

Urgent Action Needed to Catch Up on Routine Childhood Vaccinations

Key Findings

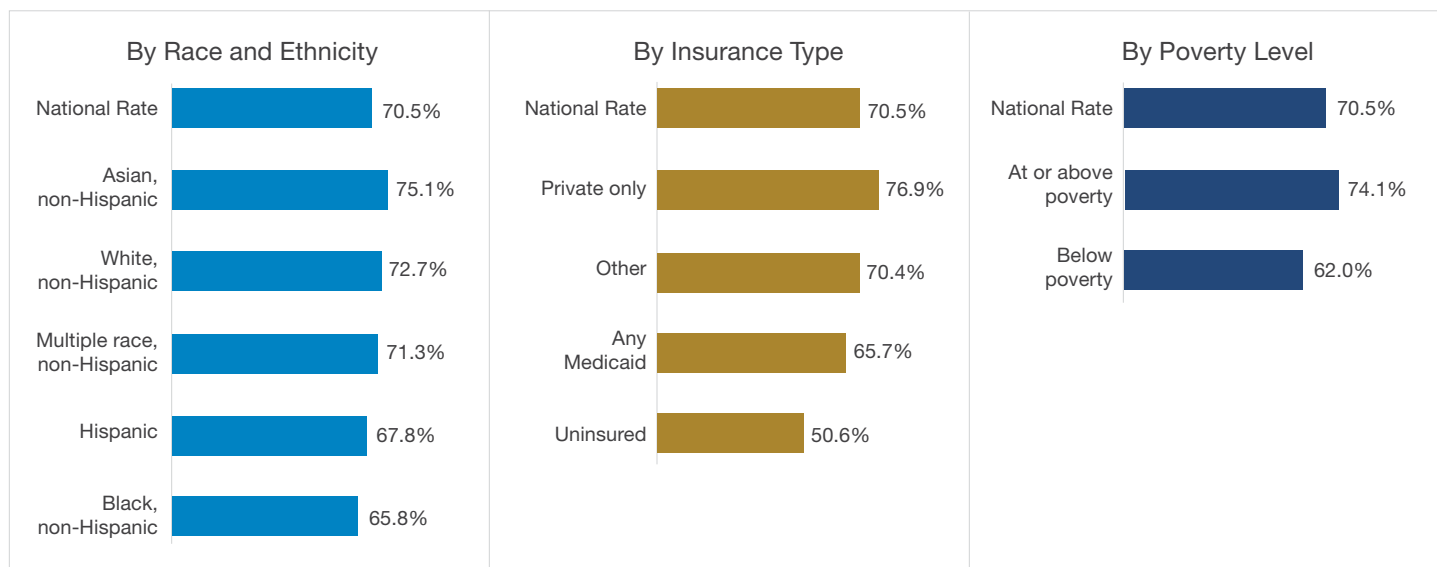
- Vaccines are a safe and effective method to reduce the burden of infectious disease. Children who receive vaccines on the recommended schedule protect themselves and their communities while also decreasing future health care costs. Most children receive the recommended vaccinations, but disparities remain.
- During the COVID-19 pandemic, children have missed routine well-child care and related vaccinations. If vaccination rates decline below levels required to maintain herd immunity, dangerous outbreaks of preventable diseases could follow.
- It is urgent that children and adolescents catch up on missed vaccinations now to protect themselves and their communities before they return to school, camp, sports, and other in-person settings. Immediately addressing missed routine vaccines may also help streamline the widespread implementation of a COVID-19 vaccination strategy for children and adolescents.
- Public education campaigns about the need to catch up on missed vaccinations as well as their safety and efficacy, together with close coordination between state and local health departments, schools, and other partners, can help increase childhood vaccination rates quickly.
- At the federal level, improvements to the Vaccines for Children program would help the program work more efficiently and reach additional children with vaccines at no cost, consequently narrowing gaps in vaccination rates by race, ethnicity, family income, and insurance status.

Introduction

Vaccines are a safe and effective method of reducing the burden of infectious disease. On an individual level, they prevent severe illness, death, and long-term consequences of disease such as neurological disorders. On the community level, they forestall dangerous outbreaks of infectious disease and save money that would otherwise be spent on treating preventable illnesses.¹ Children who receive vaccines on the recommended schedule protect themselves and their communities while also decreasing future health care costs.² The Advisory Committee on Immunization Practices (ACIP) provides a list of recommended vaccines that guide immunization schedules for children, adolescents, and adults.³ The negative impact of COVID-19 on well-child visits and routine childhood vaccination threatens to exacerbate the spread of preventable diseases and requires urgent attention.

