

Effect of COVID-19 pandemic on utilization of maternal healthcare services in a rural area of Haryana – A record-based comparative study

Tejbeer Singh¹, Ravneet Kaur¹, Shashi Kant¹, Kalaivani Mani², Kapil Yadav¹, Sanjeev Kumar Gupta¹

¹Centre for Community Medicine, All India Institute of Medical Sciences, New Delhi, Delhi, India, ²Department of Biostatistics, All India Institute of Medical Sciences, New Delhi, Delhi, India

ABSTRACT

Background: The COVID-19 pandemic posed a challenge for the public health system, as all the health facilities and manpower were diverted for the delivery of COVID-19-related services. This affected the provision of routine health services, including maternal healthcare services. There is a paucity of data from rural and primary healthcare settings, as the earlier studies were either modelling-based or from tertiary care centres. **Materials and Methods:** This record-based study was conducted in 12 subcentres in the district Faridabad of Haryana. Data of pregnant women registered during 1 April to 30 September in the years 2017–2020 were retrieved. The utilization of maternal healthcare services among women registered during 1 April 2020 to 30 September 2020 was compared with those registered in the same period during the preceding 3 years (2017–2019). **Results:** There was a significant decline in utilization of maternal healthcare services. Services like minimum four antenatal visits declined from 67.8% to 48.3% ($P < 0.0001$), at least 100 iron-folic acid tablets (45.4–20.9%; $P < 0.001$), and examination at each visit (90.8–72.3%; $P < 0.001$). The proportion of pregnant women who received full antenatal care decreased from 26.0% to 10.7% ($P < 0.001$). There was a significant increase in delivery in private health facilities (40.9–49.9%) and delivery by caesarean section (21.6–27.3%; $P = 0.002$). **Conclusion:** COVID-19 pandemic had an adverse effect on utilization of maternal healthcare services. Effective planning and coordination between different levels of government health facilities and primary care providers, including family physicians, can ensure uninterrupted provision of essential services during similar emergencies in future.

Keywords: COVID-19, maternal healthcare services, primary, rural, utilization

Introduction

On 27 January 2020, India reported its first COVID-19 case, which was followed by a rapid increase in the number of cases during the next 2 months. As a containment measure, national lockdown was declared by the government on 24 March 2020.^[1]

Address for correspondence: Dr. Ravneet Kaur, Centre for Community Medicine, All India Institute of Medical Sciences, Ansari Nagar, New Delhi - 110 029, Delhi, India. E-mail: ravneetk08@gmail.com

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This posed a challenge for the public health system in the country as all the health facilities and manpower were diverted for delivery of COVID-19-related services, which affected the provision of routine health services. The lockdown not only caused restricted mobility of people, including visits to healthcare facilities, but also led to shortages of drugs and equipment and lack of skilled birth attendants.^[2,3] Delivery of essential antenatal care (ANC) and delivery services was also adversely affected during the pandemic.

According to the World Health Organization, 32% of facility-based delivery services and 53% of ANC services in

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105 countries experienced partial disruptions.^[4] Estimates by the Guttmacher Institute suggest that even a moderate decrease of 10% in coverage of pregnancy-related and neonatal healthcare could result in an additional 28,000 maternal deaths and 168,000 neonatal deaths globally.^[5] An analysis of 118 nations indicated that a 15% reduction in coverage for 6 months could result in 253,500 more child deaths and 12,200 more maternal deaths, while a 45% reduction would cause 1,157,000 more child deaths and 56,700 additional maternal deaths.^[6] Most of the previous studies, however, were either based on modelling or had been conducted among pregnant women admitted in tertiary care centres for delivery, whose details regarding utilization of services were compared with previous years. Only a few studies have been conducted in primary healthcare settings, where the actual use of maternal healthcare services was assessed.

Primary care physicians are the first point of contact for providing essential healthcare to people living in rural areas. During the COVID-19 pandemic, primary care providers and family physicians played a vital role in providing essential health services.^[7] Integrating primary care providers and family physicians with the government health system may improve the delivery of health services. Sharing of evidence regarding status of service delivery during the pandemic, with all stakeholders, may facilitate this integration. Hence, we conducted this study in primary healthcare settings in a rural area of Haryana to compare the utilization of maternal healthcare services during the first wave of COVID-pandemic (1 April 2020–30 September 2020) with the utilization in the same months during the previous 3 years (2017–2019).

