Evaluation of Five Promising Practices Used During the COVID-19 Public Health Emergency to Improve Pediatric COVID-19 Immunization Rates

Executive Summary

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Mynti Hossain, Rumin Sarwar, Jeremy Biggs, Cindy Alvarez, Stacy Dale, Olivia Chan, Jackie Brenner, and Nyna Williams

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Executive Summary

In February 2023, the Association of Immunization Managers (AIM) engaged Mathematica to conduct the Evaluation of Promising Practices for Improvement of Immunization Rates project to identify promising practices used during the COVID-19 public health emergency to improve COVID-19 vaccination uptake among children ages 6 months to 11 years (hereafter referred to as children). As part of this work, we conducted feasibility, policy, and economic analyses of five promising practices chosen in collaboration with AIM. Below, we list the five practices (Table ES.1). We offer this report for the consideration of jurisdictions interested in implementing the practices.

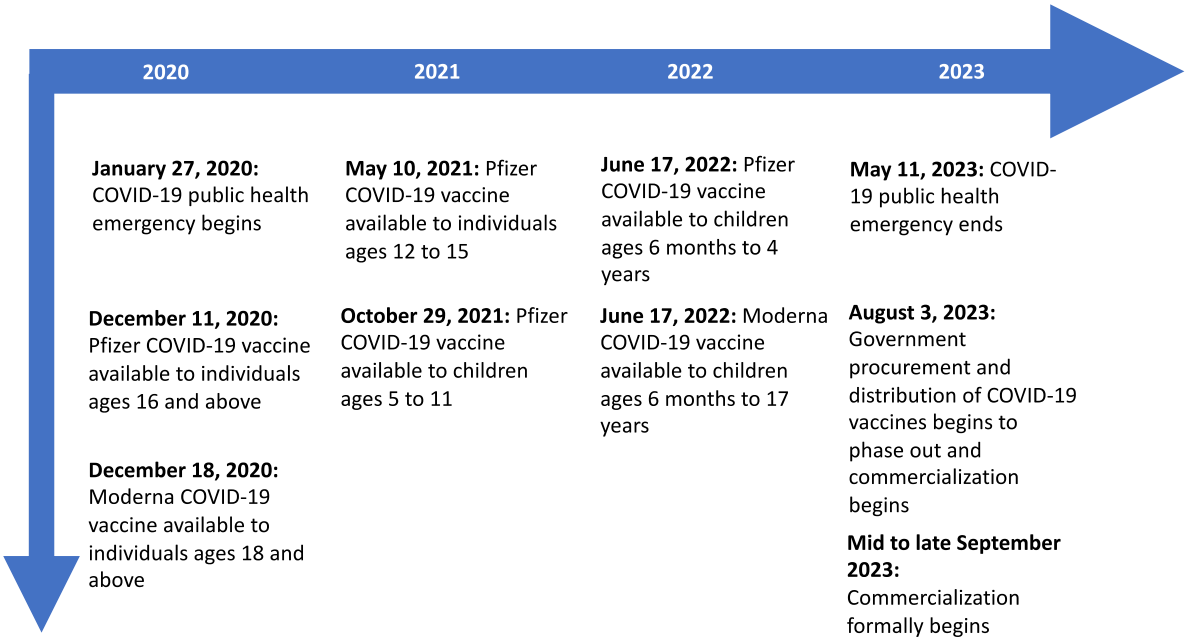
Table ES.1. Five promising practices for increasing uptake of COVID-19 vaccination among children ages 6 months to 11 years