By 2019, an estimated 70.5 percent of children born in 2016 and 2017 were up to date on the seven-vaccine series recommended by ACIP for young children.⁴ However, this rate varied by race and ethnicity, poverty level, and insurance status (see Figure 1). Black, non-Hispanic children were the least likely to receive all vaccines in the series (65.8 percent), while Asian, non-Hispanic children were the most likely (75.1 percent).⁵ Compared to 76.9 percent of privately insured children, only 65.7 percent of children covered by Medicaid were up to date, a disturbing disparity that is perhaps partially explained by socioeconomic barriers.⁶ Only 62 percent of children below poverty had received the recommended vaccines, while 74.1 percent of all other children had received the full series.⁷ In 2019, under-vaccinated communities contributed to measles outbreaks across the United States (U.S.), leading to the highest number of cases seen nationwide since 1992.⁸

Figure 1. Vaccination Coverage Rates by Selected Demographic Characteristics



Data is suppressed for estimates of American Indian/Alaska Native, non-Hispanic children and Native Hawaiian or other Pacific Islander, non-Hispanic children. Coverage rates refer to the share of children born in 2016 and 2017 up to date on the combined seven-vaccine series (4:3:1:3*:3:1:4) which consists of ≥4 doses of DTaP, ≥3 doses of poliovirus vaccine, ≥ 1 dose of measles-containing vaccine, Hib full series (≥3 or ≥4 doses depending on manufacturer), ≥3 doses of HepB, ≥1 dose of VAR, and ≥4 doses of PCV.

Source: Hill, H.A., et al., "Vaccination Coverage by Age 24 Months Among Children Born in 2016 and 2017 — National Immunization Survey-Child, United States, 2017–2019," *Morbidity and Mortality Weekly Report* 69, no. 42 (October 2020): 1505–1511, available at <http://dx.doi.org/10.15585/mmwr.mm6942a1>.

A decrease in vaccination rates could result in fewer communities reaching herd immunity for preventable diseases. A locality achieves herd immunity when the spread of an infectious disease is unlikely because a certain percentage of the population is immune to the disease. The percentage necessary to achieve herd immunity for each disease varies based on the level of infectiousness; these estimated thresholds guide vaccination requirements to ensure every community remains healthy (see Table 1).

Table 1. Herd Immunity Thresholds

Disease	Required Share of Population with Immunity
Measles	95%
COVID-19*	70-85%
Polio	80%

* Estimate

Source: Fauci, A., "It Would be Terrible if People Choose Not to Get COVID-19 Vaccine," (interview by Martin, R., National Public Radio, December 15, 2020), available at <https://www.npr.org/2020/12/15/946617217/fauci-it-would-be-terrible-if-people-choose-not-to-get-covid-19-vaccine>; and "Coronavirus Disease (COVID-19): Herd Immunity, Lockdowns and COVID-19," World Health Organization, December 31, 2020, available at <https://www.who.int/news-room/q-a-detail/herd-immunity-lockdowns-and-covid-19>.

How COVID-19 Has Impacted Vaccination Rates

The onset of the COVID-19 pandemic in March 2020 and consequent economic recession present a multi-layered threat to maintaining childhood vaccination rates. On one level, stay-at-home orders, social distancing practices, and concerns about catching the novel coronavirus have led families to skip well-child visits and delay routine vaccinations. Additionally, the economic recession brought about by the pandemic has created significant financial burdens for families with children causing them to delay preventive visits out of fear of medical costs.⁹ These concerning trends are only exacerbated among low-income families and families of color.

At the onset of the pandemic, an alarming drop in doctor’s appointments for children signaled trouble for childhood vaccination coverage rates. While visits to providers’ offices fell by 58 percent for all age groups in the last week of March 2020 compared to the beginning of the month, visits for young children ages three to five dropped 75 percent—the largest decline seen by any age group.¹⁰ In June, the number of visits started to increase again, but by the end of 2020, pediatric office visits remained 24 percent lower than baseline levels (see Table 2).¹¹ Researchers estimate that there was a cumulative 27 percent decline in pediatric office visits over the course of 2020.¹² These declines in utilization create financial challenges for the pediatric delivery system and threaten children’s timely access to needed care.

Provider orders from the federally-funded Vaccines for Children (VFC) program, which pays for vaccines for around half of children in the U.S., confirmed that the lapse in visits translated to a dramatic decline in immunizations: in May 2021, the Centers for Disease Control and Prevention (CDC) reported that orders for all non-influenza childhood vaccines had decreased by a total of about 11.7 million doses, a direct result of the decline in pediatric visits.¹³ A host of state-level data tell a similar story.¹⁴

