

COVID-19-related disruptions to routine vaccination services in India: a survey of paediatric providers

Anita Shet ¹, Baldeep Dhaliwal ¹, Preetika Banerjee,¹ Kelly Carr,¹ Andrea DeLuca,² Carl Britto,³ Rajeev Seth,⁴ Bakul Parekh,⁵ Gangasamudra V Basavaraj,⁵ Digant Shastri,⁵ Piyush Gupta⁵

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¹International Health, Johns Hopkins University Bloomberg School of Public Health, Baltimore, Maryland, USA

²Amputee Coalition of America, Knoxville, Tennessee, USA

³Infectious Disease Research Unit, St John's National Academy of Health Sciences, Bangalore, Karnataka, India

⁴Bal Umang Drishya Sanstha (BUDS), New Delhi, India

⁵Indian Academy of Pediatrics, Navi Mumbai, Maharashtra, India

Correspondence to

Dr Anita Shet; ashet1@jhu.edu

ABSTRACT

The COVID-19 pandemic has led to disruptions in essential health services globally. We surveyed Indian paediatric providers on their perceptions of the impact of the pandemic on routine vaccination. Among 424 (survey 1) and 141 (survey 2) respondents representing 26 of 36 Indian states and union territories, complete suspension of vaccination services was reported by 33.4% and 7.8%, respectively. In April–June 2020, 83.1% perceived that vaccination services dropped by half, followed by 32.6% in September 2020, indicating slow resumption of services. Concerns that vaccine coverage gaps can lead to mortality were expressed by 76.6%. Concerted multipronged efforts are needed to sustain gains in vaccination coverage.

Introduction: Essential health services, including routine childhood immunisations, have been significantly affected by the COVID-19 pandemic.^{1,2} The nationwide lockdown in India, which was implemented on 24 March 2020, possibly slowed the spread of the SARS-CoV-2 virus and averted deaths due to COVID-19.³ However the lockdown also resulted in severe movement restrictions and was associated with disruptions in healthcare service provision and health-seeking activities.⁴ In order to study how COVID-19 control measures may have impacted routine vaccination during this period, we surveyed paediatric healthcare providers in India at two timepoints, during and after the lockdown. The survey assessed the degree of disruption to vaccination services, explored barriers to healthcare provision and identified innovative ways to regain losses in vaccination coverage.

Methods: The surveys were jointly developed by the Johns Hopkins Bloomberg School of Public Health and the Indian Academy of Pediatrics. Survey 1 (April–June 2020) and survey 2 (September 2020) (online supplemental appendix 1) were launched virtually using Qualtrics and distributed to a network of paediatricians and other care providers.

Surveys were anonymous, and distribution took place via email, text messages, telephone, in person and social media platforms such as WhatsApp. Results represented paediatricians' perceptions about vaccination services and were analysed using Stata V.15.1.

Results: Survey 1 and survey 2 recorded 424 and 141 responses, respectively, representing 21 Indian states. Majority of the respondents (96.0% and 92.9%, respectively) were paediatricians who worked in predominantly urban and private healthcare centres (table 1). Complete or partial suspension of immunisation services at their respective centres was perceived by 33.4% (142 of 424) of respondents. In survey 1 (April–June 2020), vaccination services dropped by over half in 83.1%, followed by 32.6% in survey 2 (September 2020). Interruption of vaccine campaigns for measles, rubella and polio was reported by 37.7% (160 of 424). Only 38.7% (164 of 424) of the respondents reported having a plan for catch-up vaccination once these restrictions were eased.

Notable supply-side (healthcare availability) barriers included low availability of healthcare workers, financial constraints and limited supplies such as personal protective equipment (figure 1). Barriers to caregiver vaccine uptake included low awareness of

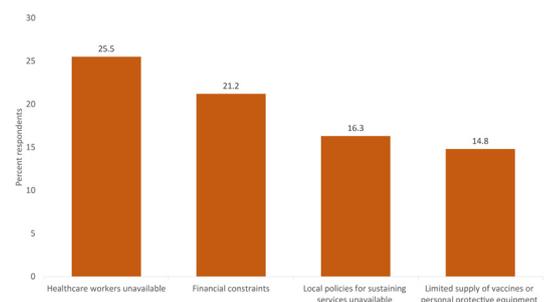


Figure 1 Reported supply-side barriers to routine immunisation services, survey 2 (September 2020).

