

What is the Impact of COVID-19 Pandemic Years on Deliveries and Home-Based New-Born Care in India? A Cross-sectional Comparative Research Study, January 2018 - December 2021

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ABSTRACT

The COVID-19 pandemic caused by SARS-CoV-2 has led to disruption of health services globally. I assessed the effect of the ongoing pandemic on the Deliveries and Home-Based Newborn Care (HBNC) in India. The author is curious and suspects a rise in maternal and neonatal mortality due to possible negative effects of COVID-19 on maternal institutional delivery and HBNC. Hence author decided to find out answer to the research question mentioned as title above. I conducted a retrospective cross-sectional comparative study among total numbers of women and newborn who have received delivery and HBNC care at different health facilities in 36 states and union territories across India during the pandemic years with pre-pandemic years (comparing 2020 and 2021 (forecasted upto December 2021 with available data from January 2021 to May 2021) with previous two years of pre-pandemic era i.e., 2018-2019). The data for the research study is extracted from electronic records of HMIS (health management information system) of MoHFW (Ministry of health and family welfare), Government of India and analysed with Stata and Microsoft office. This research study revealed that during COVID-19 era there is increase in prevalence of: 1) Total no. of deliveries-TD (HD + ID) registered per 100000 ANC registered. 2) Total number of institutional deliveries (ID) conducted (Including C-Sections) per 100000 Total deliveries. 3) Total number of home deliveries attended by SBA per 100000 HD. 4) Total number of newborns received 6 HBNC visits after Institutional Delivery per 100000 ID. 5) Total number of newborns received 7 HBNC in HD per 100000 HD. 6) Total number of PW given Tablet Misoprostol during HD per 100000 HD. This research study revealed that pandemic years have less number of home deliveries attended by SBA [(Skill Birth Attendant) (Doctor/Nurse/ANM/Midwife)] as well as there is also decrease in HD. This research study revealed that pandemic years have less number of home deliveries attended by SBA [(Skill Birth Attendant) (Doctor/Nurse/ANM/ Midwife)] may be due to less number of deliveries. There is a (projected) decrease of 37.28% in mean number of home deliveries attended by SBA in 2021 as compared to 2018. This novel research

study revealed that during pandemic years 2020 and 2021 all the variables reduced quantitatively except Number of PW given Tablet Misoprostol during HD which increased in 2020 (first pandemic year). The ongoing COVID-19 pandemic has had negative effects on Deliveries and Home Based New Born Care (HBNC) in India. More research is required to investigate the direct and indirect consequence of the pandemic on birth and provision of HBNC as well as the health facility type which are not performing well in providing respectful maternity care and newborn services during pandemic period. The facility-based research analysis is under process by the author which will be available in next version of this article.

KEYWORD

Home delivery; Institutional delivery; Newborn; Care; Pandemic year; COVID-19

INTRODUCTION

As per the previous estimates of UNICEF (United Nations International Children's Emergency Fund) about 116 million babies will be born within 40 weeks of ongoing COVID-19 pandemic, straining health systems as well as medical supply chains globally - was declared as a pandemic on March 11 [1]. Pregnant mothers as well as babies born during the ongoing COVID-19 pandemic are continued to be threatened by strained health systems involved in fighting with this novel disease. I assessed the effect of the ongoing pandemic on the Deliveries and Home-Based Newborn Care (HBNC) in India. The author is curious and suspects a rise in maternal and neonatal mortality due to possible negative effects of COVID-19 on maternal institutional delivery and HBNC. Hence author decided to find out answer to the research question mentioned as title above. Global containment measures like lockdowns etc; health centres overwhelmed with COVID-19 response efforts added with supply and equipment shortages and a lack of sufficient skilled birth attendants because health workers, including midwives, are redeployed to treat COVID-19 patients [1]. During this ongoing pandemic years countries expected with highest numbers of births during the 9 months since the declaration of pandemic are: 1) India (20.1 million) 2) China (13.5 million), 3) Nigeria (6.4 million), 4) Pakistan (5 million) and 5) Indonesia (4 million). As per available data most of these countries listed above had a high neonatal mortality rate (NMR) even before the COVID-19 pandemic and these levels may increase with COVID-19 situations [1]. Every year 25 million children are born in India accounting for one fifth of the global child births and every minute one baby dies. It is a fact that 46 per cent of all maternal mortality and 40 percent of neonatal mortality happen during labour or in the first 24 hours after birth [2]. This research study is significant as death can be reduced by provision of good delivery care at institution/health facilities by enabling access to SBA (Skilled birth attendants) and EMOC (Emergency obstetric care) services. Home based newborn care (HBNC) in the post-new-born period can improve survival rates with early and exclusive breastfeeding and immunizing newborn against vaccine preventable diseases [3,4].

Objective

The key aim of this research study was to find out the impact of COVID-19 pandemic years on Deliveries and Home-Based Newborn Care in India. To fulfil the aim of study the objective was to collect, analyse, interpret the data for the research question.

METHODS

Study Design

The researcher conducted a retrospective cross-sectional comparative study among total numbers of women and newborn who have received delivery and HBNC care in different ways at different health facilities in 36 states and union territories across India during the pandemic (comparing 2020 and 2021 (forecasted upto December 2021 with available data from January 2021 to May 2021) with previous two years of pre-pandemic era i.e., 2018-2019).

Setting

Location

All India across 36 states and union territories.

Study period

1st January 2018 to 31st December 2021 (forecast).

