



Healthcare provider perspectives on COVID-19 vaccination for children in India

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ABSTRACT

Background The rapid development and deployment of effective COVID-19 vaccines have been critical to halt the spread of the pandemic. India started vaccinating children in early 2022, however, vaccine uptake has been suboptimal.

Methods Between September and November 2022, we conducted an online survey that was disseminated to eligible participants via email, text messages and social media platforms across India. The survey aimed to gather the perspectives of Indian healthcare providers regarding key factors related to the rollout of paediatric COVID-19 vaccines. Descriptive statistics were used to analyse participant demographics and responses on knowledge about paediatric COVID-19 vaccines, perceived risks and benefits, and vaccine rollout strategies.

Results The survey yielded 805 respondents from 23 Indian states; 63.5% were men, 97.3% were paediatricians, median age was 44 years (IQR 25–81). Eighty-one per cent and 65.2% respondents had heard about the most common paediatric COVID-19 vaccines in India, Covaxin and Corbevax, but only 52.9%, 53.7% and 62.1% felt adequately informed about their safety, efficacy and vaccination schedules, respectively. Thirty per cent of respondents were unaware of vaccination guidelines. Eighty-five per cent of respondents felt that vaccines would reduce the incidence of severe disease, hospitalisation and deaths, and 60.6% felt children with comorbidities should be prioritised for vaccination. Perceived supply side barriers included lack of enforcement of guidelines (45.2%) and adverse effects following immunisation monitoring systems (37.6%), and on the demand side, parental vaccine hesitancy (64.4%). Eighty-one per cent believed that school-based vaccination strategies would be highly effective in increasing uptake.

Conclusions Most respondents were in support of the COVID-19 paediatric vaccination, although just over half did not feel adequately informed. Concerns about vaccine hesitancy among caregivers were the leading reported barrier. Targeted interventions are needed to provide adequate knowledge support to healthcare providers and evidence-based public health messaging to reduce vaccine hesitancy among caregivers.

INTRODUCTION

After emerging in late 2019,¹ the SARS-CoV-2 which causes COVID-19 has spread globally. In early days, in the absence of

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Vaccines against COVID-19 for paediatric populations are available, but uptake has been slow globally.

WHAT THIS STUDY ADDS

- ⇒ This cross-sectional study from India describes paediatrician's knowledge about paediatric COVID-19 vaccines, perceived risks and benefits, and vaccine rollout strategies.
- ⇒ During the early stages of vaccine rollout, paediatricians and other healthcare providers in India did not feel adequately informed about paediatric COVID-19 vaccines.
- ⇒ Paediatricians expressed concerns about vaccine hesitancy among caregivers that could impede optimal vaccine uptake.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ This study identifies barriers to optimal paediatric COVID-19 vaccine rollout in India, with learnings transferable to global contexts.
- ⇒ Findings call for targeted interventions to enhance provider knowledge and confidence, and towards addressing parental vaccine hesitancy.

pharmaceutical interventions, population-wide lockdowns and social distancing measures were enforced to slow the spread of the virus and reduce mortality.² Rapidly developing an efficacious vaccine was crucial to the control and mitigation of the pandemic. Extraordinary scientific endeavours saw the development of COVID-19 vaccines at remarkable speed, with vaccine trials beginning within 2 months of the discovery of the SARS-CoV-2 genetic sequence.³ COVID-19 vaccines for adults became available in August 2020, and the authorisation was expanded to include those 12–15 years of age in May 2021, and for children aged between 5 and 11 years in November 2021 in the USA.⁴ The Indian government began its COVID-19 vaccination programmes for children aged 15–18 years in



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January 2022, between 12 and 15 years in March 2022 and for children aged 6–12 years in April 2022.⁵ As of May 2023, India has four approved COVID-19 vaccines for children, Covaxin, Corbevax, Covovax and the ZyCoV-D vaccine.^{5,6}

Understanding facilitators and barriers to vaccine uptake is pivotal to ensure the success of any vaccination campaign. Paediatric COVID-19 vaccination has oftentimes been debated during the pandemic because the COVID-19 incidence in children is lower than in adults, and severe COVID-19 is less common in children than in adults⁷; however, at least two concerning long-term consequences occur following severe infection in children: multisystem inflammatory syndrome (MIS-C) and long-COVID. Both consequences can even appear in asymptomatic patients.⁸ Although the rate of severe COVID-19 is much lower in the young, it does appear that infections are more prevalent in adolescents than in the elderly.⁹ Additional emerging evidence on viral transmission further bolsters the case for paediatric immunisation.¹⁰ Thus, progressive vaccination in the paediatric population is a critical factor in preventing the further spread of COVID-19 globally.