Promising practice	Shorthand practice name	Description
Practice 1: Conducting targeted outreach to Medicaid beneficiaries for COVID-19 vaccines by linking Immunization Information System (IIS) and Medicaid data	Targeted outreach	Jurisdictions, health plans, or providers use IIS and Medicaid data to identify and reach out to families of unvaccinated children enrolled in Medicaid to encourage COVID-19 vaccination. This can include sending emails and texts and making telephone calls to families with unvaccinated children to provide information on the benefits of vaccination and where children can receive their vaccinations.
Practice 2: Connecting opportunities to vaccinate children against COVID-19 with the chance to address basic needs of children and families	Basic needs	Vaccination programs link or bundle COVID-19 vaccination delivery to children with connections to basic social and economic resources for families. Social and economic resources can include food assistance, diapers, home heating support or relief, rent assistance, or public health services. Vaccination programs can partner with organizations that provide social and economic resources to implement this practice.
Practice 3: Using mobile clinics to vaccinate children against COVID-19 at community-based locations	Mobile clinics	Providers use a vehicle, such as a van, to travel to community-based locations to administer COVID-19 vaccines to children. Mobile clinics may be set up to enable individuals to walk into the van to receive a vaccination, visit a tent set up in front of the van, or participate in a drive-thru process.
Practice 4: Vaccinating children against COVID-19 at home	At-home vaccination	Providers administer COVID-19 vaccines to children in their homes. Homes include residential homes, homeless shelters, and group homes.
Practice 5: Reducing operational barriers to help pediatric health care providers vaccinate children against COVID-19	Provider support	Federal, state, or local governments offer financial support, free or reduced-cost supplies, technical assistance, and/or additional staff to providers to support and encourage more of them to offer COVID-19 vaccinations to children. Support is often provided through partnerships with other organizations that might receive federal and state funding, such as community-based organizations, universities, and state and local departments of health.

IIS = Immunization Information Systems.

Key findings in this report are primarily based on pediatric vaccination strategies implemented during the COVID-19 public health emergency. However, these research findings apply more broadly after the public health emergency for COVID-19 vaccinations, routine vaccinations, and future pandemics. Below, we present a timeline of key events and dates regarding the COVID-19 public health emergency and COVID-19 vaccines for children (Figure ES.1). Following the figure, we list some of the major differences in implementation context for immunization program managers during versus after the COVID-19 public health emergency (Table ES.2).

Figure ES.1. Timeline of key events and dates regarding the COVID-19 public health emergency and COVID-19 vaccines for children



Sources: FDA 2021a; FDA 2021b; FDA 2022; Fortner et al. 2021; Katella 2021; Kates et al. 2022; TruMed Systems 2023.
Pfizer COVID-19 vaccine = Pfizer-BioNTech COVID-19 vaccine.

Table ES.2. Differences in the implementation context of pediatric vaccination strategies during versus after the COVID-19 public health emergency

Implementation context	During the public health emergency	After the public health emergency
Vaccine access for children	• The PREP Act temporarily authorized a range of health care providers, such as pharmacists, to administer COVID-19, flu, and routine vaccines to children ages 3 years and older. Some states also enacted new state policies to allow pharmacists to administer COVID-19 vaccines to children. • Access to COVID-19 vaccinations outside of traditional health care settings, such as pop-up clinics, schools, and drive-thru clinics.	• PREP Act provides authority for pharmacists to administer COVID-19 and flu vaccines to children ages 3 years and older through the end of 2024. • Access to pediatric COVID-19 vaccinations largely returned to traditional health care settings, such as doctors' offices and public health departments.

Implementation context	During the public health emergency	After the public health emergency
Funding for COVID-19 vaccines for children	• Federal government paid for all COVID-19 vaccines.	• Federal government pays for some COVID-19 vaccines through Vaccines for Children (VFC) program and private health insurance plans pay for COVID-19 vaccines.
Availability of qualified staff	• Urgent, large-scale need to vaccinate children against COVID-19 required a large number of staff to be hired quickly. • Some jurisdictions experienced high staff turnover, workforce shortages, and increased labor costs that challenged hiring whereas some other jurisdictions experienced low staff turnover and high retention.	• Comparatively fewer staff needed to implement practices given the smaller scale and less urgent nature of implementation. • Some jurisdictions experience fewer hiring challenges due to decreases in staff turnover, workforce shortages, and labor costs whereas some other jurisdictions continue to experience staffing challenges.
COVID-19 vaccine requirements and guidelines	• Rapidly changing requirements and guidelines for storing, transporting, and administering COVID-19 vaccines made it difficult to stay up to date.	• Fewer changes in requirements and guidelines for COVID-19 vaccines, which can make it easier for some jurisdictions to stay up to date; some other jurisdictions continue to experience difficulty staying up to date.
Demand for COVID-19 vaccines	• Relatively high demand despite low levels of vaccine confidence in some communities, potentially due to more public attention to the severity of illness after COVID-19 infection (demand varied by age group, with less demand for children ages 4 years and younger compared to children ages 12 and above).	• Relatively low demand, potentially due to low levels of vaccine confidence in some communities and less public attention to the severity of illness.
Funding for vaccine providers	• Strong will from federal, state, and local governments to support COVID-19 vaccination programs. • Public health emergency declaration made more government funding available for vaccination programs and offered a large number of allowances and flexibilities for spending (e.g., funding for the leasing, rental, and purchase of vans). • Diverse funding streams were more available, including from the commercial and non-profit sectors.	• Less federal funding and fewer allowances and flexibilities for spending exist (e.g., funding is available for the leasing and rental of vans, but not purchase). • Commercial markets play a comparatively larger role in the purchase and distribution of vaccines for privately insured populations.
Support from partners	• Higher engagement from partners to support practice implementation (e.g., co-hosting community events and donating items like vans.)	• Lower engagement from partners to support practice implementation.
Infrastructure development	• New investments in vaccine infrastructure needed to meet the urgent need and high demand.	• Some new investments in vaccine infrastructure need to be re-established and reinstated, as some investments were rapid and temporary; new investments need to be maintained and expanded.