Materials and Methods

Study design: It was a record-based study. Antenatal registers maintained at the subcentres (SCs) were the source of data.

Study area: The study area was composed of 12 SCs under 2 primary health centres (PHCs) – PHC Chhainsa and PHC Dayalpur. These PHCs catered to a population of nearly 100,000 individuals residing in 28 villages in Ballabgarh block of the district Faridabad, in Haryana state of northern India.

Each SC had at least two health workers who visited every household situated in the area catered by their respective SC, once a month, according to a prefixed beat schedule. The schedule of visits was designed to allow a gap of 15 days between the visits by the male and female workers. Thus, each household was visited by a health worker approximately every 2 weeks. These workers recorded all the vital events and health-related issues in the household. The health workers were supervised by the health supervisors and the medical officers (MOs) of the PHC. Data thus collected were entered every month in a health management information system (HMIS), which was a computerized database of all the individuals residing in the study area.^[8]

Operational definitions

Maternal healthcare services: Services provided to a woman during pregnancy, childbirth, and postnatal period.^[9]

Full ANC: It included early all of the following, that is, registration of pregnancy before 12 weeks, minimum four antenatal visits, recording of haemoglobin, blood pressure and weight on each ANC visit, tetanus toxoid (TT) immunization as indicated, and receiving at least 100 iron folic acid (IFA) tablets.^[10]

Recommended TT doses: Two doses of TT at least 1 month apart in case of first pregnancy or if the difference between two pregnancies was more than 3 years and one dose if the difference between two pregnancies was less than 3 years.^[10]

Delayed registration: Registration of pregnancy after 12 weeks of gestation.^[10]

Source of data

ANC registers: These registers were maintained routinely by the health workers. Information of all pregnant women identified during the house-to-house visits was entered in the ANC register. These women were encouraged to visit the weekly ANC clinic held in the SC. At each antenatal visit, the details of the visit were recorded in this register. In addition, information regarding childbirth and postnatal care was gathered during the domiciliary visits and was entered in this register.

Information available in the ANC register included:

- Sociodemographic details (unique ID, name, age, husband's name, caste)
- Obstetric details (date of registration, last menstrual period [LMP], expected date of delivery, past obstetric history, high-risk factors [if any] during previous or current pregnancy)
- Details of each visit (height, weight, haemoglobin, urine albumin, urine sugar, blood group, blood pressure, doses of TT, IFA tablets dispensed)
- Details of childbirth (place and type of delivery)

Method of data collection

All the 12 subcentres were visited and the antenatal registers were reviewed. Records of all pregnant women registered during the period of 1st April to 30th September from the years 2017–2020 were abstracted from the ANC registers. The reference period for antenatal, childbirth, and postnatal services coincided with the COVID-19 lockdown in the year 2020 (1st April to 30th September 2020). Details such as date of LMP, date of registration, number of antenatal visits, date and number of TT injections, examination during antenatal visit, number of IFA tablets given, and details of childbirth such as place of delivery and type of delivery were recorded in EpiCollect v5 mobile application. The data were then exported to Microsoft Excel 2019.

Statistical analysis

Data were analysed using Stata v15.2 (Stata Corp LLC 4905, College Station, Texas, USA). The utilization of services was reported as a proportion and compared with the mean utilization in the previous 3 years. Z-test for difference in proportions was applied, and P value < 0.05 was considered significant.

Ethical considerations

The study was approved by the Ethics Committee of the Institute (ref. no. 634/25.11.2020). The personal identifiers were removed before data entry. All information collected was kept confidential.

Results

The total number of pregnant women registered between 1st April and 30th September was 1078, 1073, 1080 and 1047 for the year 2017, 2018, 2019 and 2020, respectively. Table 1 shows utilization of maternal healthcare services in the study area. The number of women with early registration was 670 (62.2%) in 2017 and 631 (58.8%) in 2018. The early registration increased to 681 (63.1%) during 2019 but again decreased to 635 (60.6%) in 2020. The percentage of pregnant women with more than four ANC visits was 71.1%, 69.4%, 62.9% and 48.3% in the years 2017, 2018, 2019 and 2020, respectively. In 2017, 33 (58.7%) women received timely first TT dose. In 2018 and 2019, 639 (59.6%) and 646 (59.8%) women received timely first TT dose, respectively. This decreased to 948 (90.5%) during 2020. The number of women who got the recommended number of TT doses was 1036 (96.1%) in 2017, 1008 (93.9%) in 2018, 998 (92.4%) in 2019 and 948 (90.5%) in 2020. The number of pregnant women who received at least 100 IFA tablets during 2017 was 553 (51.3%), 491 (45.8%) during 2018, 424 (39.3%) during 2019 and 219 (20.9%) during 2020.