Both the cognitive cost of increased material hardship and the fear of unexpected medical costs mean that low-income families have faced additional challenges accessing care during the pandemic.¹⁵ Survey data show that low-income families with young children are more likely to have missed a well-child visit than middle- and upper-income families.¹⁶ And, the Michigan Department of Health and Human Services reported that despite a slight rebound in immunization rates overall by September 2020, children enrolled in Medicaid (the majority of whom live in low-income families) lagged behind their non-Medicaid peers; for seven-month-olds covered by Medicaid, the disparity in the vaccine coverage rate was almost 25 percent.¹⁷ In a representative survey of pediatricians and family physicians launched from October through December 2020, a majority of practitioners identified patients’ loss of health insurance coverage as at least a minor barrier in providing routine childhood immunizations during the pandemic; slightly less than half of pediatricians reported that financial concerns were at least a minor barrier (see Figure 2).¹⁸ Even with secure coverage, families of children enrolled in Medicaid may have struggled to safely access covered transportation services during the pandemic.¹⁹

Additionally, the double blow of the virus and the economic crisis has disproportionately increased barriers to care for communities and children of color.²⁰ Middle- to upper-income Black families are more likely to report missing a well-child appointment than their white counterparts.²¹ While precise data on the number of vaccines administered based on race and ethnicity is still unavailable, this gap in well-child visits strongly suggests that these children are missing immunizations at a higher rate than their peers.

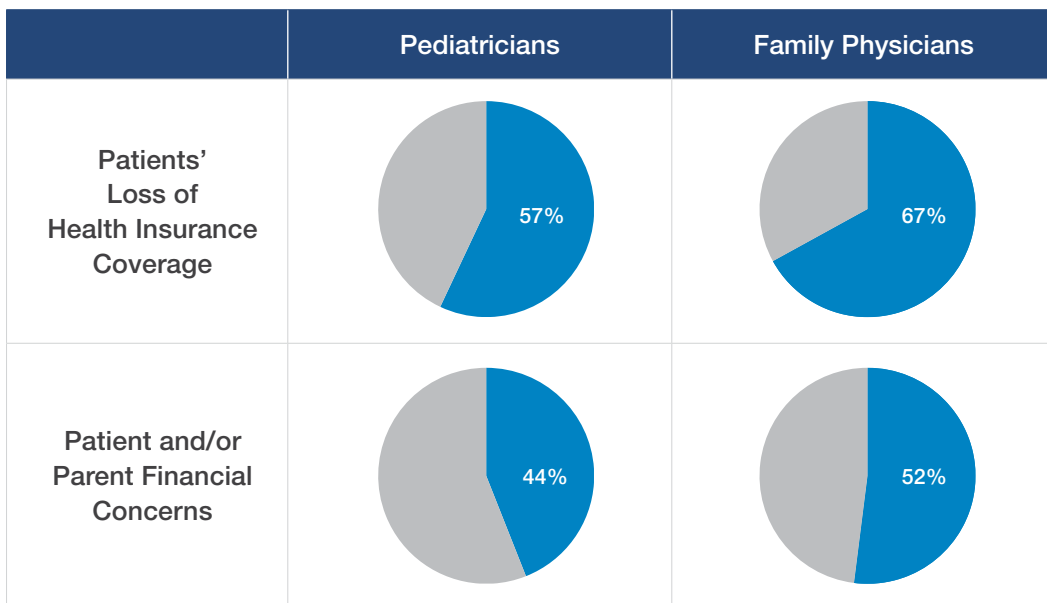
Table 2. Pandemic Decline in Office Visits as of December 2020

Age Group	Percent Difference in Weekly Office Visits
0-2	-21%
3-5	-38%
6-17	-25%

Percent difference calculated by comparing number of office visits in the third week of December 2020 to the number of visits that occurred at the same time in 2019.

Source: Mehrotra, A., et al., “The Impact of COVID-19 on Outpatient Visits in 2020: Visits Remained Stable, Despite a Late Surge in Cases” (Washington DC: The Commonwealth Fund, February 2021), available at <https://www.commonwealthfund.org/publications/2021/feb/impact-covid-19-outpatient-visits-2020-visits-stable-despite-late-surge>.

Figure 2. Share of Practitioners Reporting that Issue Is at least a “Minor Barrier” to Providing Routine Childhood Immunizations during Pandemic



Source: O’Leary, S. et al., “US Primary Care Providers’ Experiences and Practices Related to Routine Pediatric Vaccination during COVID-19 Pandemic,” Centers for Disease Control and Prevention, March 23, 2021, available at <https://www.cdc.gov/vaccines/hcp/pediatric-practices-during-COVID-19.html>.

