-COVID world, it is important to pay attention to the interventions and services directed towards better support to pregnant women that may yield successful results in these distressing times, especially in low- and middle-income countries (LMICs). Tele-interventions are often accompanied by complaints associated with their lack of human touch and support. Further, from a policy-perspective, the LMICs can use the present studies that depict a more pronounced effect on the mental health of expecting mothers, as compared with high-income countries, to guide them towards strengthening their maternal and infant care systems.

Conclusion

This review has worked to present a synopsis of the research that has investigated maternal biological, psychological, and social health ever since the onset of COVID-19. The consolidated findings indicate a high prevalence of psychological and social impact related issues among pregnant women which are detrimental to their health and that of their fetus.

The research done so far on the impact of COVID-19 on perinatal period, maternal and infant psycho-social health has immense policy implications and can be utilized to guide nations into pillaring institutions of trust and strength for the expecting mothers in crises. The primitive step towards the same is to provide maternal immunization that is based off quality research framework through COVID-19 vaccine and inculcation of steady maternal mental health care mechanisms in the maternal-care system.

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