Table 1 Survey respondents' characteristics and perceptions around routine vaccination in the context of COVID-19, April–June 2020 (survey 1) and September 2020 (survey 2)

	Survey 1 n=424 n (%)	Survey 2 n=141 n (%)
Medical specialty		
Paediatrician or primary care physician	408 (96.2)	136 (96.5)
Public health researcher/policy worker	5 (1.2)	3 (2.1)
Missing	11 (2.6)	2 (1.4)
Participated in survey 1	N/A	60 (42.6)
Institution/organisation type		
Public	32 (7.5)	28 (19.8)
Private	369 (87.0)	102 (72.3)
Missing/other	23 (5.4)	11 (7.8)
Location type		
Urban	363 (85.6)	104 (73.7)
Rural and semirural	24 (5.6)	35 (24.8)
Missing	37 (8.7)	2 (1.4)
Current volume of those seeking childhood vaccines (as proportion of the prepandemic volume)		
80%–100%	7 (1.8)*	28 (19.8)
50%–79%	25 (6.3)*	28 (19.8)
25%–50%	168 (42.4)*	35 (24.8)
<25%	161 (40.7)	11 (7.8)
Missing	35 (8.8)	39 (27.7)
Reported barriers to caregiver demand		
Unaware services are available	91 (21.4)	33 (23.4)
Only coming in for emergencies	73 (17.2)	N/A†
Transportation barriers	165 (38.9)	47 (33.3)
Afraid of contracting COVID-19	176 (41.5)	91 (64.5)
Financial constraints	N/A	48 (34.0)
Awareness and availability of a catch-up vaccination plan		
Yes	164 (38.7)	39 (27.6)
No	75 (17.6)	30 (21.2)
Don't know	108 (25.4)	60 (42.5)
Missing	77 (18.1)	12 (8.5)
What is the long-term impact of pandemic disruptions?		
No impact	16 (3.7)	4 (2.8)
Temporary vaccine coverage gap	203 (47.9)	108 (76.6)
Vaccine-preventable outbreaks	137 (32.3)	35 (24.8)

Continued

Table 1 Continued

	Survey 1 n=424 n (%)	Survey 2 n=141 n (%)
Reduced health services leading to non-COVID-19 illness and death	116 (27.3)	40 (28.3)

*This question was asked to a subset of respondents and hence the denominator was 396.

†Not applicable as the question was not asked.

N/A, not applicable.

service availability, transportation limitations, fear of contracting COVID-19 from clinical settings and financial constraints (table 1). While 61.7% (87 of 141) of the respondents were aware of guidelines on safe provision of vaccinations during the COVID-19 pandemic, 42.5% (60 of 141) were unaware of national vaccination catch-up programmes. Perceptions that lockdown consequences would result in a vaccine coverage gap persisted in 76.6% of the respondents. Reported suggestions for catch-up vaccinations included special campaigns, localised communications, door-to-door outreach campaigns, text messaging of immunisation campaigns, and implementing affordable or free immunisation visits.

Discussion: Paediatricians and primary care providers in India indicated that substantial vaccination service disruptions were ongoing in 2020 and expressed concerns about the long-lasting impact of pandemic-related health access barriers. This study was limited by a small sample size and potential selection bias. The high proportion of private practitioners in the survey is not representative of national immunisation coverage, which is predominantly offered by the public health sector in India.⁵ Nevertheless, a majority of Indian states were represented, and early recovery of disruptions seen in the private sector would be reflected in the public sector as well. Similar reports from global surveys indicated substantial disruptions of vaccination services in many countries.⁶ While India has made tremendous progress in reducing vaccination inequities in recent years,⁷ these gains are now at risk of backsliding as a result of pandemic-related disruptions. The way forward should include an increased focus on catch-up campaigns, strong government engagement, effective surveillance and clear public health messaging, as these are critical to restoring immunisation and essential services for women and children.

Contributors AS, BD and DS conceived the study with contributions from BP, GVB and PG. BP, PB and ADL developed the study instruments and planned and conducted the study. PB, BD and KC managed the data and conducted analysis of the data. CB and RS, along with DS, BP, GVB and PG, provided critical review of the instruments and conducted pilot testing. AS, BD and PB prepared the first draft of the manuscript. All authors reviewed the drafts of this manuscript and approved the final version for submission.

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Competing interests None declared.



Patient and public involvement statement This was a survey of professionals and no patients were involved.

Patient consent for publication Not required.

Ethics approval This study was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board (IRB) under IRB submission number 12405. The IRB determined that proposed activities were 'key informant research' as opposed to 'human subjects research' and determined that the study did not require IRB oversight.

Provenance and peer review Not commissioned; externally peer reviewed.