Paediatricians are recognised as the most trusted sources with regard to vaccine knowledge and they serve as ambassadors to alleviate parental concerns and enhance vaccine acceptance.¹¹ Early in the rollout of paediatric COVID-19 vaccination in India, we undertook a survey to gather the perspectives of healthcare providers working with children regarding vaccine benefits, safety and efficacy, vaccination rollout logistics and the public health impact of the COVID-19 vaccines for children. By gathering and synthesising their perspectives, we aimed to contribute towards an effective and evidence-based rollout of paediatric COVID-19 vaccines in India.

METHODS

Survey questionnaire and design

A survey to assess the perceptions of healthcare workers (HCWs) working with children in India towards COVID-19 vaccination was developed by researchers at the Johns Hopkins Maternal and Child Health Center India and the Indian Academy of Pediatrics. The survey consisted of 23 questions and aimed to capture the following key factors: participant demographic

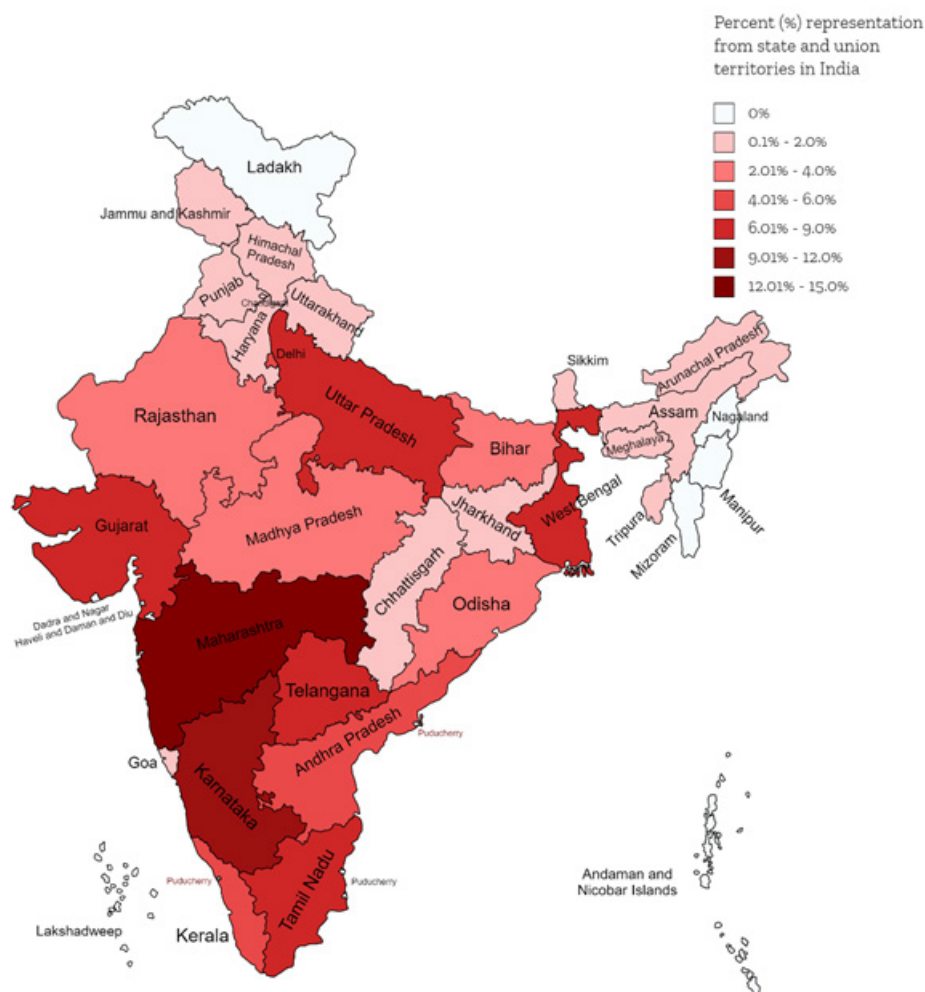


Figure 1 Geographic distribution of survey respondents.

