





RESEARCH ARTICLE

# Barriers to maternal and reproductive health care in India due to COVID-19

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COVID-19 and its associated lockdowns and restrictions on movement may be impacting women and men's access to and use of health care services including contraceptive, prenatal, and postnatal care. Yet we know little of its impact to date, especially in low- and middle-income countries, including India. Understanding how COVID-19 impacts the use of these services now, and as it persists, is essential for improving access and use today. Additionally, these data are necessary to understand fertility and other health-related outcomes we may see in the future. The objectives of this study are to understand a Facebook sample of respondent's perceived barriers to contraceptive, prenatal, and postnatal care in India and how these changed over 4 months of the COVID-19 pandemic. To meet this need, we conducted four rounds of monthly online surveys with men and women ( $N = 9,140$ ) recruited using Facebook ads in India between April and July 2020, a period when the national lockdown was tapered from the strictest to restricted. While about 75% of respondents reported no barriers to contraception due to COVID-19, about half of those pregnant or postpartum reported barriers to pre- and postnatal care. Barriers to care for contraception, prenatal, and postnatal care increased significantly over time. Most respondents reported some change on fertility preferences, with more respondents reporting desire to delay, rather than to have a child sooner, due to COVID-19. Overall, as the early COVID-19 pandemic persisted, barriers to reproductive and maternal health care increased in India, suggesting that as the pandemic continued there have likely been additional challenges for people seeking these services. It is essential that health care providers begin to address these barriers to ensure access to care throughout these important time periods.

**Keywords:** South Asia, COVID-19, Family planning care, Pregnancy care, Postpartum care, Social media

## Introduction

There have been reports and commentaries highlighting the possible impact of COVID-19 pandemic and associated lockdowns on contraceptive services, with estimates of the pandemic resulting in mistimed or unintended pregnancies [1, 2]. UNICEF estimated a potential 7 million unintended pregnancies globally, caused by disruptions in contraception supply and use due to COVID-19 [3]. Another analysis of women in low- and middle-income countries (LMICs) estimated that a 10% decline in the use of contraception could result in roughly 49 million women with an unmet need for contraception and an extra 15 million unintended pregnancies in the year following the COVID-19 pandemic. Other reports have

highlighted the potential risk of reduced access to and care-seeking of prenatal, delivery, and postnatal services in health facilities [2]. The aforementioned study estimated that a 10% decrease in coverage in prenatal and newborn care would result in an additional 28,000 maternal and 168,000 newborn deaths.

In India specifically, data from public health care centers suggested a drop in women receiving contraception as early as March when the COVID-19 pandemic started receiving serious attention but before the lockdown was imposed [1]. Another study among maternal and child health care providers in many countries, including India, found reports of a drop in patients coming for services, noncompliance with vaccination schedules in the postpartum period, and other disruptions to standards of care and procedures leading to outcomes such as increased caesarean rates and shorter stays in the facility [4]. There are myriad explanations for this, including staff shortages, the system being overwhelmed with COVID-19 response, and patients' fear of visiting facilities [2]. Additionally, private clinics providing contraception and abortion in India, such as Marie Stopes International, were forced to close due to COVID-19, again reducing options for women [5]. In India,

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many women receive contraceptive services outside of health facilities, from pharmacies and social marketing agencies. Lockdowns and resulting restrictions on movement outside of the home and limits on transportation options are likely to make accessing contraception challenging for many, in addition to supply chain disruptions [2].

India has one of the world's oldest family planning (or contraceptive) programs. Post the International Conference on Population and Development, the government has integrated the contraception programs with reproductive and maternal and child health to include immunization, provision of reproductive health knowledge, and services to improve maternal and child health [6]. The government has introduced multiple programs to advance maternal and child health outcomes including National Rural Health Mission and Janani Suraksha Yojana in 2005, National Urban Health Mission in 2008, Janani Shishu Suraksha Karyakram (JSSK) in 2011, Rashtriya Kishor Swasthya Karyakram in 2014, Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) in 2016, and Pradhan Mantri Matrutva Vandana Yojana (PMMVY) in 2017 [6, 7]. In 2013, India expanded the Reproductive and Child Health program to make it comprehensive under an integrated platform of RMNCH+A to include Reproductive, Maternal, Newborn, Child, and Adolescent health along with contraception services [8].