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ORCID iDs

Anita Shet <http://orcid.org/0000-0002-7204-8164>

Baldeep Dhaliwal <http://orcid.org/0000-0001-5021-3432>

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Impact on Routine Vaccination Services in the era of COVID-19: Round 1

Survey Round 1

Start of Survey

Introduction **Impact on Routine Vaccination Services in the era of COVID-19** Nations all over the world are implementing measures to mitigate the spread of the COVID-19 pandemic. While the global scientific community is making concerted efforts to come up with a vaccine that can prevent or limit the spread the infection, we are examining existing immunization systems that have played a crucial role in preventing millions of vaccine-preventable deaths.

We would like to assess the impact of control measures implemented nationally on routine vaccination services. This survey has 15 questions and should take less than 10 minutes of your time. The data will be anonymized and will not be attached to your institution or organization.

We are grateful to you for your help and for coming together to protect our essential health services!

1. a) To help us interpret your responses, please tell us about yourself:

Institution/Organization (1)

Title/Position (2)

Location (City/Town) (3)

Location (State) (10)

Country (9)

1. b) Please describe your institution/ organization type:

- Public (1)
- Private (2)
-

1. c) Please describe your location type:

- Urban (1)
- Rural (2)
-

2. What is your primary area of work?

- Physician/medical officer (1)
- Other health worker (2)
- Scientist/Researcher (3)
- Public policy worker/officer (4)
- ANM or Community Health Worker (CHW) (5)
- Other, specify: (6) _____
-

3. Where do people in your catchment area come from for vaccinations. Please select all that apply.

- Tertiary Hospital (1)
- Secondary-level hospital (district hospital/nursing home) (2)
- Primary health care center (urban) (3)
- Primary health care center (rural) (4)
- Private clinic (urban) (5)
- Tenement housing (slums) or marginalized communities (7)
- Other (specify): (6) _____
-

4. How involved are you in vaccination services at your clinic/hospital? Please select all that apply.

- Provide vaccination services on a daily/routine basis (1)
- Involved in special campaigns of vaccinations (2)
- Involved in oversight of vaccination services (3)
- Not directly involved but services are routinely available at my healthcare facility (4)
- Not routinely involved in vaccination services (5)
- Other (specify): (6) _____
-

5. Do you provide vaccinations in your clinic/institution/healthcare center?

- Yes (1)
- No (2)

Display This Question:

If Do you provide vaccinations in your clinic/institution/healthcare center? = Yes

5a. Do you see a similar number of children under 5 years receiving vaccinations across all months of the year (i.e. little variability in average numbers)?

- Yes (1)
- No, the number of children vaccinated varies every month (2)

Display This Question:

If Do you see a similar number of children under 5 years receiving vaccinations across all months of... = Yes

5b. How many children under 5 years are typically given vaccinations where you provide care per month? Please enter average number of children vaccinated per month)

Display This Question:

If Do you see a similar number of children under 5 years receiving vaccinations across all months of... = No, the number of children vaccinated varies every month

5c. Please provide estimates for how many children under 5 years are typically given vaccinations where you provide care per month. Please enter estimated number vaccinated in your clinic/ institution / healthcare center.

	Fewer than 10 (1)	10 to 49 (2)	50 to 99 (3)	100 to 499 (4)	500 or more (5)
January (1)	<input type="radio"/>				
February (2)	<input type="radio"/>				
March (3)	<input type="radio"/>				
April (4)	<input type="radio"/>				
May (5)	<input type="radio"/>				
June (6)	<input type="radio"/>				
July (7)	<input type="radio"/>				
August (8)	<input type="radio"/>				
September (9)	<input type="radio"/>				
October (10)	<input type="radio"/>				
November (11)	<input type="radio"/>				
December (12)	<input type="radio"/>				

6. Have vaccination services been suspended in your clinic/institution/healthcare center?

- Yes (1)
- No (2)

Display This Question:

If Have vaccination services been suspended in your clinic/institution/healthcare center? = Yes

6a. Have vaccination services been FULLY or PARTIALLY suspended where you typically provide care?

- Fully suspended (please add description) (1)

- Partially suspended (please add description) (2)

Display This Question:

If Have vaccination services been suspended in your clinic/institution/healthcare center? = Yes

6b. Since when have vaccination services in your area been fully or partially suspended?

- Prior to lockdown (specify if possible) (1)

- 25 March 2020 (day of lockdown) (2)
- After lockdown (specify if possible) (3)

Display This Question:

If Have vaccination services been suspended in your clinic/institution/healthcare center? = No

6c. If your clinic is open, are you seeing the same number of patients as before?

- Yes (1)
- No, we see between 99% - 80% of the previous patient volume (2)
- No, we see between 79% - 50% of the previous patient volume (3)
- No, we see less than 50% of the previous patient volume (4)
- Other, specify: (7) _____

Display This Question:

If Have vaccination services been suspended in your clinic/institution/healthcare center? = No

6d. Why do you think fewer people are seeking vaccinations, even though vaccination services are available? Select all that apply.