Table 1 Baseline demographic characteristics of survey respondents

Gender	N=805, n (%)
Male	511 (63.5)
Female	294 (36.5)
Primary occupation	N=805, n (%)
Paediatrician	783 (97.3)
Other physician/medical officer	10 (1.2)
Immunisation officer	2 (0.3)
Programme officer	5 (0.6)
Other	5 (0.6)
Institution/organisation type	N=805, n (%)
Public clinic	15 (1.9)
Public hospital	261 (32.4)
Private clinic	214 (26.6)
Private hospital	315 (39.1)
Location type	N=805, n (%)
Urban	684 (85.0)
Rural	121 (15.0)
Age	N=793, n (%)
<20	1 (0.1)
21–30	113 (14.2)
31–40	229 (28.9)
41–50	159 (20.1)
51–60	143 (18.0)
>60	148 (18.7)
Availability of routine childhood immunisations in clinic/institution/healthcare centre	N=805, n (%)
Yes	747 (92.8)
No	58 (7.2)

information, knowledge and attitudes of HCWs working with children about COVID-19 vaccines, perceptions of risk and benefits associated with paediatric vaccines, availability of information regarding safety and efficacy endpoints, access to vaccination guidelines, perspectives on potential demand and supply barriers and the optimal rollout strategies (online supplemental material).

Participants and survey dissemination

The survey was administered online using the software platform Qualtrics (Qualtrics, Provo, Utah, USA) between September and November 2022. HCWs working with children in various settings in India such as paediatricians, medical and immunisation officers and programme officers were invited to participate after distributing the survey via professional networks such as the Indian Academy of Pediatrics. The survey was further distributed among administrative leaders across hospitals affiliated with medical colleges and among employees of other major paediatric hospital systems in India. Survey dissemination was done via email, text messages and social media platforms such as WhatsApp. A snowball

sampling method was used to increase the reach of the survey. The identity of the respondents was verifiable through their respective email addresses.

Patient and public involvement statement

No patients were involved in this research study.

Ethical considerations

Institutional Review Board approval was obtained from the Johns Hopkins Bloomberg School of Public Health and from the ethics committee at the Indian Academy of Pediatrics. Consent to participate was provided in the introductory portion of the online survey. Participants were informed that responding to the survey request was voluntary; data obtained for the survey analysis would remain anonymous and that completing the survey and submitting it implied that they had consented to participate in the study.

Data analysis

Survey data were analysed using descriptive statistics, expressed as frequencies and proportions. Distributions of responses from each Likert-scale question were analysed by tabulating responses based on the importance level ascribed. Open-ended responses were reviewed for key themes and rapid thematic analyses were used to identify themes and/or reassign survey responses.

RESULTS

Participant demographics

The online survey was completed by a total of 805 respondents (63.5% men, mean age 46 ± 13.5 years) from 26 Indian states and three union territories (figure 1). Almost all (97.3%) were paediatricians, 85% were based in urban areas and 67.5% worked in private facilities. Most respondents (92.8%) had the ability to provide routine childhood immunisations at their centres (table 1).

Knowledge about paediatric COVID-19 vaccines and side effects

Eighty-two per cent of the respondents had heard of the Covaxin vaccine, while 65.2% of respondents were aware of Corbevax, 38.4% of ZyCoV-D and 30.9% of Covovax. Approximately half (52.9%) of survey respondents felt that they had been provided with sufficient information on COVID-19 vaccine safety and efficacy. Sixty-two per cent of respondents were aware of the vaccination schedules, while only 39.3% were aware of booster requirements and 29% of the respondents said that they had not been provided with any guidance (local/national) regarding COVID-19 vaccines for children. Although most respondents (77.5%) felt confident with recommending paediatric COVID-19 vaccines and addressing parental concerns regarding the vaccines (figure 2), over 80% of respondents expressed their concerns regarding the potential side effects such as myocarditis, vaccine-induced thrombotic thrombocytopenic purpura,