Despite overall gains and many pro-poor government programs, many demand-side barriers exist such as social norms related to contraception, poor engagement from male partners, early marriage, early childbearing, and stigma in buying contraceptives. Further, decisions made by mothers-in-law and husbands and low agency of women, limited educational attainment of women, fear of side effects, and patriarchal norms continue to be India's challenges to achieving the Sustainable Development Goals [9–12].

According to the National Family Health Survey of India (NFHS-4, 2015–2016) estimates, approximately 12.9% women have an unmet need for contraception. Just over half (54%) of married women of reproductive age (15–49 years) use modern contraception methods including female sterilization (36%), male condoms (5.6%), pills (4%), intrauterine devices (1.5%), and injectables (0.2%). The remaining just under half (46%) of women do not use any form of modern contraception. About 70% women receive their contraceptive method from public sector facility such as a community health center, primary health care center, or a rural hospital. About a quarter (24%) of women receive their contraceptive method from private sector or a nongovernmental organization [13]. Most women in India seek prenatal services, with 51% of women having the recommended four prenatal visits [14]. Postnatal care is much lower, with 30% of women not having any postnatal visits.

Contraceptive use in India is highly women-centric due to existing patriarchal norms, gender inequality, and female stereotyping in unions and reproduction [15]. Men are important decision makers in contraceptive uptake and method choice [16]. Men are also important decision makers about using maternal health care services

(including place of delivery, prenatal and postnatal care) [17]. Therefore, gathering men's perspective on maternal and reproductive health service access and use during COVID-19 is important to study [17].

### **India's COVID-19 response timeline**

India reported its first COVID-19 case on January 30, 2020, and as number of positive cases increased to 563, India closed its international borders and enforced the world's strictest nationwide lockdown on March 24, 2020, until April 14, 2020. During this period, all government offices were shut for 21 days, except essential services such as fire, police, and hospitals. All private and public sector operations were shut, except essential manufacturing, banking, vegetables and groceries, and pharmacies. Logistics and supply chains were severely restricted. This containment measure was meant to give the government time to prepare for a possible surge in cases [18, 19]. Further, this nationwide lockdown was extended until May 17, 2020, by which time nearly 50,000 confirmed cases were reported. Around the same time, the Indian government also established a three-zone system that divided the districts based on the number of reported COVID-19 cases into red, orange, and green with certain relaxations applied based on the severity of caseload [20].

Beginning June 8, 2020, the Indian government established phased reopening guidelines after 75 days of nationwide lockdown. During this phased reopening, the states were given autonomy to impose lockdown restrictions only in the containment zones, while certain activities were allowed in other zones in a phased manner. This first phase of reopening (June 1–30) was called Unlock 1.0 that permitted limited opening of private offices, start of manufacturing with resident laborers, and shops allowed to open during certain times and days. However, night curfews were observed, and gatherings or interstate travel was still not permitted [21]. The next phase of reopening (July 1–31), Unlock 2.0 included continued lockdown in containment zones based on COVID-19 caseload but allowed reopening of state borders and limited international travel [22]. At the time of writing this article, India has instituted Unlock 4.0 phase that involves continued lockdown in containment zones until September 30, 2020. Physical distancing and face coverings/masks continue to be mandatory in public places, workplaces, and public transport [23]. It is also important to note that the un-lockdown norms were often more stringent than center guidelines in states and districts with high burden of COVID-19 cases.

### **Research objectives**

To date, there are limited data on how COVID-19 has impacted men and women's contraceptive access and use, and use of prenatal and postnatal services, and what specific barriers people are facing due to COVID-19. We also do not know how these have changed over time as restrictions on movement shifted throughout the course of the pandemic and its corresponding response. Understanding the impact of the COVID-19 pandemic and associated lockdowns can help us understand how to continue to

provide services to women and men, which is vital since COVID-19 has continued, along with lockdowns of various types. Additionally, we may see other pandemics or crises in the future, which could also impact reproductive and maternal health care use. The primary objective of this article is to describe the impact of COVID-19 on fertility preferences and barriers to contraception, prenatal and postnatal care use in India, and explore trends over time.