Even as vaccination rates tick back up, the cumulative number of missed vaccines since mid-March 2020 remains worrisome. The more than 11 million dose gap for orders of childhood vaccines by May 2021 translates to many communities falling below herd immunity thresholds. By February 2021, data from Michigan showed that more than half the state’s counties were below the target 70 percent vaccination rate for young children, with some even dipping below 60 percent.²² Further, indicating that the path to rebuilding community protection is far from assured, multiple waves and new variants of COVID-19 have led to significant spikes in virus transmission rates, leading some states and localities to impose, loosen, and re-impose restrictions on movement and gathering.²³ Without an intentional effort to

get childhood vaccines on track, the risk of a secondary outbreak from a preventable infectious disease on top of the current pandemic remains high.²⁴

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State and Local Strategies to Increase Vaccination Rates

In order to regain lost ground and restore the vaccination rate to safe levels, advocates, state agencies, and providers need a coordinated and far-reaching public education campaign. Providers and advocates should start by highlighting the precautions pediatric practices have put in place to ensure patient safety during visits. Pediatricians have made changes such as removing toys and seating from their waiting room, mandating that all staff and visitors wear masks, and separating sick- and well-child visit times and locations.²⁵ Some practices have even started offering drive-through vaccination appointments for children.²⁶ Parents will likely be more at ease bringing their child to the pediatrician knowing that there are stringent infection-control measures in place.

Another critical step in restoring safe vaccination levels is widespread and culturally competent messaging communicating the efficacy and safety of childhood vaccines. Studies show that promoting vaccination as the default or norm, using storytelling and imagery, and promoting dialogue between patients and trusted providers successfully combats vaccine hesitancy.²⁷ Humorous messaging can also be an effective means of reducing defensive reactions and reaching hesitant parents.²⁸ The American Academy of Pediatrics' (AAP) #CallYourPediatrician campaign offers amusing materials in English and Spanish to remind parents about routine vaccinations and assure them about the safety of visiting pediatricians (see Figure 3).²⁹ The American Rescue Plan enacted in March 2021 includes \$1 billion in funding for the CDC to address vaccine hesitancy through evidence-based education campaigns.³⁰

Finally, as communities plan for children to return to school in-person, well-designed school vaccination requirements and dedicated school communities can increase vaccination uptake. These interventions can take place at multiple levels of governance. For example:

- **Legislative level:** In April 2021, Connecticut lawmakers limited exceptions to school vaccination requirements by disallowing non-medical exemptions. This applies to students attending pre-K-12 schools, day care centers, and institutions of higher education.³¹
- **Health department level:** In order to increase Measles, Mumps, and Rubella (MMR) vaccination rates in 2019-2020, the Colorado state health department provided

Figure 3.
AAP #CallYourPediatrician
reminding parents about routine vaccinations and assuring them about the safety of visiting pediatricians



Source: "#CallYourPediatrician," American Academy of Pediatrics, available at <https://services.aap.org/en/news-room/campaigns-and-toolkits/call-your-pediatrician/>.

local health departments with technical assistance, media toolkits, and lists of elementary schools with poor coverage rates.³² In turn, local health departments worked with schools to launch simulation exercises and provide incentives for families to vaccinate their children.³³

- **School district level:** In Pennsylvania, even as the state extended the deadline for providing proof of immunization to schools for the 2020-21 school year, Philadelphia school nurses conducted extensive outreach and the district partnered with providers to offer vaccines in school buildings in October and November 2020.³⁴

Federal Improvements to the Vaccines for Children Program

A critical foundation for administration of routine childhood vaccinations is the Vaccines for Children (VFC) program, which provides vaccines at no or *de minimus* charge to children who would otherwise not have access due to cost.³⁵ This program distributes federally purchased vaccines to participating providers who administer the vaccines to VFC-eligible children, with administrative costs covered by state Medicaid programs. Since its rollout in 1993, the VFC program has successfully reduced racial disparities in vaccination and now supports vaccine administration for half of all children in the U.S.³⁶

As the VFC program completes its third decade, it is ripe for some updates and improvements to address the program designs and features that have not evolved with children's coverage nor with pharmaceutical innovations.

Eligibility: In order to be eligible to receive vaccines through VFC, children must be enrolled in Medicaid, uninsured, American Indian or Alaska Native, or underinsured. Children enrolled in the Children's Health Insurance Program (CHIP) through a Medicaid-expansion program (M-CHIP) are eligible for VFC vaccines, but children enrolled in standalone CHIP (separate CHIP) programs are ineligible. To simplify vaccine administration, the VFC program should be expanded to include all CHIP enrollees.

Vaccines in the medical home: Currently, underinsured children whose health insurance does not adequately cover vaccines are eligible to receive VFC vaccines only at Federally Qualified Health Centers (FQHCs) and Rural Health Clinics (RHCs), or other sites designated by the state. For some children, this means that they have to leave their doctor's office and travel to a separate location in order to receive a vaccine, even if their pediatrician is a VFC provider. This disruption to the medical home increases the likelihood that children will forgo vaccinations and creates a gap between the trusted relationship in the medical home and the clinical team administering vaccines.