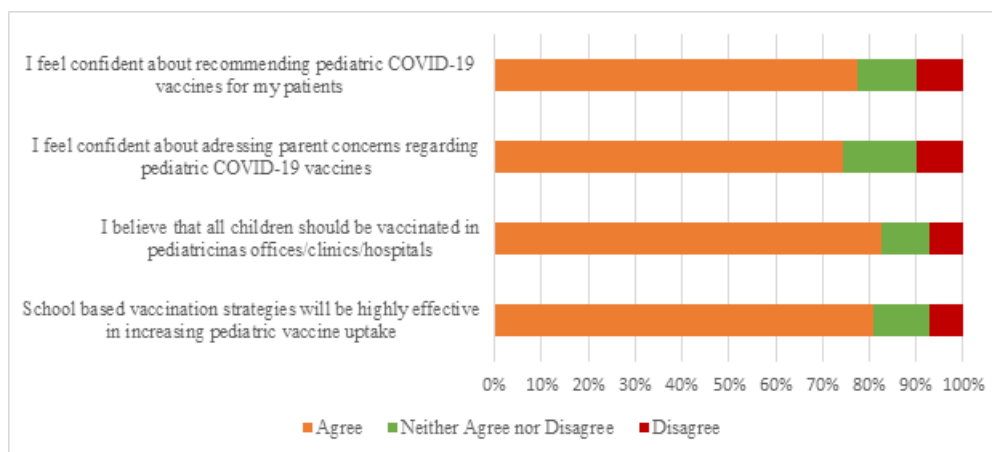


Figure 2 Healthcare provider perspectives regarding COVID-19 vaccination for children in India.

vaccine-induced MIS-C, long-COVID and other adverse events following immunisation (AEFI) (figure 3).

Potential benefits of paediatric COVID-19 vaccination

A majority of respondents felt that paediatric COVID-19 vaccines would directly benefit the paediatric population by reducing disease severity, need for hospitalisation and mortality (85.3%), as well as reducing the cases and incidence of long-term complications in children, including MIS-C (81.4%) (figure 3). Similarly, most of the respondents anticipated various indirect benefits from paediatric COVID-19 vaccination such as the reopening of schools (83.4%), reduction of community transmission (84.7%) and enabling catchup of missed doses of other vaccines (77.4%) (figure 4).

Vaccine rollout: strategies and challenges

Sixty-one per cent of the respondents prioritised children with comorbidities for initial receipt after rollout, followed by children living with high-risk individuals (17.0%), children aged 12–17 years (13.5%), children aged 5–11 years (6.6%) and children aged 2–5 years (2.4%). Eighty-one per cent believed that school-based vaccination strategies would be highly effective in increasing uptake. The most anticipated demand side barrier was vaccine hesitancy

among parents (64.4%), while on the supply side, the most common concern was the lack of enforcement guidelines/policies (45.2%) followed by the lack of efficient AEFI monitoring systems. (figure 5). Reasons for vaccine hesitancy among caregivers were perceived to be due to the lack of adequate information on vaccine safety/efficacy (77.0%), fear of side effects (65.5%), spread of vaccine rumours/misinformation (53.9%), concerns about the long-term effects of vaccination (37.9%), overbooked paediatric immunisation schedules (21.0%), general vaccine distrust (20.4%) and financial concerns (14.5%).

DISCUSSION

Key findings from this study that aimed to understand the perspectives of paediatricians and other healthcare providers working with children in India regarding paediatric COVID-19 vaccines within the first year of the rollout indicated that most respondents were supportive of paediatric vaccination, although half did not feel adequately informed. Concerns about vaccine hesitancy among caregivers were also highlighted.