## Materials and methods

Online survey data were collected at four time points: mid-April, mid-May, mid-June and mid-July, 2020. Men and women living in any part of India were recruited for the survey using Facebook advertisements (ads). Respondents could take the survey in either Hindi or English. Eligibility criteria included being over 18 years old and living in India. We used a repeated cross-sectional design, sending out the Facebook ads every month for three more rounds (total of four rounds) to recruit a new set of respondents at each time point. This study received human subjects' approval from the University of California, San Francisco.

In addition to basic demographics, the survey covered domains related to barriers to pregnancy, postpartum, contraceptive and abortion care due to COVID-19, as well as barriers to health care in general (questionnaire will be available with open data). Given the cultural norms around pregnancy and contraception use outside of marriage, our study team felt it was appropriate that unmarried respondents skipped the questions related to pregnancy and contraception. Additionally, all respondents who reported that they were currently sterilized skipped these questions. Midway through the second round we switched the ordering of the questions to put the reproductive and maternal health questions last, after the demographic questions because we thought that having fewer sensitive questions at the end might help increase response rates.

First, we cleaned the data to remove suspected fraudulent responses or those who did not meet eligibility requirements. Fraudulent results were classified as responses that came from the same IP address as another response, were answered very quickly (<60 s), wrote non-appropriate responses (e.g. words where there should have been letters), and noneligible were those not over age 18. Next, we describe the demographics of the sample, by round. We then describe the change over time (by round) in the impact of COVID-19 on fertility preferences, barriers to contraception, and pre- and postnatal services. To measure fertility preferences, respondents were asked "How have your/your wife's pregnancy preferences been affected by COVID-19?" Given cultural norms related to joint decision-making and the fact that both men and women responded to the survey, the study team felt that this was the appropriate phrasing for this question. To measure barriers to contraception, nonpregnant and non-sterilized respondents were asked "Did COVID-19 affect your access to family planning/contraception?" To measure barriers to pre- and postnatal care due to COVID-19, pregnant and postpartum women (and their partners)

were asked "Did COVID affect your access to pre- or postnatal care?" For each of these items, respondents could select one or more from a list of barriers, including an "Other" response category. While data were collected separately from pregnant and postpartum women, data are presented together here due to the similar stage in their life course, similar services being availed and small sample sizes.

Finally, multivariable logistic regression models are run to look at the association between round of the survey (time), sociodemographics, and barriers to (1) contraception and (2) pre- or postnatal care. A binary outcome variable for barriers was created with no barrier being coded as 0 and 1 or more barrier being coded as 1. Sociodemographic variables included in the models are age, sex, education, region of India, rural/urban, and wealth.

## Results

From the total 12,898 respondents who completed the sample, 3,758 were dropped due to suspected fraudulent data, leaving a final sample of 9,140 (**Table 1**). Sample characteristics varied across all rounds, which is expected given that the investigators have no control over who chooses to complete the survey unlike in face-to-face surveys.

*Fertility preferences:* An increasing proportion of respondents over time stated that their or their wife's fertility preferences had not changed due to COVID-19, ranging from 31% to 49% (**Table 2**). The most commonly cited response to the impact was that respondents felt that they could not afford a/another child, and this appeared to increase from around 12% to around 20%. Few respondents reported that it increased their desire, hovering around 2-3% over time.

*Contraceptive access:* A fairly stable percentage of respondents reported that their contraceptive access was not affected by COVID-19 (62–74%) (**Table 3**). Only a small percentage (about 2%) said that their access to contraception was made easier. Generally over time, respondents became more fearful to go to the clinic, felt the economic impact posed by the pandemic, and perceived less time and increased household burden. Also, 2% of respondents said that it had become easier for them to obtain their method.

In the first round of the survey, we allowed respondents the option to write in "other" responses. A common theme was that men and women brought up was that they were no longer having sex because they are now living in a different place or separated in some way from their partner due to COVID-19. Relatedly, respondents also wrote about there not being a "chance" to meet now due to COVID-19, which we interpreted as being related to rules about the nationwide lockdown, social distancing, and restrictions on movement. This response came up so frequently that we added another response category to the subsequent surveys; however, only 1% reported this (although this was only an option after Round 1). A number (about 20) of respondents wrote that they received their method via some sort of a mobile application.