Administrative and operational challenges: VFC providers must take on a number of costs to participate in the program, including separate storage and monitoring

for VFC-provided vaccines and private stock. Typically, providers must maintain separate inventory of VFC-provided and private stock of identical vaccines, and cannot "borrow" doses between funding sources. Helping to offset these upfront costs and allowing equal exchange of doses between VFC and private inventory would increase VFC provider participation and program efficiency. In particular, providers need flexibility to borrow between inventory to get their patients caught up on the recommended immunization schedules and avoid missed opportunities to vaccinate.

Payment: Multi-component vaccines protect individuals against multiple diseases with a single administration. However, the payment system for VFC vaccine administration has not kept up with improvements in vaccine delivery, and VFC providers are often underpaid to administer modern, multi-component vaccines. When a pediatrician administers a vaccine with multiple components, such as MMR, they counsel the child or family about each component of the vaccine. This is reflected in the way that practices usually bill for vaccine administration: one charge for the counseling and administration of the first component of the vaccine, and an additional, smaller charge for the time spent fully addressing families' questions and concerns about each additional component of the vaccine. As of June 2021, CMS interprets the VFC statute to only allow Medicaid to pay for the cost associated with counseling parents and addressing vaccine hesitancy for the first component of a vaccine. As a result, Medicaid does not pay for the full cost of vaccine administration and counseling, which is a disincentive for providers to participate in VFC or accept more VFC-eligible children into their practice. With more multi-component vaccines expected on the market soon, vaccine science is evolving and Medicaid payment policy should keep up.³⁷

COVID-19 Vaccines for Children and Adolescents

There are several anticipated challenges in administering COVID-19 vaccines to children. The Pfizer-BioNTech vaccine has been authorized for emergency use among children and adolescents ages 12 and older.* Clinical trials are underway in children as young as six months for the Pfizer-BioNTech, Moderna, and Johnson & Johnson vaccines, and could produce safety and efficacy data as soon as Fall 2021.³⁸ The sole authorization for the Pfizer-BioNTech vaccine means that 12- to 17-year-olds may not be able to receive a vaccine at the same location as other members of their family if a location only has Moderna or Johnson & Johnson vaccines available. A survey of parents in February 2021 found that a large minority of parents—27 percent of mothers and 14 percent of fathers—were extremely unlikely to vaccinate their child against COVID-19.³⁹ Vaccine hesitancy and resistance can best be addressed within the context of the medical home, where parents and children can have their questions and concerns addressed by a trusted care team.

As pediatricians work to ensure children catch up on routine childhood immunizations, they can also counsel families about the COVID-19 vaccine and, in some cases, administer the COVID-19 vaccine. CDC guidance allows coadministration of COVID-19 vaccines and routine childhood immunizations—that is, administration of a COVID-19 vaccine and other vaccines on the same day. Previously, the CDC recommended implementing a 14-day buffer between any COVID-19 vaccine dose and any other vaccination, but data have shown that such a delay is unnecessary.⁴⁰ Unfortunately, many primary care practices are not able to access COVID-19 vaccines in order to offer it to their patients, though federal and state governments have recently begun to increase the distribution of vaccine to primary care providers.⁴¹ In early 2021, the distribution of COVID-19 vaccine prioritized mass vaccination sites and sites that could accommodate extremely cold storage. Even as the distribution of COVID-19 vaccines has expanded to smaller sites, the process still limits orders to extremely large volumes such as a minimum of 1,170 Pfizer vaccine doses. Once received, the Pfizer vaccine doses

can only be stored for two weeks at typical vaccine temperature ranges, and once thawed and diluted, each six-dose vial must be used within six hours.⁴² These windows of time are not feasible for many practices outside of special events like a vaccine clinic. The current disconnect between vaccine administration and one of the most trusted sources of information—the primary care medical home—leaves little opportunity for providers to counsel patients.

Children in immigrant families may face additional barriers to COVID-19 vaccines. Some vaccine sites currently require certain types of government-issued identification and Social Security Numbers to access vaccines, even though these are not required federally.⁴³ One-quarter of children in the U.S. have at least one foreign-born parent.⁴⁴ Consequently, specific identification requirements for parents could present a barrier to vaccine access for over 18 million children.⁴⁵ It is important that the CDC clarify that lack of documentation cannot be a reason to deny a person a vaccine.

Patient cost-sharing is not likely to be a barrier for COVID-19 vaccination. All Medicaid and CHIP enrollees under the age of 21 are eligible to receive a COVID-19 vaccine at no cost.⁴⁶ For people who are uninsured, the CARES Act provides funding for the federal government to purchase the vaccine, and the Provider Relief Fund covers administration costs. In addition, the CARES Act requires private insurance to cover COVID-19 vaccines starting 15 days after recommendation from ACIP.⁴⁷ This requirement is in effect through the end of the Public Health Emergency, and insurers must cover the cost of COVID-19 vaccines even if it is not designated for “routine use.”⁴⁸ Consequently, many vaccine sites ask for insurance information in order to bill insurance if possible, and that question may stop some individuals from seeking the COVID-19 vaccine.