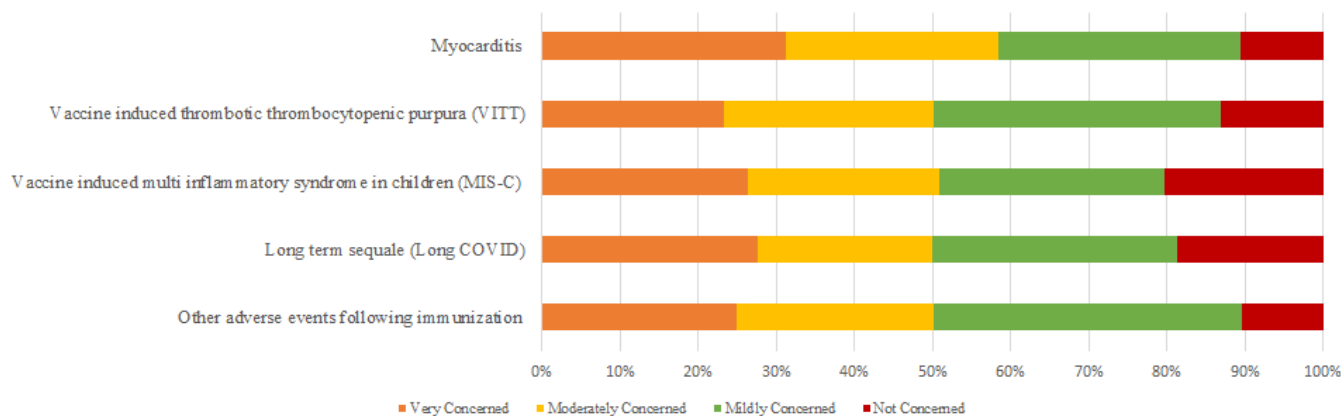


Figure 3 Concerns regarding the side effects of paediatric COVID-19 vaccines.

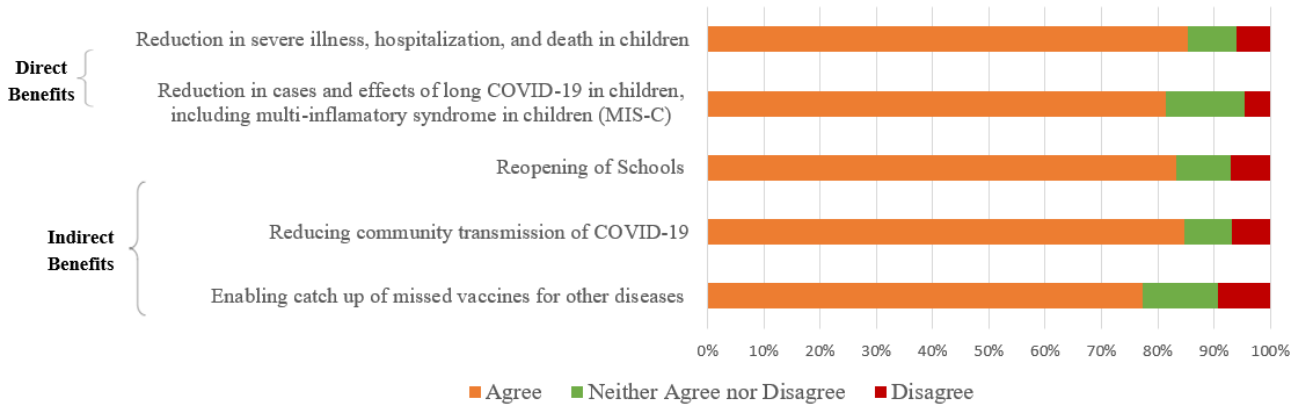


Figure 4 Potential direct and indirect benefits of paediatric COVID-19 vaccination.

Healthcare authorities globally continue to emphasise the importance that vaccinating adults alone cannot curb the pandemic without widespread vaccine uptake in children.¹² Although adult vaccination rates are increasing around the globe, paediatric infections have become a significant source of burden in communities as infected children could serve as the primary drivers for disease transmission.¹³ As of May 2023, 21% of the reported COVID-19 cases were noted in children and adolescents, with many children requiring hospitalisation and critical care in Low-and-middle income countries (LMICs) every day.^{14 15} Data indicated that with the emergence of new variants worldwide, unvaccinated children may be at higher risk of infections due to increased transmission and virulence, changes in clinical manifestations of the disease, including conditions like MIS-C and long-COVID.^{15 16} Vaccinating children and adolescents might help reduce the indirect harms caused by quarantine, lockdowns, repeat testing, school exclusion and closures.¹⁷ In India, COVID-19 paediatric vaccines approved for emergency use authorisation, such

as ZyCoV-D, Corbevax and Covaxin have shown 66.6%, >91% and >95% safety, efficacy and immunogenicity regarding vaccines, respectively.^{18–20} The successes of such scientific endeavours and subsequent availability of such efficacious vaccines in the arsenal against COVID-19 should motivate providers and recipients to advocate for and increase uptake rates, respectively.