**Table 1. Characteristics of study participants, by round, April–July 2020**

Variables	Round 1	Round 2	Round 3	Round 4
Total (N)	5,980	618	1,881	659
Age ranges				
<20	335 (5.7%)	22 (3.6%)	52 (3.0%)	14 (3.0%)
20–29	2,985 (50.8%)	316 (51.1%)	423 (24.7%)	100 (21.4%)
30–39	1,683 (28.6%)	138 (22.3%)	495 (28.9%)	93 (19.9%)
40–49	548 (9.3%)	86 (13.9%)	348 (20.3%)	136 (29.1%)
50–59	209 (3.6%)	52 (8.4%)	398 (23.2%)	125 (26.71%)
Over 60	121 (2.1%)	4 (0.7%)	0 (0.0%)	0 (0.0%)
Sex of the participant				
Female	2,455 (41.8%)	484 (78.3%)	624 (50.5%)	124 (46.8%)
Male	3,525 (58.9%)	134 (21.7%)	1,257 (66.8%)	535 (81.2%)
Married	3,410 (58.0%)	412 (66.7%)	965 (78.5%)	214 (81.4%)
Region of India				
North	2,908 (52.2%)	343 (55.5%)	628 (53.9%)	127 (51.8%)
South	610 (10.9%)	39 (6.3%)	70 (6.0%)	19 (7.8%)
East	1,053 (18.9%)	107 (17.3%)	234 (20.1%)	53 (21.6%)
West	1,005 (18.0%)	110 (17.8%)	211 (18.1%)	41 (16.7%)
Pregnancy status				
Pregnant	198 (6.0%)	25 (7.9%)	38 (6.7%)	7 (6.3%)
Postpartum 1 month	97 (3.0%)	22 (7.0%)	15 (2.7%)	7 (6.3%)
Not pregnant, not sterilized	1,346 (41.0%)	146 (46.2%)	201 (35.6%)	35 (31.5%)
Sterilized/wife sterilized	613 (18.7%)	100 (31.7%)	188 (33.3%)	36 (32.4%)
Education				
Less than high school	329 (5.8%)	11 (1.9%)	34 (3.0%)	11 (4.5%)
Class tenth	794 (13.9%)	30 (5.1%)	60 (5.2%)	21 (8.6%)
Vocational/some college	828 (14.5%)	46 (7.9%)	97 (8.4%)	33 (13.5%)
College degree or more	3,774 (65.9%)	499 (85.2%)	961 (83.4%)	179 (73.4%)
Income				
Less than \$662	1,732 (30.2%)	169 (28.1%)	307 (26.0%)	73 (29.6%)
\$662–1,324	1,784 (31.2%)	177 (29.5%)	314 (26.6%)	56 (22.7%)
\$1324–6,620	1,676 (29.3%)	172 (28.6%)	382 (32.4%)	81 (32.8%)
Over \$6,620	535 (9.3%)	83 (13.8%)	178 (15.1%)	37 (15.0%)
Urbanicity				
Urban	3,661 (64.2%)	440 (71.2%)	780 (67.5%)	145 (59.4%)
Rural	2,319 (38.8%)	178 (28.8%)	1,101 (58.5%)	514 (78.0%)

*Prenatal and postnatal care:* Between about 50% and 60% of respondents reported barriers to pre- or postnatal care (**Table 4**). Over time, fewer respondents reported no barriers to pre- or postnatal care; in other words, reports of

barriers increased over time, although the N's got quite small by Round 4. Being unable to go to an appointment because of lockdown/restrictions on movement was the most common barrier, with some evidence of increase

**Table 2. Fertility preferences, by round, April–July 2020**

How have your/your wife's pregnancy preferences been affected by COVID-19?	Round 1 (N = 2,691)		Round 2 (N = 140)		Round 3 (N = 192)		Round 4 (N = 35)	
	N	%	N	%	N	%	N	%
It has not changed my preferences	837	31	52	37	74	39	17	49
Increased my desire to have a child/another child	61	2	4	3	7	4	1	3
Decreased my desire to have a child/another child	95	4	5	4	22	11	1	3
Feel that I can't afford a child/another child	339	13	31	22	41	21	7	20
Scared to be pregnant/have a/another child	112	4	11	8	22	11	3	9
Want to delay having a child for the next year	246	9	19	14	24	13	3	9
Other	1001	37	35	25	42	22	10	29