Exposure

To know the impact of COVID-19 pandemic years on delivery and HBNC the following indicators of mentioned period are included as operational definition to assess impact on Deliveries and Home-Based Newborn Care in this research analysis (Table 1):

Table 1: Indicators inclusion for operational definition to assess impact of COVID-19 on delivery and HBNC.

Variable	Period
Number of Home Deliveries Attended by Skill Birth Attendant (SBA) (Doctor/Nurse/ANM/Midwife)	1 st Jan 2018 - 31 st Dec 2021
Number of Home Deliveries Attended by Non-SBA (Trained Birth Attendant (TBA)/Relatives/etc.)	1 st Jan 2018 - 31 st Dec 2021
Number of PW given Tablet Misoprostol during Home Delivery	1 st Jan 2018 - 31 st Dec 2021
Number of Newborns Received 7 Home Based Newborn Care (HBNC) Visits in Case of Home Delivery	1 st Jan 2018 - 31 st Dec 2021
Number of Institutional Deliveries Conducted (Including C-Sections)	1 st Jan 2018 - 31 st Dec 2021
Out of Total Institutional Deliveries Number of Women Discharged within 48 Hours of Delivery	1 st Jan 2018 - 31 st Dec 2021
Number of Newborns Received 6 HBNC Visits after Institutional Delivery	1 st Jan 2018 - 31 st Dec 2021

Follow up - The data is continuously extracted, observed and investigated for specificity, measurability, accuracy, reproducibility and timeliness. The available data is forecasted with excel to reduce bias arising due to lack of data availability up to December 2021 from HMIS.

Data collection

The data is extracted from electronic records of HMIS (health management information system), MoHFW (Ministry of health and family welfare), and Government of India. For this retrospective cross-sectional study, available online data from HMIS is collected from January 2018 to May 2021 forecasted up to December 2021 with Microsoft excel utilizing available data of 2021. Newborn who utilized HBNC and deliveries reported during this period were included in this study. Data analyses including statistical analysis were done with Stata and Microsoft office software.

Participants

Eligibility criteria

The eligibility criteria are listed below in table 2 for participants in this research study. All the eligible participants are those who are reported by electronic records of HMIS (health management information system), MoHFW (Ministry of health and family welfare), and Government of India for variables mentioned in table 2 below.

Table 2: Eligibility criteria or criteria for inclusion.

Variable	Period
Home Deliveries Attended by Skill Birth Attendant (SBA) (Doctor/Nurse/ANM/Midwife)	1 st Jan 2018 - 31 st Dec 2021
Home Deliveries Attended by Non-SBA (Trained Birth Attendant (TBA)/Relatives/etc.)	1 st Jan 2018 - 31 st Dec 2021
PW given Tablet Misoprostol during Home Delivery	1 st Jan 2018-31 st Dec 2021
Newborns Received 7 Home Based Newborn Care (HBNC) Visits in Case of Home Delivery	1 st Jan 2018 - 31 st Dec 2021
Institutional Deliveries Conducted (Including C-Sections)	1 st Jan 2018 - 31 st Dec 2021
Out of Total Institutional Deliveries Number of Women Discharged within 48 Hours of Delivery	1 st Jan 2018 - 31 st Dec 2021
Newborns Received 6 HBNC Visits after Institutional Delivery	1 st Jan 2018 - 31 st Dec 2021

Source: Secondary data available from the electronic records of HMIS of MoHFW (Ministry of Health and Family Welfare), Government of India.

Method of selection

A purposive sampling is done by the author for the research question mentioned in title above. The sample is collected continuously from accredited national source of HMIS of MoHFW (Ministry of Health and Family Welfare), Government of India.

Variables

The variables for this research study are mentioned in table 1 and table 2 above.

Data sources/Measurements

Data Availability - For this novel study, accredited data is obtained from electronic records of HMIS of MoHFW (Ministry of Health and Family Welfare), Government of India. The link for the source is available below:

<https://hmis.nhp.gov.in/#!/standardReports>

Bias

To reduce the bias the data is projected up to December 2021 with the Microsoft excel software utilizing available data for 2021. For further reduction of Bias, the total number of pregnancy/HD/ID is taken into account (table 3). This will also show the trends of delivery and HBNC in the study period.

Table 3: Total and mean of pregnancy and delivery.

Period	Total No. of Pregnant Women Registered for ANC- Taken as Total Number of Pregnancy	Mean- No. of Pregnant Women	Total HD	Total ID	Total No. of Deliveries (HD + ID)	Mean- Total Number of Deliveries
Jan to Dec 2018	28715284	7178821	1453777	19388411	20842188	1736849
Jan to Dec 2019	29239176	7309794	1243190	20328254	21571444	1797620
Jan to Dec 2020	27331061	6832765	1077371	19298327	20375698	1697975
Jan to Dec 2021	21891305	1824275	807260	16057132	16864392	1405366

Study size

This research study size for different years is listed in above table number 3.

Quantitative variables

All the quantitative variables are listed in table 1 - table 3 above.

Statistical methods

Linear regression is used to forecast 2021 to predict future values from available past values of 2021.

RESULTS

Numbers of individuals at each stage of study

The total no. of pregnant women registered for ANC- Taken as total number of pregnancies for January to December 2018, January to December 2019, January to December 2020, and January to December 2021 was 28715284,29239176,27331061,21891305; respectively (table 4). This research study revealed that before start of pandemic in 2020, in which first case of COVID-19 was reported in India [3], year 2019 reported an increase in total amount of pregnancy. During pandemic years this research study revealed a decrease in this numbers of several variables under study (table 4 and table 5) (figure 1).