One of the most described and researched reasons for low COVID-19 vaccine uptake has been vaccine hesitancy.²¹ In the context of paediatric COVID-19 vaccination, several studies conducted in diverse settings including Italy,²² Kuwait,²³ Singapore,²⁴ Saudi Arabia²⁵ and the USA²⁶ have indicated strong hesitancy among parents against the COVID-19 vaccination of their children. A major concern noted by these studies was that hesitancy was driven mostly by concerns about vaccine safety and efficacy, a pattern that is also noted in our study findings. Parental hesitancy was predominantly driven by the fear of vaccine side effects, adverse events following vaccination, parental trust in their child’s paediatrician and the healthcare system and the rapid development

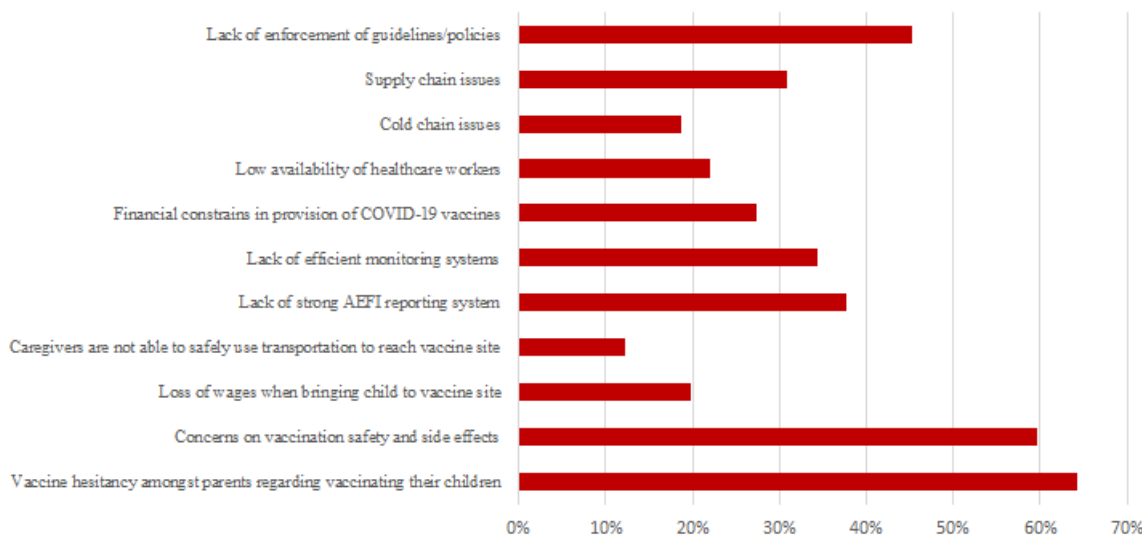


Figure 5 Anticipated supply and demand barriers in the provision of paediatric COVID-19 vaccination.



of COVID-19 vaccines and the label of ‘emergency use authorisations’. Several of these reasons can be successfully addressed by informed providers, and findings from these studies and ours call for concerted efforts from public health leaders and healthcare providers in raising awareness and providing sufficient information on the safety, efficacy and effectiveness of COVID-19 vaccines.

Paediatricians and other paediatric providers are recognised globally as highly trusted sources about providing vaccine education and safety.^{11 27} Parents often rely on their child’s paediatricians for alleviating questions and concerns regarding vaccines and enhancing vaccine acceptance. Most respondents in our survey did not feel adequately informed about details surrounding paediatric COVID-19 vaccination. Wide-spread dissemination of guidelines that were made available early in the rollout phase would be of vital importance to allay concerns. Additionally, tools such as those developed by the Centers for Disease Control²⁸ and the Indian Academy of Pediatrics²⁹ to be used during patient visits incorporating a series of motivational interviewing techniques, aimed toward increasing COVID-19 vaccination uptake should be made available to healthcare providers to provide additional support. Paediatricians are also encouraged to explore opportunities to partner with schools, and other academic institutions and/or organisations to advocate for COVID-19 vaccines. Public health leaders need to collaborate with paediatric providers, global organisations and local political leaders to build rapport and provide the targeted audience with educational resources and programmes, evidence-based communication and policies aimed toward the implementation of mass immunisation efforts.