**Table 3. Barriers to contraceptive use, by round, April–July 2020**

Did COVID-19 affect your access to family planning/contraception?	Round 1 (N = 2,584)		Round 2 (N = 182)		Round 3 (N = 187)		Round 4 (N = 34)	
	N	%	N	%	N	%	N	%
Not affected	1934	75	114	63	139	74	24	71
Made easier	41	2	4	2	3	2	1	3
Switched method due to COVID-19			4	2	6	3	0	0
Stopped method	58	2	1	1	5	3	0	0
Made harder because you are not allowed to go outside your home currently due to government restrictions	118	5	7	4	2	1	1	3
Made harder because the place you get your method is closed	35	1	3	2	7	4	0	0
Harder because you are afraid to go to the hospital/clinic	42	2	4	2	10	5	3	9
Harder because you are afraid to go to outside	80	3	2	1	0	0	0	0
Harder because you do not have enough money	72	3	2	1	7	4	2	6
Harder because you don't have time due to additional household work or childcare	93	4	4	2	12	6	3	9
No longer needed because we are separated due to COVID-19			17	9	12	6	7	21
Other	173	7	38	21	53	28	13	38

Notes: Multiple responses per respondents possible, all responses combined.

over time. More respondents noted that COVID-19 made them more likely to deliver in a facility, rather than less likely to deliver in a facility.

#### **Multivariable models of factors associated with reproductive and maternal health care barriers**

The odds of reporting barriers to contraception increased over time in a steady manner, with respondents reporting 4.41 times the odds (95% CI = 2.14–9.08) by July compared to April (Table 5). Respondents living in urban areas, who had a higher income and who were more educated, reported lower odds of facing barriers compared to rural, poorer, and less well-educated respondents. There was no difference by gender or age.

When both genders are included in the model, the odds of reporting barriers to prenatal or postnatal care increased in a consistent manner over time, with respondents in June having increased odds times of reporting barriers compared to respondents in the first month of data collection (OR = 2.73, 95% CI 1.29–5.75) (Table 6). The confidence intervals are quite large for the fourth round of data collection because the sample size became small. Since women had significantly higher odds of reporting barriers, we also ran the model for women alone and found a similar trend, with women having an increased odds (OR = 2.23, 95% CI = 0.94–5.29 in May; OR = 3.85, 95% CI 1.46–10.14 in June) of reporting barriers, compared to April, and the trend increasing in

**Table 4. Impact of COVID-19 on access to prenatal and postnatal care, by round, April–July 2020**

	Round 1 (N = 287)		Round 2 (N = 46)		Round 3 (N = 48)		Round 4 (N = 11)	
	N	%	N	%	N	%	N	%
<b>Did COVID affect your access to pre or postnatal care?</b>								
Not affected	154	54	16	35	22	46	3	27
Unable to go to your appointments because of lockdown/restrictions on movement	32	11	14	30	7	15	4	36
Unable to go to your appointments because you are afraid to go to a facility/clinic	53	18	5	11	12	25	2	18
Unable to go to your appointments because facility/clinic closed			6	13	5	10	2	18
Unable to go to your appointment because of transportation issues			3	7	—	—	—	—
Less likely to/made us not deliver at a health facility because of transportation issues			4	9	—	—	—	—
Less likely to/made us not deliver at a health facility because of lockdown/restrictions on movement	15	5	3	7	2	4	0	0
Less likely to/made us not deliver at a health facility because you are afraid to go to a facility/clinic	24	8	1	2	4	8	1	9
More likely to/made us deliver in a health care facility	—	—	1	2	12	25	2	18
Other changes of prenatal and postnatal services change	15	5	3	7	22	46	6	55

Notes: Multiple responses per respondents possible, all responses combined.

a steady manner over time. No other sociodemographic factors were significantly associated with barriers.

## Discussion

COVID-19 is associated with barriers to care for contraception, prenatal and postnatal women in India, and these are increasing over time. Given that we are 2 years into the COVID-19 pandemic, this highlights the potential large-scale impacts that the pandemic could be having on access to reproductive and maternal health services.