Implementation context	During the public health emergency	After the public health emergency
Data to inform efforts to advance vaccine equity	• Some jurisdictions integrated data systems like Medicaid and IIS, enabling jurisdictions to use more robust data to inform efforts to advance vaccine equity.	• Integrated data systems need to be maintained and improved to inform efforts to advance vaccine equity.

Notes: The public health emergency (PHE) was from January 27, 2020 through May 11, 2023. For more information, see https://aspr.hhs.gov/legal/PHE/Pages/covid19-11Jan23.aspx and https://www.hhs.gov/coronavirus/covid-19-public-health-emergency/index.html.

The VFC program provides free vaccines to eligible children whose families cannot pay for vaccines. Children are eligible if they are age 18 years or younger and meet one of the following requirements: (1) American Indian or Alaska Native, (2) Medicaid eligible, (3) uninsured, or (4) underinsured. For more information, see https://www.cdc.gov/vaccines/programs/vfc/parents/index.html. DHHS = Department of Health and Human Services; PREP Act = Public Readiness and Emergency Preparedness Act.

Methodology. The feasibility, policy, and economic analyses assessed different aspects of the five promising practices. Therefore, each analysis used different research questions and analytic methods (Table ES.3). All three analyses used the same four data sources: (1) information from the Task 1 literature review, (2) articles from targeted internet searches, (3) information from the Vaccine Access Cooperative (VAC) meetings[1], and (4) virtual interviews with immunization program managers. The data sources for the Task 1 literature review included peer-reviewed literature, materials from organizations in the vaccine ecosystem, the AIM Program Practice Database, Centers for Disease Control and Prevention (CDC) internal documents, and CDC suggestions for potential promising practices.

Table ES.3. Research questions and analytic process for the feasibility, policy, and economic analyses

Analysis	Research questions	Analytic process
Feasibility	• What are the key facilitators, challenges, and resources needed to implement each of the five promising practices? • How can the practice be maintained and achieve desired outcomes over time? • How can the practice be applied to or adapted for different settings?	We developed a codebook that included codes for each practice, as well as codes related to the research questions, such as challenges and facilitators. We coded the data sources in NVivo, a qualitative coding software. We then used NVivo to generate queries of coded data by practice and theme, and we summarized code reports. We identified themes by and across each of the five practices.
Policy	• How does the policy landscape affect the implementation of the five promising practices? • What are examples of policies and/or factors that affect implementation of each practice?	We extracted relevant information from the data sources into an Excel-based tool, organized by policies and factors, that the research team developed. We then reviewed the tool to synthesize the information and identify important themes and nuances.

[1] Vaccine Access Cooperative regional meetings brought together jurisdiction-based teams comprised of representatives of immunization programs, Medicaid medical directors, immunization coalitions, public education, the American Academy of Pediatrics, the American Academy of Family Physicians, pharmacist associations, and other key partners to discuss and design strategies to improve pediatric COVID-19 vaccination rates. Sixty-three teams were assembled and represented all 50 states, 6 major US cities, and 7 US territories and freely associated states.