Table 4: Total numbers of quantitative variables under study in different years.

Period	Jan to Dec 2018	Jan to Dec 2019	Jan to Dec 2020	Jan to Dec 2021
Total No. of Pregnant Women Registered for ANC- Taken as Total Number of Pregnancies.	28715284	29239176	27331061	21891305
Total No. of Deliveries (HD+ ID).	20842188	21571444	20375698	16864392
Total Number of Institutional Deliveries Conducted (Including C-Sections).	19388411	19388411	19298327	16057132
Total HD.	1453777	1243190	1077371	807260
Total Number of Home Deliveries attended by SBA.	255814	228079	197151	160443.4
Total Home Deliveries Attended by Non-SBA.	1197963	1015111	880220	646816.6
Total (Out of total ID) Women Discharged within 48 Hours.	6803202	6890913	6483022	5382451
Total Number of PW Given Tablet Misoprostol During HD.	80621	74416	78722	63822.13
Total Number of Newborns Received 7 HBNC in HD.	938660	936941	891089	802483.6
Total Number of Newborns Received 6 HBNC Visits after Institutional Delivery.	6405013	7981529	8651475	8355130

There is a declining trend in No. of pregnant women registered for ANC- Taken as total number of pregnancies during pandemic years 2020 and 2021 as compared to pre-pandemic years. A similar trend was observed in all other variables in this research study except in 2020 1. Number of PW given Tablet Misoprostol during HD increased in number compared to previous year 2019 by 4306 and 5.78639 percent (%) 2. number of newborns received 6 HBNC visits after Institutional Delivery HD increased in number compared to previous year 2019 by 669946 numbers and 8.393705 percent (%) [5-8].

Table 5: Increase and decrease in numbers and percentage of different variables taking 2018 base year.

Period	Increase/Decrease 2019 to Previous Year 2018 - Numbers	Increase/Decrease 2020 to Previous Year 2019 - Numbers	Increase/Decrease 2021 to Previous Year 2020 - Numbers	Increase/Decrease 2019 to Previous Year 2018 Percent	Increase/Decrease 2020 to Previous Year 2019 - Percent	Increase/Decrease 2021 to Previous Year 2020 - Percent
Total No. of pregnant women registered for ANC- Taken as total number of pregnancies	523892	-1908115	-5439756	1.824436074	-6.52588	-19.9032

Mean- No. of pregnant women	130973	-477029	-5008490	1.824436074	-6.52589	-73.3011
Total HD	-210587	-165819	-270111	-14.48550913	-13.3382	-25.0713
Total ID	939843	-1029927	-3241195	4.847447271	-5.06648	-16.7952
Total No. of Deliveries (HD+ ID)	729256	-1195746	-3511306	3.498941666	-5.54319	-17.2328
Mean- Total Number of Deliveries	60771	-99645	-292609	3.498922474	-5.54316	-17.2328
Number of Home Deliveries attended by SBA	-27735	-30928	-36707.6	-10.84186167	-13.5602	-18.619
Home Deliveries attended by Non-SBA	-182852	-134891	-233403	-15.26357659	-13.2883	-26.5165
Number of PW given Tablet Misoprostol during HD	-6205	4306	-14899.9	-7.696505873	5.78639	-18.9272
Number of newborns received 7 HBNC in HD	-1719	-45852	-88605.4	-0.183133403	-4.8938	-9.9435
Number of Institutional Deliveries conducted (Including C-Sections)	900000	-1000000	-3200000	4.639175258	-4.92611	-16.5803
Out of total ID women discharged within 48 hours	87711	-407891	-1100571	1.289260557	-5.91926	-16.9762
Number of newborns received 6 HBNC visits after Institutional Delivery	1576516	669946	-296345	24.61378299	8.393705	-3.42537

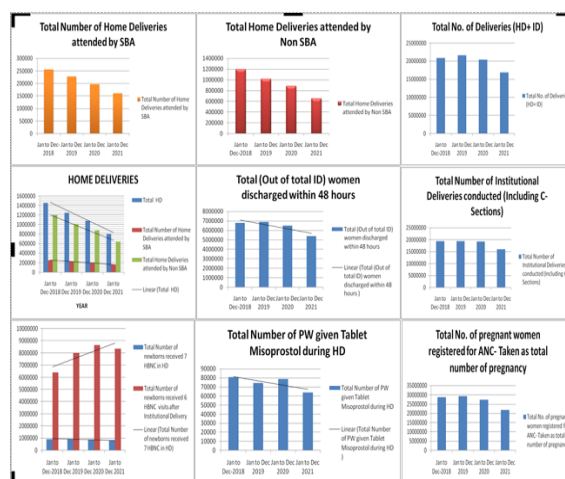


Figure 1: Comparisons and trends of different variables during pandemic and pre-pandemic years.

All variables have shown an increase in 2019 except: 1) Total HD; 2) Number of newborns received 7 HBNC in HD; 3) Home Deliveries attended by non-SBA; 4) Number of PW given Tablet Misoprostol during HD; 5) Number of Home Deliveries attended by SBA. This novel research study revealed that during pandemic years 2020 and 2021 all the variables reduced quantitatively except: 1) Number of PW given Tablet Misoprostol during HD; 2) Number of newborns received 6 HBNC visits after Institutional Delivery; 3) Total HD; 4) Home deliveries attended by non-SBA which increased little in 2020 (table 5) (figure 1) (first pandemic year). The statistical analysis of observation for years 2021, 2020, 2019 and 2018 is given (table 6 - table 9) and data for each year is given in (table 10 - table 13) [9].