Overall, COVID-19 led to changes in fertility preferences for about one third of respondents. Among those whose preferences had changed, it was mostly in terms of not wanting children at the time of the survey or due to financial concerns. A study in the United States which collected data using established online panels from early in the pandemic (late April/early May) suggested that 40% of women changed their fertility preferences with an overwhelming majority wanting children later or fewer children, because of COVID-19 [24]. Findings are similar in magnitude and suggest that the impact was similar for both men and women in the Indian setting. The item used in our survey was limited in that it did not differentiate well between a woman's preferences, a man's preferences, and a man's perception of his wife's preference. At the time of deploying the survey, this seemed like the appropriate wording given the cultural context; however, it leads to limitations in our interpretation.

The majority of respondents in our sample did not have their access to contraception affected by COVID-19 (75%); however, barriers increased over time with the pandemic. As we would expect, urban, educated, and richer

respondents faced fewer barriers, raising the concern about exacerbated reproductive health inequalities due to COVID-19. We excluded respondents who were sterilized or whose partner was sterilized. Long-acting methods (LARCs) are not as common in India, and therefore we do not believe that the reason there as little impact on contraceptives was that most respondents or their partners were using LARCs. The open-ended responses from the first round suggest that perhaps respondents were able to switch to getting their methods from online sources. The study from the United States, mentioned above, found very similar proportions of women reporting barriers to contraceptive care, at about 30% reporting a barrier [24].

Another interesting finding is that a subset, that is potentially not negligible, of respondents noted that changes in contraceptive use were due to not being with their partner at this time due to COVID-19 restrictions. This has interesting implications for both interpretations of method discontinuation during this time and, potentially more importantly, for what might happen after restrictions are eased and respondents are able to reconnect with their partners. If respondents have stopped using their method because of COVID-19 and then suddenly are able to be sexually active again, perhaps without much warning, this might lead to mistimed or unintended pregnancies. Ensuring that people have a choice of contraceptive methods on hand for the future thus may have added importance.

In contrast to few impacts on contraception, prenatal and postnatal care appear to have been more affected by COVID-19, with about half of respondent reporting barriers. We also find that barriers to these services increased

**Table 5. Adjusted logistic regression models assessing the association between time, socioeconomic factors and antenatal and postnatal care barriers, India**

Variables	Both Genders ( <i>n</i> = 374)			Women Only ( <i>n</i> = 180)		
	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>
Month						
April	1.0	Referent	0.07	1.0	Referent	0.07
May	1.98	0.95–4.13	0.01	2.23	0.94–5.29	0.01
June	2.73	1.29–5.75	0.03	3.85	1.46–10.14	0.08
July	9.68	1.20–78.2		7.25	0.81–64.86	
Sex						
Male	1.0	Referent	0.06	–	–	–
Female	1.60	0.97–2.64				
Age						
Under 30	1.0	Referent	0.99	1.0	Referent	0.92
At least 30	0.99	0.62–1.62		1.04	0.49–2.21	
Rural						
Yes	1.0	Referent	0.94	1.0	Referent	0.64
No, urban	0.98	0.62–1.56		0.84	0.40–1.75	
Region in India						
North	1.0	Referent	0.47	1.0	Referent	0.64
South	0.77	0.34–1.58	0.40	0.77	0.27–2.25	0.88
East	0.78	0.43–1.40	0.49	1.08	0.41–2.82	0.99
West	0.83	0.48–1.42		0.99	0.45–2.21	
Income						
Less than \$662	1.0	Referent	0.71	1.0	Referent	0.27
\$662–1,324	0.90	0.51–1.58	0.82	1.65	0.67–4.03	0.18
\$1,324–6,620	0.94	0.52–1.67	0.14	1.90	0.75–4.85	0.73
Over \$6,620	0.51	0.21–1.25		0.81	0.26–2.59	
Education						
Less than high school	1.0	Referent	0.57	1.0	Referent	0.15
Class tenth	0.73	0.25–2.14	0.91	0.12	0.01–2.13	0.16
Vocational/some college	0.94	0.33–2.64	0.52	0.16	0.01–2.06	0.20
College degree or more	0.73	0.28–1.89		0.22	0.02–2.30	

OR = odds ratio; CI = confidence interval.

with the course of the pandemic, and that sociodemographic characteristics were not associated with barriers—instead they seem to be more universal. A modeling study predicts that the coverage of maternal and reproductive health interventions including antenatal care, contraception, and postnatal care have significantly declined (9.8–18.5%) in LMICs [25].