Analysis	Research questions	Analytic process
Economic	• What are the key benefits for each practice? • What are the key cost drivers for each practice? • Which of the five promising practices result in the greatest benefit-cost ratio?	We extracted relevant information from the data sources into an Excel-based tool organized by benefits and costs. We supplemented the previously noted sources with other external information, including but not limited to price information and hourly wage data for relevant professions, using the most recently available data from the Bureau of Labor Statistics (U.S. Bureau of Labor Statistics 2022). We then used the populated tool to calculate the net present value and benefit-cost ratio for each practice. We ranked practices based on their benefit-cost ratio, with practices having a higher ratio receiving a higher ranking. Last, we tested the sensitivity of the practices' benefit-cost ratios and rankings by varying key assumptions. Additional detail on methodology is in the Economic Analysis section.

We note key limitations to our work. First, we did not conduct systematic literature reviews for the five promising practices. Given that the COVID-19 pandemic began recently and is ongoing, the literature is modest and descriptive in nature. For this reason, we relied heavily on a small set of articles and on articles that were not specific to the pediatric population and COVID-19 vaccination. In addition, we did not reach data saturation, meaning we ended the data collection phase of the project before we stopped learning new information about the practices. We also did not gather information on or from every jurisdiction in the U.S. We made this decision in consideration of the project timeline and resources and to avoid placing undue burden on immunization program managers and other health and community leaders during the ongoing COVID-19 pandemic. We tried to minimize burden and maximize their responses by relying on convenience samples for both data collection at the VAC meetings and interviews, as well as CDC internal documents for promising practices. Moreover, our findings reflect the vaccination landscape at the time the three analyses were conducted. This means that some of the practices were implemented with support that was linked to one-time emergency federal funds. Practices were also supported with a mix of state and local government funds and private and philanthropic funds that were available during the public health emergency. As such, the practices may not be identically replicated in the future as the vaccination landscape changes due to the commercialization of COVID-19 vaccines and other factors.

Feasibility analysis key findings. Through the feasibility analysis, we found that jurisdictions can benefit from implementing combinations of the five practices rather than one practice in isolation. Combining practices enables jurisdictions to strengthen each practice's different benefits:

- Jurisdictions may consider implementing practices that increase demand for pediatric COVID-19 vaccinations in tandem with practices that increase access. This helps protect against demand for COVID-19 vaccinations outpacing availability of the vaccines. For

example, the targeted outreach practice can increase demand for COVID-19 vaccinations and could be implemented with the mobile clinics practice, which can efficiently meet an increase in demand.

- Jurisdictions may consider implementing practices that efficiently reach large numbers of children in tandem with practices that improve vaccine equity by serving children from historically minoritized and/or underserved communities. For example, the targeted outreach practice can be used to reach a large population and could be implemented with the at-home practice that can reach children who are medically and/or socially underserved.

Jurisdictions that cannot implement combinations of practices due to resource limitations and other factors may consider implementing a single practice based on the level of resources and complexity required to start up, sustain, and scale the practice. For example, the basic needs promising practice could require a low level of resources to start up, sustain, and scale if a jurisdiction can incorporate the practice into existing infrastructure and partner with state and local organizations that can provide basic needs resources at low or no cost. In contrast, mobile clinics and at-home vaccination practices require high levels of resources to start up, sustain, and scale because they both require significant investments in the physical infrastructure to transport, store, and administer vaccines.

We also found that jurisdictions' formal and informal collaboration with local partners can support implementation of practices. Formal collaboration includes structured activities like surveys, interviews, and listening sessions. Informal collaboration involves building and maintaining relationships with local partners who are willing to share information about, and resources within, their communities. Local partnerships help jurisdictions do the following:

- **Draw on local expertise and knowledge,** such as how to navigate difficult terrain to access communities in remote regions.
- **Customize the practice to best serve the target community,** such as offering vaccinations at convenient venues, providing language translation resources, adapting practices to be culturally relevant, and considering how to make community members feel safe.
- **Build trust and acceptance between COVID-19 vaccinating providers and communities** by inviting local partners to play a role in fostering awareness and credibility of pediatric vaccination programs.
- **Improve the long-term capacity for jurisdictions to respond to public health emergencies.** While relationships with local partners may be difficult to establish quickly, they are necessary for effective responses in urgent public health crises, like the COVID-19 pandemic.
- **Share costs of implementing the practices,** with local partners providing free or discounted resources. Examples include local partners distributing basic needs resources to families at vaccination events, and donating venues, vehicles for transportation, staff time, event promotion, and other support for the event's operations.