Table 6: Summary- statistics-2021 (January to December).

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
No. of HD by SBA	12	13370.28	2235.476	10275.74	17301
No. of HD by non-SBA	12	53901.39	12868.63	36336.46	75810
No. given Misoprostol-HD	12	5318.511	811.0819	4141.267	6629
No. received7 HBNC-HD	12	66873.63	7590.975	60215.57	81396
No. of ID (including C-section)	12	1338094	195455.9	1207656	1826745
ID discharged <48 hours	12	448537.5	65624.69	401151	589308
No. received 6 HBNC-ID	12	696260.9	69886.11	646157.3	829656
Total Estimation - 2021					
Total Estimation	Number of Observations	=	12		
Variable	Total	Std. Err.	[95% Conf. Interval]		
No. of HD by SBA	160443.4	7743.915	143399.1	177487.6	
No. of HD by non-SBA	646816.6	44578.24	548700.6	744932.7	
No. given Misoprostol-HD	63822.13	2809.67	57638.09	70006.17	
No. received7 HBNC-HD	802483.6	26295.91	744606.7	860360.5	
No. of ID (including C-section)	1.61e+07	677079	1.46e+07	1.75e+07	
ID discharged <48 hours	5382451	227330.6	4882099	5882802	
No. received 6 HBNC-ID	8355130	242092.6	7822288	8887973	
C.I (Confidence Interval) Means - 2021					
Variable	Observation	Mean	Standard Error	[95% Conf. Interval]	
No. of HD by SBA	12	13370.28	645.3262	11949.93 14790.63	
No. of HD by non-SBA	12	53901.39	3714.853	45725.05 62077.72	
No. given Misoprostol-HD	12	5318.511	234.1392	4803.174 5833.848	
No. received7 HBNC-HD	12	66873.63	2191.326	62050.56 71696.71	
No. of ID (including C-section)	12	1338094	56423.25	1213908 1462281	
ID discharged <48 hours	12	448537.5	18944.22	406841.6 490233.5	
No. received 6 HBNC-ID	12	696260.9	20174.38	651857.4 740664.4	

The mean number of home deliveries attended by SBA [(Skill Birth Attendant) (Doctor/Nurse/ANM/Midwife)] during the pandemic year 2021 with total number of observations of 5 months forecasted up to December 2021 across India was 13370.28, for years 2020, 2019, 2018 it was 16429.25, 19006.58, 21317.83 respectively with total number of observations of 12 months across India for these three years.

Table 7: Summary- statistics-2020 (January to December).

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
No. of HD by SBA	12	16429.25	3373.569	8047	20183
No. of HD by non-SBA	12	73351.67	14621.01	33185	86457
No. given Misoprostol-HD	12	6560.167	1241.477	4251	8580
No. received7 HBNC-HD	12	74257.42	17327.82	28639	87890
No. of ID (including C-section)	12	1608194	197666.5	1219729	1849115
ID discharged <48 hours	12	540251.8	91445.49	364659	648151
No. received 6 HBNC-ID	12	720956.3	123371.7	461874	869027
Total Estimation - 2020 - Number of Observations = 12					
Variable	Total	Std. Err.	[95% Conf. Interval]		
No. of HD by SBA	197151	11686.38	171429.4	222872.6	
No. of HD by non-SBA	880220	50648.66	768743	991697	
No. given Misoprostol-HD	78722	4300.604	69256.43	88187.57	
No. received7 HBNC-HD	891089	60025.33	758974.1	1023204	
No. of ID (including C-section)	1.93e+07	684736.8	1.78e+07	2.08e+07	
ID discharged <48 hours	6483022	316776.5	5785802	7180242	
No. received 6 HBNC-ID	8651475	427372.2	7710835	9592115	
C.I (confidence interval) means – 2020					
Variable	Observation	Mean	Standard Error	[95% Conf. Interval]	
No. of HD by SBA	12	16429.25	973.8654	14285.79	18572.71
No. of HD by non-SBA	12	73351.67	4220.722	64061.92	82641.41
No. given Misoprostol-HD	12	6560.167	358.3837	5771.37	7348.964
No. received7 HBNC-HD	12	74257.42	5002.111	63247.84	85266.99
No. of ID (including C-section)	12	1608194	57061.4	1482603	1733785
ID discharged <48hours	12	540251.8	26398.04	482150.1	598353.5
No. received 6 HBNC-ID	12	720956.3	35614.35	642569.6	799342.9

This research study revealed that pandemic years have less number of home deliveries attended by SBA [(Skill Birth Attendant) (Doctor/Nurse/ANM/Midwife)]. There is a decrease of 37.28% in mean number of home deliveries attended by SBA in 2021 as compared to 2018. The details of data and statistical analysis are mentioned in table 6 - table 14 and the comparisons of various indicators are displayed in figure 1. The mean number of Number of Home Deliveries attended by non-SBA (Trained Birth Attendant (TBA)/Relatives/etc. during the pandemic year 2021 with total number of observations of 5 months forecasted up to December 2021 across India was 53901.39, for years 2020, 2019, 2018 it was 73351.66, 84592.58, 99830.25 respectively with total number of observations of 12 months across India for these three years. This research study revealed that pandemic years have less number of home deliveries attended by Non SBA (Trained Birth Attendant (TBA)/Relatives/etc. There is a decrease of 33.74 % in mean number of home deliveries attended by non-SBA in 2021 as compared to 2018.