Other studies have documented the adverse impact of COVID-19-related measures on contraception and maternal health services in LMICs. Antenatal care coverage was also impacted in LMICs with the closure of health facilities because of COVID-19 measures and lack of funds to access

antenatal care [26]. In Rwanda, there was significant decline in access to and utilization of maternal care services including antenatal care, deliveries, postnatal care, and vaccinations [27]. In Bangladesh, lockdown instituted due to COVID-19 resulted in significant drops in number of antenatal and postnatal care visits to public health facilities [28]. Similar results were seen in Ethiopia where there were significant declines in utilization of antenatal care, health facility births, contraception, and newborn immunizations, while at the same time, there was significant increases in teenage pregnancy, stillbirths and neonatal deaths, and teenage abortions [29].

**Table 6. Adjusted logistic regression model assessing the association between time, socioeconomic factors and contraceptive barriers, India**

Variables	Both Genders ( <i>n</i> = 2,878)		
	OR	95% CI	<i>p</i>
Month			
April	1.0	Referent	0.001
May	2.05	1.48–2.84	0.001
June	2.22	1.61–3.06	0.001
July	4.41	2.14–9.08	
Sex			
Male	1.0	Referent	0.78
Female	0.97	0.81–1.17	
Age			
Under 30	1.0	Referent	0.91
At least 30	0.99	0.83–1.18	
Rural			
Yes	1.0	Referent	0.001
No, urban	0.70	0.58–0.84	
Region in India			
North	1.0	Referent	0.43
South	1.13	0.83–1.53	0.89
East	0.98	0.78–1.24	0.72
West	0.96	0.77–1.20	
Income			
Less than \$662	1.0	Referent	0.013
\$662–1,324	0.75	0.60–0.94	0.001
\$1,324–6,620	0.68	0.54–0.85	0.004
Over \$6,620	0.63	0.45–0.86	
Education			
Less than high school	1.0	Referent	0.89
Class tenth	1.03	0.69–1.55	0.20
Vocational/some college	0.76	0.50–1.16	0.04
College degree or more	0.70	0.49–0.99	

OR = odds ratio; CI = confidence interval.

There has been a shift to the provision of prenatal and some postnatal care via telemedicine in India, as elsewhere, and more research is needed on how much of care has been able to be moved to telemedicine and the longer term impact of this approach on maternal and child outcomes and experiences. In a worldwide survey of health care providers, 58% of them stated that maternal and newborn care services such as online birth preparedness classes, antenatal and postnatal care by video/phone, a COVID-19 helpline, and online psychosocial counseling

had moved online via telemedicine [30]. The main challenges reported by health care providers in the study included lack of infrastructure and technological literacy, limited monitoring, financial and language barriers, lack of nonverbal feedback and bonding, and distrust from patients [30]. In our study, fear of going to the clinic/facility was a main barrier for all types of health care utilization. Delays due to fear of going to the facility have been found in a few other small studies on COVID-19 from other countries (mostly European) and for other types of health care seeking [31, 32]. It is interesting that actual barriers due to facility closure or restrictions on movement were not the primary barrier, but rather respondents were making choices not to go, due to fear. Helping women, especially those at high risk, feel safe and understand precautions taken at facilities to protect them, is essential.

Some pregnant women/partners of pregnant women expressed fears about delivering in a facility due to COVID-19; however, more respondents reported that it made them more likely to deliver in a facility (or want to). This could have important implications for health care delivery if systems become overcrowded. However, fundamentally, more research, including qualitative interviews with men and women, could help uncover reasons for these fears and the other barriers described above.

These findings were collected early in the pandemic, and more research is needed on the impact on access to care as COVID-19 has persisted. Additionally, how barriers have translated into changes in health care use and outcomes is essential, for example, if there have been unintended pregnancies or more adverse maternal or infant health outcomes. Much more evidence is needed about impacts of COVID-19 on place of delivery, and what longer term effects this has on maternal and newborn health outcomes.