* Note: As of the date of this writing, Moderna has indicated that its data supports the safety and efficacy of its vaccine in children adolescents ages 12-17, and will seek emergency use authorization from FDA.

Conclusion

Policymakers and stakeholders should take several steps now to make sure children and adolescents are fully caught up on recommended vaccinations, with special attention to subgroups of children and adolescents who are less likely to have received recommended vaccinations since the beginning of the COVID-19 pandemic. Ensuring children and adolescents are fully vaccinated will help prevent an outbreak of diseases such as measles, which could overwhelm an already over-burdened public health system.

Trusted messengers should be deployed to inform families about the efficacy and safety of childhood vaccines and the

importance of catching up on missed doses immediately. State and local health departments, working with schools and other community-based organizations, can help reach children and adolescents who are more likely to have missed recommended vaccinations, such as children covered by Medicaid/CHIP. Finally, COVID-19 has created a window of opportunity for policymakers to make needed improvements to VFC, helping this successful program reach even more children and adolescents.

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The American Academy of Pediatrics is an organization of 67,000 pediatricians committed to the optimal physical, mental, and social health and well-being for all infants, children, adolescents, and young adults. Visit <https://www.aap.org/>.

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Endnotes

¹ Plotkin, S.L., and Plotkin, S.A., “A Short History of Vaccination,” in *Vaccines*, 4th edn. (Philadelphia: WB Saunders, 2004): 1-15.

² “Five Important Reasons to Vaccinate Your Child,” Centers for Disease Control and Prevention, available at <https://www.vaccines.gov/get-vaccinated-for-parents/five-reasons>; and Butler, A., “A Qualitative Study Examining Pediatric Clinicians’ Perceptions of Delayed Vaccine Schedules,” *Vaccine* 38, no. 30 (June 2020): 4740-4746, available at <https://www.sciencedirect.com/science/article/pii/S0264410X20306332>.

³ After recommendation by ACIP, the vaccine schedule is approved by the CDC, American Academy of Pediatrics, American Academy of Family Physicians, American College of Obstetrics and Gynecology, American College of Nurse-Midwives, American Academy of Physician Assistants, and National Association of Pediatric Nurse Practitioners. “ACIP Vaccine Recommendations and Guidelines,” Centers for Disease Control and Prevention, available at <https://www.cdc.gov/vaccines/hcp/acip-recs/index.html>; and Kimberlin, D. et al., “Immunization Schedules for 2021,” in *Red Book 2018-2021: Report of the Committee on Infectious Diseases*, 31st edn, American Academy of Pediatrics, 2018, available at <https://redbook.solutions.aap.org/SS/immunization/Schedules.aspx>.

⁴ Hill, H.A. et al., “Vaccination Coverage by Age 24 Months Among Children Born in 2016 and 2017 – National Immunization Survey-Child, United States, 2017–2019,” *Morbidity and Mortality Weekly Report* 69, no. 42 (October 2020): 1505–1511, available at <http://dx.doi.org/10.15585/mmwr.mm6942a1>.

⁵ Ibid.

⁶ Ibid.

⁷ Ibid.

⁸ “Measles Cases and Outbreaks,” Centers for Disease Control and Prevention, available at <https://www.cdc.gov/measles/cases-outbreaks.html>; Hoffman, J., “Measles Deaths Soared Worldwide Last Year, as Vaccine Rates Stalled,” *The New York Times*, November 12, 2020, available at <https://www.nytimes.com/2020/11/12/health/measles-deaths-soared-worldwide-last-year-as-vaccine-rates-stalled.html>; and Griess, R., “25 U.S. Counties Identified as Most at Risk for Measles Outbreaks,” *UT News*, May 9, 2019, available at <https://news.utexas.edu/2019/05/09/25-u-s-counties-identified-as-most-at-risk-for-measles-outbreaks/>.

⁹ In households that have lost income during the pandemic, those with children are significantly more likely to report not seeking medical care because of cost and/or fear of exposure to the coronavirus than those without children (57.3 percent compared to 38.4 percent). See Gonzalez, D. et al., “Almost Half of Adults in Families Losing Work during the Pandemic Avoided Health Care Because of Costs or COVID-19 Concerns” (Washington: The Urban Institute, July 2020), available at https://www.urban.org/sites/default/files/publication/102548/almost-half-of-adults-in-families-losing-work-avoided-health-care-because-of-cost-or-covid-19-concerns_3.pdf.