The mean number of Number of PW given Tablet Misoprostol during home delivery during the pandemic year 2021 with total number of observations of 5 months forecasted up to December 2021 across India was 5318.511, for years 2020, 2019, 2018 it was 6560.16, 6201.33, and 6718.42 respectively with total number of observations of 12 months across India for these three years. This research study revealed that pandemic years have less number of PW given Tablet Misoprostol during home delivery. There is a decrease of 9.72% in mean Number of PW given Tablet Misoprostol during home delivery in 2021 as compared to 2018.

Table 8: Summary- statistics-2019 (January to December)

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
No. of HD by SBA	12	19006.58	1652.682	16387	20793
No. of HD by non-SBA	12	84592.58	6727.217	70630	91917
No. Given Misoprostol-HD	12	6201.333	531.5118	5253	6959
No. Received7 HBNC-HD	12	78078.42	7856.47	63616	87138
No. of ID (including C-section)	12	1694021	168219.1	1409794	1895697
ID Discharged <48 hours	12	574242.8	72415.95	443409	671254
No. Received 6 HBNC-ID	12	665127.4	85338.78	542151	781203
Total Estimation - 2019 Number of Observation = 12					
Variable	Total	Standard Error	[95% Conf. Interval]		
No. of HD by SBA	228079	5725.058	215478.2	240679.8	
No. of HD by non-SBA	1015111	23303.76	963819.8	1066402	
No. Given Misoprostol-HD	74416	1841.211	70363.52	78468.48	
No. Received7 HBNC-HD	936941	27215.61	877039.8	996842.2	
No. of ID (including C-section)	2.03e+07	582728	1.90e+07	2.16e+07	
ID Discharged <48 hours	6890913	250856.2	6338782	7443044	
No. Received 6 HBNC-ID	7981529	295622.2	7330869	8632189	
C.I (Confidence Interval) Means - 2019					
Variable	Observation	Mean	Standard Error	[95% Conf. Interval]	
No. of HD by SBA	12	19006.58	477.0882	17956.52	20056.65
No. of HD by non-SBA	12	84592.58	1941.98	80318.31	88866.85
No. Given Misoprostol-HD	12	6201.333	153.4342	5863.627	6539.04
No. Received7 HBNC-HD	12	78078.42	2267.967	73086.65	83070.18
No. of ID (including C-section)	12	1694021	48560.67	1587140	1800902
ID Discharged <48 hours	12	574242.8	20904.68	528231.8	620253.7
No. Received 6 HBNC-ID	12	665127.4	24635.18	610905.7	719349.1

Table 9: Summary- statistics-2018 (January to December).

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
No. of HD by SBA	12	21317.83	1730.307	19091	24266
No. of HD by non-SBA	12	99830.25	9646.946	84554	116307
No. Given Misoprostol-HD	12	6718.417	657.5543	5411	7564
No. Received7 HBNC-HD	12	78221.67	7188.477	68640	87132
No. of ID (including C-section)	12	1615701	176173.3	1363935	1856881
ID Discharged <48 hours	12	566933.5	73511.3	448374	660925
No. Received 6 HBNC-ID	12	533751.1	63534.34	440685	624944
Total estimation - 2018 Number of obs = 12					
Variable	Total	Std. Err.	[95% Conf. Interval]		
No. of HD by SBA	255814	5993.958	242621.4	269006.6	
No. of HD by non-SBA	1197963	33418	1124410	1271516	
No. Given Misoprostol-HD	80621	2277.835	75607.52	85634.48	
No. Received7 HBNC-HD	938660	24901.61	883851.9	993468.1	
No. of ID (including C-section)	1.94e+07	610282.2	1.80e+07	2.07e+07	
ID Discharged <48 hours	6803202	254650.6	6242720	7363684	
No. Received 6 HBNC-ID	6405013	220089.4	5920600	6889426	
C.I (Confidence Interval) means – 2018					
Variable	Observation	Mean	Standard Error	[95% Conf. Interval]	
No. of HD by SBA	12	21317.83	499.4965	20218.45	22417.22
No. of HD by non-SBA	12	99830.25	2784.833	93700.87	105959.6
No. Given Misoprostol-HD	12	6718.417	189.8196	6300.627	7136.207
No. Received7 HBNC-HD	12	78221.67	2075.135	73654.33	82789.01
No. of ID (including C-section)	12	1615701	50856.85	1503766	1727636
ID Discharged <48 hours	12	566933.5	21220.89	520226.6	613640.4
No. Received 6 HBNC-ID	12	533751.1	18340.78	493383.3	574118.9

The mean number of newborns who received 7 Home Based Newborn Care (HBNC) visits in case of home delivery during the pandemic year 2021 with total number of observations of 5 months forecasted up to December 2021 across India was 66873.63, for years 2020, 2019, 2018 it was 74257.42, 78078.42, and 78221.67 respectively with total number of observations of 12 months across India for these three years. This research study revealed that pandemic years have decreased number of newborns received 7 Home Based Newborn Care (HBNC) visits

in case of home delivery. There is a decrease of 6.47 % in mean Number of newborns received 7 Home Based Newborn Care (HBNC) visits in case of home delivery in 2021 as compared to 2018.

- The researcher is pointing out the fact that less number of different variables during pandemic years may be due less number of pregnancy and resultant deliveries during covid-19era. The prevalence rate discussed at end will clear the scenario.

The mean number of Institutional Deliveries (ID) conducted (including C-Sections) during the pandemic year 2021 with total number of observations of 5 months forecasted up to December 2021 across India was 1338094, for years 2020, 2019, 2018 it was 1608193.92, 1694021.12, and 1615700.92 respectively with total number of observations of 12 months across India for these three years. This research study revealed that pandemic years have less number of Institutional Deliveries conducted (including C-Sections). There is a decrease of 8.34 % in mean number of Institutional Deliveries conducted (including C-Sections) in 2021 as compared to 2018 [10].