### Limitations

Despite its strengths in terms of collecting data rapidly (and inexpensively) on the emerging pandemic's impact, and doing so over time, this study has limitations. From a methodological standpoint, due to COVID-19, there is increasing interest in methods of data collection that can collect data quickly from respondents without personal interactions, such as over the phone and online. Recruitment via social media platforms, such as Facebook, is one such approach for recruiting respondents and collecting data from them. A number of studies have employed this technique during the recent pandemic, and interesting contributions are being made in terms of thinking about the ethics, representativeness, weighting, and general approaches of such methods [33, 34].

Limited research of this nature has been carried out in LMICs, especially studies involving multiple rounds of data collection. One recent study that did use Facebook ads for recruitment in India noted that they found no other published studies in India using this approach [35]. These authors noted that while the sample recruited on Facebook was not representative of the population broadly, it did have a wide geographical spread. Studies



using Facebook or other social media approaches for recruitment do have limitations in that we do not know the exact population from which we are drawing our sample; however, by adjusting our models for socioeconomic covariates, we are able to still draw inferences about factors associated with outcomes of interest.

Another limitation of note is that, especially in the later rounds, the sample size of respondents to questions on reproductive and maternal health was quite small. This reduces our ability to draw conclusions about the impacts of the pandemic on access and behaviors, or how those changed over time. We were interested in a broad range of questions and wanted to capture gendered effects; had we more narrowly targeted our Facebook ads for women of reproductive age only (and not collected data on men), we likely would have recruited larger samples. Also, we did not offer an incentive for each round, which might have increased the sample, although this likely would have drawn bots or more fraudulent or duplicated responses. Partly due to the small sample size, we were unable to stratify our data by other important characteristics, such as age, geography, caste, education level, and so on. India is a heterogeneous and diverse country and these different subpopulations would likely be differentially impacted by COVID-19. However, we are forced to make generalized statements about India as a whole, which hide the subtleties that likely exist. Finally, our survey was rather long, and midway through the second round we switched the ordering of the questions to put the reproductive and maternal health questions last (upon advice that having fewer sensitive questions at the end might increase respondents). However, this likely ended up reducing the sample that answered these questions specifically.

It is essential that these findings, both because of their sample size and recruitment approach, not be generalized to a wider population. At best, these provide some suggestive insights into the impact of the pandemic on a social media using population, mostly in the north of India.

## Conclusions

Our study, based on a sample of women and men in India recruited using social media, suggests that respondents faced some barriers to their prenatal and postnatal care due to COVID-19 and associated lockdowns, and these worsened over the first few months of the pandemic, even after official restrictions loosened. The pandemic seems to be making some respondents more likely to want to delay or not have children, primarily due to financial concerns. One of the main takeaways is that the pandemic did not appear to increase respondents' desire to have more children at the time of the survey. If we do see additional births, as has been widely touted as a possibility by the news media, we have some limited evidence that these were unintended [36].

This study provides timely information about the impact of COVID-19 and related lockdowns/restrictions on movement on reproductive and maternal health care access and use. These findings are suggestive that some

barriers exist to seeking reproductive and maternal health care due to COVID-19, and they may worsen with time.

## Recommendations

In light of our current study, we suggest programs or policy makers focus on ensuring that women and men are receiving the reproductive and maternal health care that they need as the pandemic persists, with a focus on vulnerable and disadvantaged populations. Addressing concerns about fears related to going to facilities through mass media or social media might help assuage fears or address misperceptions. Ensuring that widespread misinformation and disinformation regarding COVID-19 and immunizations can help reduce concerns of affected populations.

## Data availability statement

We are currently working on share our data on the CORNET platform funded by BMGF. [https://covidresearchnetwork.slack.com/join/shared\\_invite/zt-ffgukmau-9G0wYJRzXgXHeVQX0YZr7Q#/.](https://covidresearchnetwork.slack.com/join/shared_invite/zt-ffgukmau-9G0wYJRzXgXHeVQX0YZr7Q#/)

## Competing interests

The authors declare that they have no competing interests.

## Author contributions

NDS: conceptualization, methodology, writing; LG: conceptualization, project management, investigation, methodology; SG: analysis, data cleaning; SF: data curation, resources, methodology; NS: supervision, writing; SP: supervision.

## Ethical approval

This study received human subjects' approval from the University of California, San Francisco.

## Patient consent

All respondents read and gave consent to participate online at the start of the survey.

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