¹⁰ Mehrotra, A. et al., “The Impact of COVID-19 Pandemic on Outpatient Visits: Changing Patterns of Care in the Newest COVID-19 Hot Spots” (Washington: The Commonwealth Fund, August 2020), available at <https://www.commonwealthfund.org/publications/2020/aug/impact-covid-19-pandemic-outpatient-visits-changing-patterns-care-newest>.

¹¹ Mehrotra, A. et al., “The Impact of COVID-19 on Outpatient Visits in 2020: Visits Remained Stable, Despite a Late Surge in Cases” (Washington DC: The Commonwealth Fund, February 2021), available at <https://www.commonwealthfund.org/publications/2021/feb/impact-covid-19-outpatient-visits-2020-visits-stable-despite-late-surge>.

¹² Ibid.

¹³ Woodworth, K., “Clinical Considerations for Pfizer-BioNTech COVID-19 Vaccination in Adolescents,” Presentation to the Advisory Committee on Immunization Practices, May 12, 2021, available at <https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2021-05-12/05-COVID-Woodworth-508.pdf>.

¹⁴ See, for example, “Effects of the COVID-19 Pandemic on Pediatric Visits July 2021

and Childhood Immunizations in Pennsylvania” (Harrisburg: Pennsylvania Partnerships for Children, September 2020), available at <https://www.papartnerships.org/wp-content/uploads/2020/09/Immunizations-Fact-Sheet.pdf>; and O’Leary, S. et al., “Number of Childhood and Adolescent Vaccinations Administered Before and After the COVID-19 Outbreak in Colorado,” *JAMA Pediatrics* 175, no. 3 (December 2020), available at <https://jamanetwork.com/journals/jamapediatrics/fullarticle/2773308>.

¹⁵ Material hardship defined as trouble affording necessities for subsistence such as housing and groceries. Center for Translational Neuroscience at the University of Oregon, “The Basic Truth About Basic Needs: Structural Inequalities Exist based on Income and Race/Ethnicity among Households with Young Children during the Pandemic,” *Medium*, July 8, 2020, available at <https://medium.com/rapid-ec-project/the-basic-truth-about-basic-needs-f505132d173c>.

¹⁶ Center for Translational Neuroscience at the University of Oregon, “Health (Still) Interrupted: Pandemic Continues to Disrupt Young Children’s Healthcare Visits,” *Medium*, October 13, 2020, available at <https://medium.com/rapid-ec-project/health-still-interrupted-pandemic-continues-to-disrupt-young-childrens-healthcare-visits-e252126b76b8>.

¹⁷ Michigan Department of Health and Human Services Division of Immunization, “COVID-19 Impact Report,” September 14, 2020, available at <https://www.mcir.org/wp-content/uploads/2020/09/9.5.2020-MCIRCOVID19ImpactReport.pdf>. In addition to low-income children, Medicaid also serves many children and youth with special health care needs (CYSHCN). For CYSHCN families, the pandemic has brought additional financial stressors and led to higher rates of parental anxiety and depression when compared to other families. These factors could also decrease vaccination rates. See, Greenberg, E. and Fisher, P., “Families of Children with Disabilities will Need Support beyond the Pandemic,” *UrbanWire Blog*, The Urban Institute (July 8, 2020), available at <https://www.urban.org/urban-wire/families-children-disabilities-will-need-support-beyond-pandemic>.

¹⁸ O’Leary, S. et al., “US Primary Care Providers’ Experiences and Practices Related to Routine Pediatric Vaccination during COVID-19 Pandemic,” Centers for Disease Control and Prevention, March 23, 2021, available at <https://www.cdc.gov/vaccines/hcp/pediatric-practices-during-COVID-19.html>.

¹⁹ Fraade-Blanar, L. and Whaley, C. M., “Non-Emergency Medical Transportation in the Time of COVID-19,” *The RAND Blog*, RAND Corporation (May 5, 2020), available at <https://www.rand.org/blog/2020/05/non-emergency-medical-transportation-in-the-time-of.html>.

²⁰ Bixler, D. et al., “SARS-CoV-2–Associated Deaths Among Persons Aged <21 Years – United States, February 12–July 31, 2020,” *Centers for Disease Control and Prevention Morbidity and Mortality Weekly Report* 2020 69, no. 37 (September 2020): 1324–1329, available at <http://dx.doi.org/10.15585/mmwr.mm6937e4>; and McMorro, S., “Urgent Action Needed to Address Children’s Unmet Health Care Needs during the Pandemic” (Washington: The Urban Institute, October 2020), available at <https://www.urban.org/research/publication/urgent-action-needed-address-childrens-unmet-health-care-needs-during-pandemic>.

²¹ Center for Translational Neuroscience, “Health (Still) Interrupted,” op. cit.

²² “Doctors, Public Health Leaders Urge Michigan Parents to ‘Catch Up’ Children on Routine Vaccinations,” *IVaccinate*, April 12, 2021, available at <https://ivaccinate.org/doctors-public-health-leaders-urge-michigan-parents-to-catch-up-children-on-routine-vaccinations/>.