The mean number of women discharged within 48 hours of delivery out of total ID during the pandemic year 2021 with total number of observations of 5 months forecasted up to December 2021 across India was 448537.5, for years 2020, 2019, 2018 it was 540251.83, 574242.75, and 566933.5 respectively with total number of observations of 12 months across India for these three years. This research study revealed that pandemic years have less number of women discharged within 48 hours of delivery out of total ID. There is a decrease of 12.32 % in mean number of women discharged within 48 hours of delivery out of total ID in 2021 as compared to 2018.

The mean number of newborns received 6 HBNC visits after Institutional Delivery during the pandemic year 2021 with total number of observations of 5 months forecasted up to December 2021 across India was 696260.9, for years 2020, 2019, 2018 it was 720956.25, 665127.42, and 533751.08 respectively with total number of observations of 12 months across India for these three years. This research study revealed that pandemic years have less number of newborns received 6 HBNC visits after Institutional Delivery. There is an increase of 40.03 % in mean number of newborns received 6 HBNC visits after Institutional Delivery in 2021 as compared to 2018.

Table 10: Prevalence of different study variables per 100000 in different years.

Period	Jan to Dec 2018	Jan to Dec 2019	Jan to Dec 2020	Jan to Dec 2021
Total No. of Pregnant Women Registered for ANC- Taken as Total Number of Pregnancies.	28715284	29239176	27331061	21891305
Total No. of Deliveries-TD (HD+ ID) Registered per 100000 ANC Registered.	72582.21092	73775.82734	74551.43436	77036.94229
Total Number of Institutional Deliveries (ID) Conducted (Including C-Sections) per 100000 Total Delivery.	93024.83501	89879.98671	94712.47071	95213.22797
Total HD per 100000 TD.	6975.164987	5763.128328	5287.529291	4786.772034
Total Number of Home Deliveries attended by SBA per 100000 HD.	17596.50896	18346.27048	18299.26738	19875.05884
Total Home Deliveries Attended by non-SBA per 100000 HD.	82403.49104	81653.72952	81700.73262	80124.94116
Total (Out of total ID) Women Discharged within 48 Hours per 100000 ID.	35089.01271	35541.40151	33593.6996	33520.62498
Total Number of PW Given Tablet Misoprostol during HD per 100000 HD.	5545.623572	5985.891135	7306.860868	7906.019126
Total Number of Newborns Received 7 HBNC in HD per 100000 HD.	64566.98655	75365.87328	82709.5773	99408.3195
Total Number of Newborns received 6 HBNC Visits after Institutional Delivery per 100000 ID.	33035.26524	41166.49374	44830.18139	52033.76294

The prevalence of total no. of deliveries-TD (HD+ ID) registered per 100000 ANC registered was 72582.21092, 73775.82734, 74551.43436, 77036.94229, for 2018, 2019, 2020 and 2021 respectively whereas prevalence for total number of Institutional deliveries (ID) conducted (Including C-Sections) per 100000 total delivery was 93024.83501, 89879.98671, 94712.47071, 95213.22797 for the years 2018, 2019, 2020 and 2021 respectively (table 10) (Figure 2 and Figure 3). Regarding total HD per 100000 TD the prevalence was 6975.164987, 5763.128328, 5287.529291, 4786.772034, and total Number of Home Deliveries attended by SBA per 100000 HD the prevalence were 17596.50896, 18346.27048, 18299.26738, and 19875.05884 for 2018, 2019, 2020 and 2021 respectively. Total Home Deliveries attended by non-SBA per 100000 HD was 82403.49104, 81653.72952, 81700.73262, 80124.94116, and total (Out of total ID) women discharged within 48 hours per 100000 ID were 35089.01271, 35541.40151, 33593.6996, 33520.62498, for 2018, 2019, 2020 and 2021 respectively. Total Number of PW given Tablet Misoprostol during HD per 100000 HD for 2018, 2019, 2020 and 2021 respectively was 5545.623572, 5985.891135, 7306.860868, 7906.019126, and total Number of newborns received 7 HBNC in HD per 100000 HD was 64566.98655, 75365.87328, 82709.5773, 99408.3195, respectively (table 10) (Figure 2 and Figure 3). The total Number of newborns received 6 HBNC visits after Institutional Delivery per 100000 ID was 33035.26524, 41166.49374, 44830.18139, 52033.76294, for 2018, 2019, 2020 and 2021 respectively. This research study revealed that during covid-19 era there is increase in prevalence of following:

- Total No. of Deliveries-TD (HD+ ID) registered per 100000 ANC registered.
- Total Number of Institutional Deliveries (ID) conducted (Including C-Sections) per 100000 Total deliveries.
- Total Number of Home Deliveries attended by SBA per 100000 HD.
- Total Number of newborns received 6 HBNC visits after Institutional Delivery per 100000 ID.
- Total Number of newborns received 7 HBNC in HD per 100000 HD.
- Total Number of PW given Tablet Misoprostol during HD per 100000 HD.

There is decrease in prevalence of following during covid-19 era:

- Total Home Deliveries attended by non-SBA per 100000 HD.
- Total HD per 100000 TD and Total (Out of total ID) women discharged within 48 hours per 100000 ID.