In addition to demand side barriers to vaccination such as vaccine hesitancy, respondents alluded to concerns such as lack of efficient vaccine monitoring systems and enforcement guidelines, supply and cold chain issues, and low availability of HCWs for vaccination sessions as supply-side barriers to successful vaccine rollout. Studies have identified that during the pandemic in India, HCWs’ tasks shifted towards tackling the immediate challenges associated with the pandemic, with duties that included promoting COVID-19 preventive behaviours, contact tracing, mobilising testing, ensuring home quarantines, delivering medicines³⁰; and thus, staffing at immunisation clinics was poor. Studies have also identified bottlenecks in the storage and transportation of COVID-19 vaccines; the government of India has been highly responsive and has taken special measures to ensure that a robust plan is in place for vaccine storage and distribution.³¹ Further, vigorous pharmacovigilance of vaccines is of paramount importance to promote the safe use of vaccines among their recipients.³² While India has a specific, passive AEFI reporting system for COVID-19 vaccines, inbuilt within the COWIN application, reporting rates are poor.³³ A recent study from South India found that 76.5% of COVID-19 vaccine recipients who suffered an AEFI did not report it.³⁴ There is a need for an active surveillance

system to gather vaccine-related data which would help enhance vaccine confidence.

In our survey, a large majority of respondents suggested that school-based vaccination programmes (SBVPs) would be an effective strategy for the successful rollout and uptake of paediatric COVID-19 vaccines. SBVPs offer numerous advantages for vaccine delivery by eliminating many logistical barriers, including reducing travel and time demands.³⁵ They can improve equity in vaccine access for children experiencing sociodemographic disadvantages. They are uniquely positioned to boost vaccine acceptability by normalising vaccination and providing access to trusted sources of information via school nurses or other officials, to meaningfully engage parents and address concerns.³⁵ Historically, SBVPs have been instrumental in increasing uptake among adolescents for multiple routinely recommended vaccines, including meningococcal, hepatitis B and Human papillomavirus (HPV) vaccines.³⁵ A Canadian study showed that first dose coverage of COVID-19 vaccines increased from 30.6% to 81.5% within 12 days of the launch of an SBVP.³⁶ Innovative strategies such as these will need to be incorporated into rollout strategies in the Indian context as well.

Our study has some limitations that are worth noting. The survey was disseminated shortly after the initial rollout of the paediatric COVID-19 vaccines in India, a period when paediatric COVID-19 vaccine information, options and opinions were rapidly changing. We acknowledge the possibility of selection bias as mostly private-sector paediatricians had responded to the survey since a large part of dissemination occurred through the listservs of the Indian Academy of Pediatrics. Selection bias may have additionally arisen because the survey was administered in English on an internet-supported platform; non-English speaking healthcare providers and those without access to the internet would not have been able to participate in this survey. The snowball sampling strategy may have further added to the selection bias, since such a sampling methodology does not guarantee representativeness of a sample, and does not allow an estimation of the response rate, leading to an unknown denominator. Responses may have been affected by social desirability bias. Further, this was a cross-sectional survey with no longitudinal follow-up; the cross-sectional survey design was employed to understand healthcare providers’ perspectives towards paediatric COVID-19 vaccination, the rapid rollout of which precluded us from strengthening our sampling methodology.

CONCLUSION

In conclusion, findings from this study conducted to understand healthcare provider perspectives on COVID-19 vaccination for children in India within 6 months of the availability of COVID-19 vaccines for children indicated substantial support for the COVID-19 paediatric vaccine from paediatricians, although just over

half did not feel adequately informed about the vaccine. Since healthcare providers are highly trusted sources with regards to childhood vaccination, it is critical to empower them with adequate resources and knowledge to advocate for COVID-19 vaccination for children. In addition to targeted interventions to provide adequate knowledge support to healthcare providers, there is need for evidence-based public health messaging to reduce vaccine hesitancy among caregivers, as this was perceived as a significant challenge to successful vaccine rollout.

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Contributors PB, KM and AS designed the research (project conception, development of overall research plan and study oversight), VS, PG and NT conducted the research, AK and KM analysed the data and performed statistical analysis, AK and KM wrote the first draft of the paper, and PG, NT and AS reviewed and revised the manuscript; and all authors approved the final manuscript as submitted. AS is the guarantor, and is responsible for the work presented.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved. Institutional Review Board approval was obtained from the Johns Hopkins Bloomberg School of Public Health (IRB number 20847) which determined it to be exempt from human subjects research oversight, and from the ethics committee at the Indian Academy of Pediatrics (IRB number F.IAPNIEC/2022/New Protocols/02). Participants gave informed consent to participate in the study before taking part.

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Data availability statement Data are available upon reasonable request.

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