Finally, we identified three main challenges to implementing the five practices during the COVID-19 public health emergency:

- **Difficulties hiring and retaining qualified staff,** given the high turnover during the pandemic as well as the time-sensitive nature of the public health emergency.
- **Complex and evolving guidelines for administering COVID-19 vaccines,** including keeping staff and programs updated on guidelines for storing and administering vaccines.
- **Managing additional reporting requirements** that were new for COVID-19 vaccines, especially for general pediatricians who are often already under resourced.
- After the public health emergency, jurisdictions face new challenges arising from the commercialization of COVID-19 vaccines, decreased demand for and attention to COVID-19 vaccination, and less and more restricted government and non-governmental funding.

Policy analysis key findings. Through the policy analysis, we identified these 11 key factors and policies that can affect the implementation of the five practices:

1. Organized groups can support or challenge the implementation of practices. (Organized groups are bodies of people working together for a specific purpose and can include nonprofits, for-profits, alliances, and associations.)
2. Policies authorizing a range of health care providers, such as pharmacists, to administer COVID-19 vaccines to children can make vaccination more accessible, possibly prompting more discourse and action for or against the practices.
3. Policies on minor consent for vaccination govern jurisdictions' authorization to administer COVID-19 vaccines to minors who independently seek vaccination.
4. Policies offering state and federal funding to enhance data infrastructure and support data sharing can lead to improvements in vaccination data quality and sharing in the short- and long-term.
5. Managed care organization (MCO) requirements can support targeted outreach to unvaccinated Medicaid enrollees.
6. Policies on entities reporting vaccinations to the Immunization Information Systems (IIS) affect IIS data quality and use.
7. Policies requiring parent or guardian consent to report vaccinations of children to the IIS affect IIS data quality and, potentially, their reported vaccination rates.
8. Policies on COVID-19 vaccination data sharing can support targeted outreach to unvaccinated Medicaid enrollees.
9. State and local governments' vaccination and resource dissemination events can help adults and children from communities that are disproportionately affected by COVID-19.
10. The changing guidelines for storing, transporting, and administering COVID-19 vaccines adds to the complexity of implementing the practices, potentially deterring some providers from offering vaccinations.
11. Policies offering federal and state funding to support pediatric health care providers in ensuring access to vaccinations.

Of these 11 key factors and policies, we found the following major takeaways:

- Organized groups supporting or opposing practice implementation affect the most promising practices (the targeted outreach, basic needs, mobile clinics, and at-home vaccination practices). This indicates that organized groups who engage in the vaccine ecosystem can have a strong influence on practice implementation.
- The targeted outreach practice is affected by most factors and policies (specifically, state policies). This indicates that practice implementation depends heavily on federal and state policymakers' decisions on funding, data reporting, and data sharing.

Economic analysis key findings. The purpose of the economic analysis is to offer an initial attempt to quantify the possible costs and benefits for each of the promising practices, with the goal of informing more rigorous future economic analyses. With this in mind, we conducted a high-level, hypothetical implementation scenario for an average county in the U.S. Across all five practices, we considered major benefits related to caretaker time, reduction in deaths, reduction in inpatient hospitalizations and other medical costs, and reduction in learning loss. Costs varied by practice but typically included costs associated with vaccination, training, outreach, wastage, refrigeration and storage, and staff time.

Three of the five practices—mobile clinics, basic needs, and targeted outreach—had a benefit-cost ratio greater than one, indicating that the benefits outweighed the costs.