In 2017, 993 (92.1%) of women got examined during each visit, while in 2018 and 2019, it was 960 (89.5%) and 981 (90.8%), respectively, which decreased to 757 (72.3%) in 2020.

Number of women who delivered during 2017 to 2020 was 997, 972, 971 and 930, respectively. In 2017, 196 out of 997 (19.7%) women delivered by caesarean section, while it was 20.9%, 24.2% and 27.3% in the years 2018, 2019 and 2020, respectively. Although there were only 12 home deliveries in 2017, 8 in 2018, 17 in 2019 and 13 in 2020, the proportion of deliveries in private hospital was 37.4%, 42.9%, 41.8% and 49.9% in the years 2017, 2018, 2019 and 2020, respectively. Thus, there was a rise in number of deliveries in private hospital during COVID-19 as compared to previous years.

Table 2 shows the comparison of mean of proportions of various maternal healthcare services in 2017–2019 with the proportion during 2020. The mean number of pregnant women who had at least four ANC visits decreased significantly from 730 (67.8%) to 506 (48.3%) with a P value of < 0.0001 . The percentage of pregnant women who received timely TT reduced significantly from 730 (67.8%) to 506 (48.3%) ($P = 0.017$). Also, the proportion of pregnant women who received recommended number of TT doses decreased significantly from a mean of 639 (59.4%) to 568 (54.3%) ($P = 0.002$). The number of women who received at least 100 IFA tablets also decreased from a mean of 489 (45.4%) to 219 (20.9%) with P value < 0.0001 . There was a significant decrease in proportion of women who got examined during each antenatal visit from 978 (90.8%) to 757 (72.3%) in the year 2020 ($P < 0.0001$). The proportion of pregnant women who received full ANC also decreased from 280 (26.0%) to 112 (10.7%). This difference was statistically significant ($P < 0.001$). The mean number of women who had caesarean section increased from 211 (21.6%) to 254 (27.3%) in 2020, and it was statistically significant ($P = 0.002$). The mean number of women who delivered in a private hospital also increased significantly from 401 (40.9%) to 464 (49.9%) ($P < 0.001$).

Discussion

We found that there was a significant decline in the utilization of maternal healthcare services during COVID-19 pandemic as

Table 1: Utilization of various maternal healthcare services during 2017–2020 (1 April to 30 September)

Variable	Pre-COVID years			COVID year
	2017 n=1078 (%)	2019 n=1080 (%)	2018 n=1073 (%)	2020 n=1047 (%)
Early registration (<12 weeks)	670 (62.2)	681 (63.1)	631 (58.8)	635 (60.6)
At least four antenatal visits	766 (71.1)	679 (62.9)	745 (69.4)	506 (48.3)
Timely 1 st dose of tetanus toxoid (TT)	633 (58.7)	646 (59.8)	639 (59.6)	568 (54.3)
Receipt of required TT doses	1036 (96.1)	998 (92.4)	1008 (93.9)	948 (90.5)
>100 IFA tab	553 (51.3)	424 (39.3)	491 (45.8)	219 (20.9)
Examination done at each visit	993 (92.1)	981 (90.8)	960 (89.5)	757 (72.3)
Full antenatal care	315 (29.2)	263 (24.4)	261 (24.3)	112 (10.7)
Total number of deliveries	n=997	n=971	n=972	n=930
Caesarean delivery	196 (19.7)	235 (24.2)	203 (20.9)	254 (27.3)
Home delivery	12 (1.2)	17 (1.8)	8 (0.8)	13 (1.4)
Private hospital	367 (37.4)	402 (41.8)	413 (42.9)	464 (49.9)

Table 2: Comparison of utilization of various maternal healthcare services in 2020 with the mean of the preceding 3 years