- Parents are unaware that vaccination services are still available (4)
- Parents are not coming to health clinics, unless there is an emergency (7)
- Parents are unable to travel to clinic due to transportation barriers (8)
- Parents are afraid of contracting COVID-19 in a clinic setting (9)
- Other, specify: (10) _____

7. After the lockdown is lifted, how long do you think it will take your clinic/hospital to resume vaccination services:

	Up to 50% Capacity (1)	Up to 100% Capacity (8)
Immediately (1)	<input type="radio"/>	<input type="radio"/>
2-4 Weeks (2)	<input type="radio"/>	<input type="radio"/>
1-3 Months (9)	<input type="radio"/>	<input type="radio"/>
3-6 Months (10)	<input type="radio"/>	<input type="radio"/>
More than 6 Months (11)	<input type="radio"/>	<input type="radio"/>

8. To your knowledge, in your city/town/district have other vaccination services been suspended in:

Private clinics (1)	▼ Yes (1) ... No (2)
Public clinics/hospitals (2)	▼ Yes (1) ... No (2)

9. To your knowledge, are there fewer vaccines or vaccine supplies available in your institution/clinic?

- Yes (1)
- No (2)
- I don't know (3)
- Other, specify: (4) _____

10. Have the following services been suspended:

	Yes (1)	No (2)	I Don't Know (3)
Polio Vaccine Campaigns (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Measles and Rubella vaccine Campaigns (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. In your service catchment area, has payment to any of your healthcare colleagues/staff/community health care workers been affected?

- No impact – all staff still receiving payment (1)
- Receiving reduced payment (specify who is impacted and why their payment has been reduced) (2)
- Receiving no payment (specify who is impacted and why their payment has been reduced) (3)
- Other (specify) (4)

12. Is there a plan in place for catch up vaccination services after the lockdown is lifted?

- Yes (specify) (1) _____
- No (2)
- I do not know (3)

13. How do you think this lockdown will affect long-term health for children (select all that apply)?

- No impact (1)
- Reduced vaccination coverage that is temporary (2)
- Reduced vaccination coverage leading to vaccine-preventable disease outbreaks (3)
- Reduced health services leading to non-COVID-19 related morbidity and deaths (4)
- Other (specify) (5) _____
-

14. How do you think vaccination services could have been continued during the lockdown period?

15. Do you have any other remarks on the impact of COVID-19 on routine immunization that you would like to share?

16. Thank you very much for your feedback and time! If you are interested in receiving a report back, please leave your email here:

End of Survey

Impact on Routine Vaccination Services in the era of COVID-19: Round 2

Survey 2

Start of Survey

Impact on Routine Vaccination Services in the era of COVID-19: Round 2

Nations all over the world are implementing measures to mitigate the spread of the COVID-19 pandemic. While the global scientific community is making concerted efforts to come up with a vaccine that can prevent or limit the spread the infection, we are examining existing immunization systems that have played a crucial role in preventing millions of vaccine-preventable deaths.

Johns Hopkins University and the Indian Academy of Pediatrics are collaborating to assess the long-term impact of the pandemic on routine vaccination services. This is a quick survey and should only take you approximately 10 minutes. The data will be anonymized and will not be attached to your institution or organization.

We are grateful to you for your help and for coming together to protect our essential health services!

1. To help us interpret your responses, please tell us about yourself:

- Institution/Organization (1)
 - Title/Position (2)
 - Location (City/Town) (3)
 - Location (State) (4)
-

2. (i) Please describe your institution/organization type

- Public, Specify (Clinic or Hospital): (1)
- Private, Specify (Clinic or Hospital): (2)
- Other, Specify: (3) _____
-

2. (ii) Please describe your location type:

- Urban (1)
- Rural (2)
- Semi-urban (3)
-

3. What is your primary area of work?

- Pediatrician (1)
- Other Physician /medical officer (2)
- Scientist/Researcher (3)
- Public policy worker/officer (4)
- Other, Specify: (5) _____
-

4. Did you participate in the survey of Impact on Routine Vaccination Services in the era of COVID-19 Round 1, which was circulated on 5 May 2020 by the Indian Academy of Pediatrics?