- The mobile clinics practice had the largest benefit-cost ratio, 3.14. This practice is associated with moderate-to-high implementation costs ($1 million) and was approximately twice the cost to implement as the lowest-cost practice (targeted outreach), which was ranked third. However, it had a high benefit-cost ratio due to the large number of vaccinations generated by this practice which in turn generated the largest benefits (through reducing deaths, inpatient hospitalizations, other health care costs, learning loss, and caretaker time). It also has the advantage of bringing vaccination clinics to locations (such as supermarkets) that children and families frequently visit, rather than encouraging families to travel to a new, potentially out-of-the-way, location.
- The basic needs and targeted outreach practices showed the second and third highest benefit-cost ratios, respectively. The basic needs practice benefits from the use of community-based locations which reaches a greater population of children and families, thus the increase in overall benefits.
- The provider support practice had the lowest benefit-cost ratio (0.70) which was due to limited evidence of a large increase in vaccinations for this type of practice.

We assumed a six-month future time frame for the implementation of all five practices, with vaccinations occurring over 20 weeks (or about five months) within that period.

The economic analysis was premised on several assumptions. We varied these assumptions to test their sensitivity and noted that the benefit-cost ratios can vary substantially depending on factors such as assumptions around efficacy of the practice, reduction in deaths, inpatient

hospitalizations and other health care costs, and changes in input costs, and many of these costs may change in a post-pandemic environment. Some varying assumptions also altered the ranking of practices. In particular, increasing software costs for the targeted outreach practice reduced the relative ranking of the practice, and increasing the population size increased its relative ranking. Finally, jurisdictions need to keep in mind that many of the inputs in this analysis (such as vaccination cost, inpatient and outpatient costs) will be different after the pandemic, so they need to consider how their jurisdiction may differ from the average county.

Implications. Although the public health emergency expired on May 11, 2023, jurisdictions can use the five promising practices described in this report to increase pediatric COVID-19 vaccination rates and apply the practices more broadly to routine vaccinations and future pandemics. Below, we list facilitators and challenges for implementing each practice during and after the COVID-19 public health emergency (Table ES.4). Following the table, we summarize the three common challenges affecting all or most of the five practices after the public health emergency.

Table ES.4. Facilitators and challenges for implementing each of the five promising practices during versus after the COVID-19 public health emergency

	During	After
Practice 1: Targeted outreach		
Facilitators	• Government funding offered allowances and flexibilities for spending • Non-governmental funding from commercial and non-profit sectors • High engagement from partners due to urgent need to vaccinate • Support for new investments in vaccine infrastructure (such as new data sharing functionalities)	• Some investments in vaccine infrastructure from during the public health emergency can be sustained and improved, which facilitates future improvements • Coverage for COVID-19 vaccinations makes vaccination free of charge for nearly all children who are eligible for the Vaccines for Children (VFC) program
Challenges	• Focus was often on making rapid and temporary investments in vaccine infrastructure, rather than long-term and sustainable investments	• Less government funding and fewer allowances and flexibilities for spending • Fewer opportunities for non-governmental funding • Low engagement from partners due to competing priorities and perceptions that there is no longer an urgent need to vaccinate • Less support for new investments in vaccine infrastructure

	During	After
Practice 2: Basic needs		
Facilitators	• Government funding offered allowances and flexibilities for spending • Non-governmental funding from commercial and non-profit sectors • High engagement from partners due to urgent need to vaccinate • Many opportunities for vaccination outside of traditional health care settings • Federal government paid for all COVID-19 vaccines	• In some jurisdictions, less staff turnover, workforce shortages, and labor costs • Coverage for COVID-19 vaccinations makes vaccination free of charge for nearly all children who are eligible for the VFC program
Challenges	• High staff turnover, workforce shortages, and increased labor costs in some jurisdictions	• Less government funding and fewer allowances and flexibilities for spending • Fewer opportunities for non-governmental funding • Low engagement from partners due to competing priorities and perceptions that there is no longer an urgent need to vaccinate • Fewer opportunities for vaccination outside of traditional health care settings
Practice 3: Mobile clinics		
Facilitators	• Government funding offered allowances and flexibilities for spending • Non-governmental funding from commercial and non-profit sectors • High engagement from partners due to urgent need to vaccinate • Temporary authorization of a wide range of health care providers to administer COVID-19 vaccines to children (through PREP Act and state policies) • Federal government paid for all COVID-19 vaccines	• Continuation of some states policies that authorized pharmacists to administer COVID-19 vaccines (will play a larger role after the PREP Act expires) • In some jurisdictions, less staff turnover, workforce shortages, and labor costs • Coverage for COVID-19 vaccinations makes vaccination free of charge for nearly all children who are eligible for the VFC program
Challenges	• High staff turnover, workforce shortages, and increased labor costs for some jurisdictions	• Less government funding and fewer allowances and flexibilities for spending • Fewer opportunities for non-governmental funding • Low engagement from partners due to competing priorities and perceptions that there is no longer an urgent need to vaccinate • PREP Act authority for pharmacists to administer COVID-19 vaccines to children ages 3 and above expires in 2024 and reverts to state laws, which are more restrictive in many cases