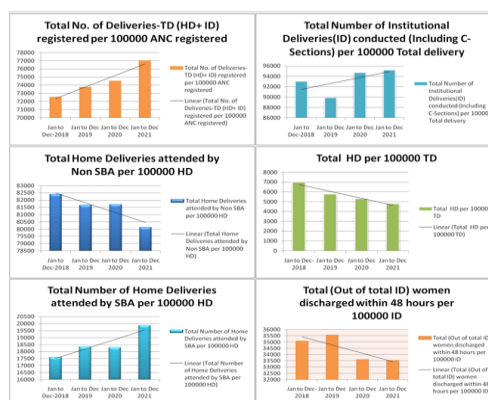


Figure 2: Comparison and trends of prevalence of different study variables per 100000 in different years.

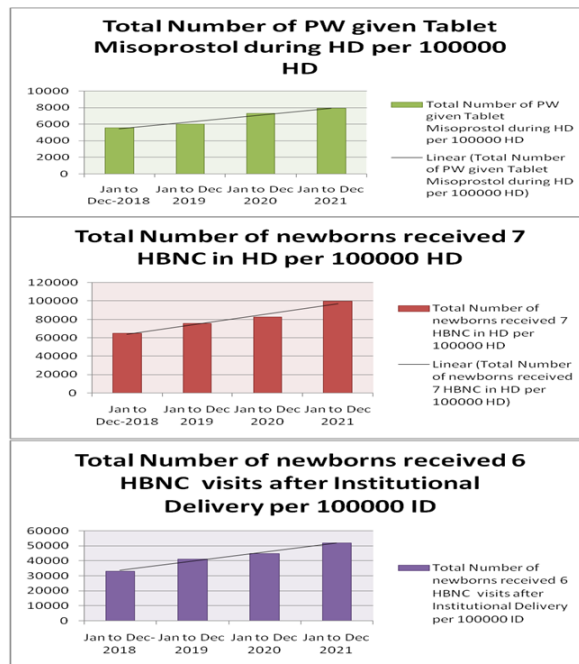


Figure 3: Comparison and trends of prevalence of different study variables per 100000 in different years.

DISCUSSION

Urgent attention and measures should be taken by government and policy makers to continue to provide maternal and newborn health services during ongoing COVID-19 pandemic. Government, policy makers should develop special need-based guidelines, interventions-for the pregnant women and newborn. Continuous monitoring and routinely checking -the existing facilities health service in different levels of hospitals i.e., from local to tertiary specialised and rural-urban-public- private clinics. Legal regulations and strict enforcements so that healthcare institutions cannot deny providing maternal and newborn services. Training and capacity building of the health workers including everyone and to sort out the barriers to access maternal-newborn health services during ongoing COVID-19. Raising awareness among PW and relatives about visiting health care facilities along with the positive behavioural change of the health workers to work in pandemic situations can help in mitigation of negative impacts of COVID-19.

Study Strength and Limitation

This is a novel cross-sectional retrospective research study based on accredited secondary data which was one of the limitations of this research study. Another limitation is data availability is not for latest time and date, hence it is forecasted using standard statistical method using excel. Accredited and established source of data recognized worldwide is not available for the same study anywhere else. The main strength is that the whole study is based on real time-based accredited government data sources and this kind of research study is unique and not available for the context of India or other countries as found by the researcher of this novel study.

CONCLUSION AND RECOMMENDATION

The ongoing COVID-19 pandemic has had less number of deliveries and hence less Home-Based newborn care (HBNC) in India. More research is required to investigate the direct and indirect consequence of the pandemic on birth and provision of HBNC as well as the health facility type which are not performing well in providing

respectful maternity care and newborn services during pandemic period. The facility-based research analysis is under process by the author which will be available in next version of this article. The author recommends following:

- Establishment of exclusive specialised birth centres as pregnant women feels usually worried about giving birth in multipurpose hospitals.
- Helping pregnant women to receive ANC checkups, delivery care, postnatal care, COVID-19 care as needed.
- Ensuring availability of skilled health workers with PPE (personal protective equipment), priority testing and vaccination so that they can deliver care to all pregnant women and newborn babies without spreading infection during the pandemic.
- Application of infection prevention and control measures in health facilities during childbirth and care immediately after.
- Raising awareness among pregnant women through home visits.
- Encouraging women and their relatives in remote areas to use maternal health facilities and HBNC
- Training, protecting and capacity building of health workers with clean birth kits for home births when health facilities are not available or closed.
- Allocating more resources to maternity and newborn services and supplies.
- Educating PW to protect themselves from exposure to COVID-19 and take advice from the designated health facility if experience symptoms.
- Seek medical care timely from accredited health facility and avoid jhola-chaap (fake medical practitioners) as well as quacks if they live in remote areas and have fever, cough or difficulty breathing.
- Continue breastfeeding their baby as the virus has not been found in samples of breast milk [4]. Wear a mask while feeding baby; wash hands; and routinely clean and disinfect surfaces; if not Covid positive continue to hold the newborn as well as perform skin-to-skin care.
- Ask designated doctor and health staff the safest place to give birth.
- Have a birth plan in advance to reduce stress and to ensure place on time.
- Routine immunizations, after the baby is born.

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ANNEXURE

Table 11: Total observation with forecast (Jun to Dec) for the year - 2021.