- Yes (1)
- No (2)

5. Did you provide vaccinations in your clinic / institution / healthcare center?

- Yes (1)
- No (2)
-

6. (i) How involved were you in vaccination services at your clinic/hospital, prior to the months of March/April 2020? (Please mark all that apply)

- Provide vaccination services on a daily/routine basis (1)
- Involved in oversight of vaccination services (3)
- Not directly involved but services are routinely available at my healthcare facility (4)
- Not routinely involved in vaccination services (5)
- Other, Specify: (6) _____
-

6. (ii) Are you involved in special campaigns of vaccinations?

- Yes (1)
- No (2)
-

7. Compared to the early months of the pandemic, how did your involvement with vaccination services CHANGE during the months of July/August 2020?

- I am providing a greater number of vaccinations (1)
 - I am providing the same number of vaccinations (2)
 - I am providing vaccinations less frequently (3)
 - I am not providing vaccinations currently (4)
-

8. During the months of July/August 2020, did you see the same number of patients coming in for vaccination services, as prior to the COVID-19 pandemic?

- Yes (1)
 - No, we saw between 99% - 80% of the previous patient volume for vaccinations (2)
 - No, we saw between 79% - 50% of the previous patient volume for vaccinations (3)
 - No, we saw between 25-50% of the previous patient volume for vaccinations (4)
 - No, we saw less than 25% of the previous patient volume for vaccinations (5)
 - Other, specify: (6) _____
-

9. Please select any access barriers for vaccination services during the months of July/August 2020: (Please mark all that apply)

- None (1)
 - Local policies for sustaining vaccination services were not available or enforced (2)
 - Limited availability of vaccine(s) or vaccine-related supplies (e.g., syringes) (3)
 - Low availability of healthcare workers (4)
 - Healthcare workers are prioritizing other health issues (5)
 - Low availability of personal protection equipment (PPE) for healthcare workers (6)
 - Financial constraints in the provision of vaccination services (7)
 - Other, Specify: (8) _____
-

10. Please select any demand-side barriers for accessing vaccination services during the months of July/August 2020: (Please mark all that apply)

- None (1)
- Caregivers are not able to safely use transportation to get the clinic (2)
- Caregivers are uncertain about coming for vaccination services because they are unaware if vaccinations are available (3)
- Caregivers are afraid of contracting COVID-19 in a clinic setting (4)
- Financial barriers and difficulty to pay for services (5)
- Concerns on vaccination safety and effectiveness in the time of the pandemic (6)
- Other, Specify: (7) _____
-

11. Has your state/district started to plan activities to vaccinate children who may have missed their routine vaccines due to the pandemic?

- Yes (1)
- No (2)
- Don't know (3)
- Other, Specify: (4) _____
-

12. Have you begun to provide catch-up vaccinations to children who have missed their routine vaccinations due to the pandemic?

- Yes (1)
- No, Specify why: (2) _____

13. Which of the following strategies have been implemented to increase vaccine uptake during the months of July/August?

- Increased hours for vaccinations, Specify details: (1)

- Having special and distinct hours for vaccination, Specify details: (2)

- SMS / text messaging campaigns, Specify details: (3)

- Calls to caregivers who have missed vaccinations, Specify details: (4)

- Outdoor vaccination camps, Specify details: (5)

- Door-to door vaccination outreach, Specify details: (6)

- Novel and cost-effective ways of providing adequate PPE, Specify details: (7)

- Providing vaccines in special settings (e.g. bazaar) or common places of social gathering and incorporating social distancing measures, Specify details: (8)

- None, Specify details: (9) _____
- Other, Specify: (10) _____
-

14. How do you think the lockdown has impacted long-term health for children (select all that apply)?

- No impact (1)
- Temporary reduction in vaccination coverage and missed doses for children (2)
- Reduced vaccination coverage leading to vaccine-preventable disease outbreaks (3)
- Reduced health services leading to non-COVID-19-related morbidity and deaths (4)
- Increased malnutrition among children (5)
- Other, Specify: (6) _____
-

15. Have you received any guidelines on safe vaccination practices in the era of the pandemic?

- Yes, National Guidelines (1)
- Yes, State Guidelines (2)
- Yes, Guidelines from the Indian Academy of Pediatrics (IAP) (3)
- We put together our own institutional guidelines based on international guidelines (4)
- No (5)
- Other, Specify: (6) _____
-

16. Have you been able to incorporate these guidelines in your practice?

- Yes, Specify: (1) _____
- No, Specify: (2) _____

17. Have you seen an increase in misinformation (through digital media, mainstream media, community rumors) related to routine immunization since the start of the pandemic?

Yes, Specify: (1) _____

No, Specify: (2) _____

18. Do you have any other remarks on the impact of COVID-19 on routine immunization you would like to share? (optional)

19. Thank you very much for your feedback and time! If you are interested in receiving a report back, please leave your email here:

End of Survey