Variable	Pre-COVID years	COVID year	P (Z-test)
	Mean 2017–2019 n=1077 n (%)	2020 n=1047 n (%)	
Early registration (<12 weeks)	661 (61.3)	635 (60.6)	0.74
At least four antenatal visits	730 (67.8)	506 (48.3)	<0.0001
Timely 1st dose of tetanus toxoid (TT)	639 (59.4)	568 (54.3)	0.017
Receipt of required TT doses	1014 (94.2)	948 (90.5)	0.002
At least 100 IFA tab	489 (45.4)	219 (20.9)	<0.0001
Examination done at each visit	978 (90.8)	757 (72.3)	<0.0001
Full antenatal care	280 (26.0)	112 (10.7)	<0.001
Type of delivery	n=980	n=930	
Normal delivery	769 (78.4)	676 (72.7)	
Caesarean section	211 (21.6)	254 (27.3)	0.002
Place of delivery	n=980	n=980	
Home delivery	12 (1.2)	13 (1.4)	0.38
Private hospital	401 (40.9)	464 (49.9)	<0.001

P values in bold indicate a statistically significant difference

compared to the preceding 3 years. Services such as having at least four antenatal visits delayed first TT dose during antenatal period, receiving at least 100 iron and folic acid tablets and getting examined at each antenatal visit to healthcare facility were significantly reduced.

Similar findings were reported in other studies done during the COVID-19 pandemic regarding utilization of maternal healthcare services in India and other countries. In a record-based study conducted by Wanyana *et al.* (2021) in Rwanda, a significant decrease in number of antenatal visits was reported.^[11] Kassie *et al.* (2021) also reported a significant decline in utilization of ANC services and institutional delivery among women who visited healthcare facilities in Ethiopia.^[12]

A systematic review and meta-analysis of 21 studies conducted in Ethiopia by Mekonnen *et al.* (2023) reported a significant reduction (19.3%) in use of pregnancy care services, 12.8% decrease in institutional delivery and 17.8% decline in postnatal care.^[13]

In a hospital-based study conducted by Goyal *et al.* (2021) in Jodhpur, and in various health facilities in Uttar Pradesh by Singh *et al.* (2021), reduction in number of admissions, fewer antenatal visits and a decline in institutional deliveries have been reported.^[14,15] Kumari *et al.* (2020) reported reduction in admission and increase in caesarean section rate in hospitals in western India.^[16] In our study, we also found that the proportion of caesarean sections increased significantly during the study period as compared to the corresponding period in the preceding 3 years. Similar findings were reported by Bhatia *et al.* (2020) in north-west England^[17] and Bish t *et al.* (2020) in Pune, India.^[18]

In a secondary analysis of routinely collected data from HMIS of 28 states of India, Sharma *et al.* (2023) reported a significant decline

in ANC registrations and emergency obstetric care, and marginal increase in home deliveries during the COVID-19 pandemic.^[19]

We found that the number of deliveries in private hospitals during COVID-19 increased significantly as compared to the mean of the previous 3 years. The reason for the same can be explained by the fact that a negative COVID-19 test report was mandatory for availing services at government health facilities. In public health facilities, women without the test report were either referred elsewhere or asked to bring the same to get admitted. However, private hospitals used to perform the test by themselves. Hence, many women went to private hospitals for childbirth. Similar findings were reported by Hailemariam *et al.* (2021) in a community-based study in Ethiopia.^[20]

Our study had few limitations. Due to the record-based design, we could not identify barriers and facilitators for utilizing the services during the COVID-19 pandemic. A qualitative study design would be better to gain an in-depth understanding of this issue from the beneficiaries' perspective.

However, we believe that the quality of data used in this study was reasonably good, as ANC registers were used as source of data for comparison of services with previous years. These registers were maintained regularly by domiciliary visits by health workers and were verified by health supervisors and MOs of the PHC.

Our study is one of the few studies conducted at primary healthcare level. The study provides information regarding utilization of services among women at village and SC level. We found a significant decline in utilization of essential healthcare services. However, studies conducted in various countries have shown that family physicians played a significant role in provision of comprehensive health services during the COVID-19 pandemic. The patients relied heavily on family physicians, be it

virtual consultation, health education, counselling or measures to reduce stigma and anxiety.^[7,21]

In addition to being competent in providing primary healthcare services, family physicians have a unique advantage of being closely associated with the families they serve. Hence, they can play an important role in maintaining continuity of services during public health emergencies. Integration of primary care providers with the existing government health system may overall improve the delivery of healthcare services.^[22]

Conclusion

COVID-19 pandemic had an adverse effect on utilization of maternal healthcare services in the study area. A comprehensive analysis of health systems during pandemic, effective planning and integration between different levels of government health facilities and primary care clinicians, including family physicians, can ensure uninterrupted delivery of essential services, such as maternal healthcare services during similar challenges in future.

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Conflicts of interest

There are no conflicts of interest.

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