2021	Number of Home Deliveries attended by Skill Birth Attendant (SBA) (Doctor/Nurse/ANM/Midwife)	Home Deliveries in no. Attended by Non-SBA (Trained Birth Attendant (TBA) /Relatives/etc.)	Number of PW given Tablet Misoprostol during Home Delivery	Number of Newborns Received 7 Home Based Newborn Care (HBNC) Visits in Case of Home Delivery	Number of Institutional Deliveries Conducted (Including C-Sections)	Out of Total Institutional Deliveries Number of Women Discharged within 48 Hours of Delivery	Number of Newborns Received 6 HBNC Visits after Institutional Delivery
Jan-21	17301	75810	6629	81396	1615041	551895	829656
Feb-21	15975	70376	6434	78307	1452146	517895	781658
Mar-21	15791	68104	5826	77450	1826745	589308	817272
Apr-21	13263	53151	5251	62140	1247082	422764	656825
May-21	15125	63284	6189	66498	1263285	403324	651878
Jun-21	13336.22747	53727.38473	5353.22939	64972.17675	1290810.996	436629.3658	684528.3665
Jul-21	12899.79742	50847.59968	5191.408807	63609.23421	1252172.47	423582.2049	669984.7213
Aug-21	12356.961	47832.20161	5067.426715	63168.86238	1224416.143	409968.2942	655277.1404
Sep-21	12169.6793	46936.77135	4893.840417	62427.89444	1241652.183	414920.7519	659632.6303
Oct-21	11122.22832	41081.52452	4468.987951	61464.34617	1227940.099	408929.0559	655365.6287
Nov-21	10827.71983	39329.68095	4376.97079	60834.50528	1208184.943	402083.8468	646895.6104
Dec-21	10275.73918	36336.45906	4141.266552	60215.56907	1207656.2	401150.9866	646157.2941

Table 12: Observation for the year 2020.

Indicator	Number of Home Deliveries Attended by SBA	Home Deliveries Attended by Non-SBA	Number of PW given Tablet Misoprostol during HD	Number of Newborns Received 7 HBNC in HD	Number of Institutional Deliveries Conducted (Including C-Sections)	Out of total ID Women Discharged within 48 Hours	Number of Newborns Received 6 HBNC Visits after Institutional Delivery
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Total Jan 2020	17364	81458	6452	86904	1686421	564526	765405
Total Feb 2020	17321	75444	5690	84736	1534676	518676	738549
Total Mar 2020	14060	67611	5134	76170	1527869	511141	695368
Total April 2020	8047	33185	4251	28639	1219729	364659	461874
Total May 2020	14364	66359	5763	60682	1395381	435889	584777
Total Jun 2020	14946	67389	6253	64834	1409429	442182	618175
Total Jul 2020	15200	71088	6724	66954	1576238	517349	665568
Total Aug 2020	19355	80333	7479	75412	1725793	603254	740827
Total Sep 2020	20183	86457	8580	85804	1811424	648151	798730
Total Oct 2020	19388	84215	7991	86738	1849115	643160	852982
Total Nov 2020	18412	85274	7567	87890	1813584	627710	860193
Total Dec 2020	18511	81407	6838	86326	1748668	606325	869027

Table 13: Observation for the year 2019.

Indicator	Number of Home Deliveries Attended by SBA	Home Deliveries Attended by Non-SBA	Number of PW given Tablet Misoprostol during HD	Number of Newborns Received 7 HBNC in HD	Number of Institutional Deliveries Conducted (Including C-Sections)	Out of total ID Women Discharged within 48 Hours	Number of Newborns received 6 HBNC Visits after Institutional Delivery
Total Jan 2019	20559	90459	6959	77446	1660316	586521	609397
Total Feb 2019	19620	89852	6239	77616	1472340	523286	578978
Total March 2019	20325	91917	6504	80964	1717500	566155	614187
Total April 2019	16395	70630	5253	63616	1409794	443409	542151
Total May 2019	16387	75644	5370	67538	1544936	494842	581991
Total Jun 2019	17670	78944	5556	70976	1548487	501656	614269
Total Jul 2019	17582	82948	6255	72506	1710352	567274	662672
Total Aug 2019	20793	90982	6288	82663	1895697	671254	727880
Total Sep 2019	20572	88290	6305	85882	1871061	660643	760083
Total Oct 2019	20213	88023	6681	85424	1879063	652288	781203
Total Nov 2019	19661	85232	6490	85172	1848889	624935	752457
Total Dec 2019	18302	82190	6516	87138	1769819	598650	756261

Table 14: Observation for the year 2018.

Indicator	Number of Home Deliveries Attended by SBA	Home Deliveries Attended by Non-SBA	Number of PW given Tablet Misoprostol during HD	Number of Newborns Received 7 HBNC in HD	Number of Institutional Deliveries Conducted (Including C-Sections)	Out of Total ID Women Discharged within 48 Hours	Number of Newborns Received 6 HBNC Visits after Institutional Delivery
Total Jan 2018	24266	116307	7564	85372	1537515	580841	495132

Total Feb 2018	22174	105130	6770	81164	1414812	533569	480260
Total March 2018	22682	104756	6826	83942	1559206	556698	505544
Total April 2018	19091	84554	5411	68640	1363935	448374	440685
Total May 2018	19981	89514	5599	69383	1479816	485796	478596
Total Jun 2018	19993	91476	6225	70263	1455342	478528	492563
Total Jul 2018	20255	95981	7194	74076	1590046	543513	512433
Total Aug 2018	21100	100816	7054	76342	1795922	643962	551799
Total Sep 2018	23731	110616	7066	87132	1845585	660925	596423
Total Oct 2018	22394	105652	7189	85570	1856881	660268	622508
Total Nov 2018	21046	103762	7084	85039	1802810	641385	624944
Total Dec 2018	19101	89399	6639	71737	1686541	569343	604126