	During	After
Practice 4: At-home vaccination		
Facilitators	• Government funding offered allowances and flexibilities for spending • Non-governmental funding from commercial and non-profit sectors • High engagement from partners due to urgent need to vaccinate • Federal government paid for all COVID-19 vaccines	• In some jurisdictions, less staff turnover, workforce shortages, and labor costs • Coverage for COVID-19 vaccinations makes vaccination free of charge for nearly all children who are eligible for the VFC program
Challenges	• High staff turnover, workforce shortages, and increased labor costs for some jurisdictions	• Less government funding and fewer allowances and flexibilities for spending • Fewer opportunities for non-governmental funding • Low engagement from partners due to competing priorities and perceptions that there is no longer an urgent need to vaccinate
Practice 5: Provider support		
Facilitators	• Government funding offered allowances and flexibilities for spending • Non-governmental funding from commercial and non-profit sectors • Federal government paid for all COVID-19 vaccines	• Changes in requirements and guidelines for storing, transporting, and administering the different COVID-19 vaccines are less rapid, which can make it easier for some providers to stay up to date • Payment for vaccines through the VFC program and private insurance for nearly all children reduces financial risk
Challenges	• Rapidly changing requirements and guidelines for storing, transporting, and administering the different COVID-19 vaccines • Upfront provider costs for equipment and staffing to properly store and administer novel vaccines	• Less government funding and fewer allowances and flexibilities for spending • Fewer opportunities for non-governmental funding

Note: The public health emergency was from January 27, 2020 through May 11, 2023. For more information, see https://aspr.hhs.gov/legal/PHE/Pages/covid19-11Jan23.aspx and https://www.hhs.gov/coronavirus/covid-19-public-health-emergency/index.html.

IIS = Immunization Information Systems; PREP Act = Public Readiness and Emergency Preparedness Act.

Three common challenges affect all or most of the five practices after the public health emergency:

1. **Less government and non-governmental funding.** Jurisdictions looking to implement any of the five practices after the public health emergency will likely need to identify new ways to fund practice implementation. For example, a jurisdiction that implemented a practice during the public health emergency only using government funding might implement the practice with a mix of government funding, philanthropic funding, and in-kind donations.
2. **Low engagement from partners.** Jurisdictions implementing the targeted outreach, basic needs, mobile clinics, and at-home vaccination practices after the public health emergency

might see potential and existing partners focusing less on COVID-19 vaccination. Jurisdictions might consider prioritizing building and maintaining long-term relationships with partners as these relationships are investments in the jurisdiction's long-term public health infrastructure. Local partners can provide critical knowledge and resources that can help jurisdictions successfully implement and improve the practices.

3. **Complexities arising from the commercialization of COVID-19 vaccines.** Without the federal government paying for all COVID-19 vaccines, jurisdictions implementing the basic needs, mobile clinics, at-home vaccination, and provider support practices after the public health emergency will need to consider how to support providers in billing multiple insurers for vaccines administered to privately insured patients while managing the requirements of the VFC program for those children who qualify.

Overall, the key findings and implications presented in this report document (1) early implementation experiences and insights of immunization program managers and other health and community leaders working to improve pediatric COVID-19 vaccination rates through five promising practices, (2) early factors and policies affecting implementation of the practices, and (3) estimated costs and benefits associated with the practices. We hope this report can advance opportunities for public health practitioners to share and learn from each other regarding promising practices to improve COVID-19 immunization rates among children. Research combined with dissemination can strengthen the existing infrastructure to respond to new or emerging crises.

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