²³ “Covid-19: Pandemic Shatters More Records in U.S., as States and Cities Tighten Restrictions,” *The New York Times*, November 15, 2020, available at <https://www.nytimes.com/live/2020/11/12/world/covid-19-coronavirus-updates>.

²⁴ Some researchers estimate that catch-up visits may have to surpass a

level 15 percent higher than expected well-child visits for an entire year in order to achieve the 90 percent coverage rate needed for measles-containing vaccines. See Carias, C. et al., “Potential Impact of COVID-19 Pandemic on Vaccination Coverage in Children: A Case Study of Measles-Containing Vaccine Administration in the United States (US),” *Vaccine* 39, no. 8: 1201-1204, available at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7723783/>.

²⁵ O’Leary et al., “US Primary Care Providers’ Experiences,” op. cit.; and “COVID-19 and Childhood Vaccinations: Is it Safe to Take my Kid to the Clinic for their Shots?” HealthPartners, available at <https://www.healthpartners.com/blog/covid-19-and-childhood-vaccinations-is-it-safe-to-take-my-kid-to-the-clinic-for-their-shots/>.

²⁶ O’Leary et al., “US Primary Care Providers’ Experiences,” op. cit.; Karnes, B., “Free Childhood Immunizations, Free Turkeys This Week,” *The Patch*, November 16, 2020, available at <https://patch.com/california/elcerrito/free-childhood-immunizations-free-turkeys-week>; and Sy, S., “Childhood Vaccination Rates Dropped Amid the Pandemic. Will they Rebound?” *PBS Newshour*, November 9, 2020, available at <https://www.pbs.org/newshour/show/childhood-vaccination-rates-dropped-amid-the-pandemic-will-they-rebound>.

²⁷ Olson, O., Berry, C., and Kumar, N., “Addressing Parental Hesitancy Towards Childhood Vaccines in the United States: A Systematic Literature Review of Communication Interventions and Strategies,” *Vaccines* 8, no. 4 (October 2020), available at <https://www.mdpi.com/2076-393X/8/4/590/htm>.

²⁸ Moyer-Gusé, E., Robinson, M., and Mcknight, J., “The Role of Humor in Messaging about The MMR Vaccine,” *Journal of Health Communication* 23, no. 6 (May 2018): 514-522, available at <https://doi.org/10.1080/10810730.2018.1473533>.

²⁹ “#CallYourPediatrician,” American Academy of Pediatrics, available at <https://services.aap.org/en/news-room/campaigns-and-toolkits/call-your-pediatrician/>.

³⁰ Kates, J., “What’s in the American Rescue Plan for COVID-19 Vaccine and Other Public Health Efforts?” The Henry J. Kaiser Family Foundation, March 16, 2021, available at <https://www.kff.org/policy-watch/whats-in-the-american-rescue-plan-for-covid-19-vaccine-and-other-public-health-efforts/>.

³¹ Connecticut Office of the Governor, *Governor Lamont Signs Legislation Updating School Immunization Requirements*, Press Release (April 28, 2021), available at <https://portal.ct.gov/Office-of-the-Governor/News/Press-Releases/2021/04-2021/Governor-Lamont-Signs-Legislation-Updating-School-Immunization-Requirements>.

³² Seither, R., et al., “Vaccination Coverage with Selected Vaccines and Exemption Rates Among Children in Kindergarten—United States, 2019-20 School Year,” *Centers for Disease Control and Prevention Morbidity and Mortality Weekly Report* 2021 70, no. 3 (January 2021): 75-82, available at <http://dx.doi.org/10.15585/mmwr.mm7003a2>.

³³ Ibid.

³⁴ Graham, K., “6,000 Philly Kids Could be Excluded from School if they Don’t Get Vaccinations; School Sites Opening for Shots,” *The Philadelphia Inquirer*, October 21, 2020, available at <https://www.inquirer.com/education/philadelphia-school-district-vaccine-cvs-shots-20201021.html>.

³⁵ Centers for Disease Control and Prevention, “About VFC,” available at <https://www.cdc.gov/vaccines/programs/vfc/about/index.html>.

³⁶ Walsh, B., Doherty E., and O’Neill, C., “Since the Start of the Vaccines for Children Program, Uptake has Increased, and Most Disparities have Decreased,” *Health Affairs* 35, no. 2 (February 2016): 356-364, available at <https://pubmed.ncbi.nlm.nih.gov/26858392/>.

³⁷ CMS’ interpretation of VFC statute currently limits vaccine administration payments to CPT code 90460. Allowing VFC providers to also use CPT code 90461 would account for the additional costs associated with administering multi-component vaccines. This will be even more important in 2021, when a new, six-component vaccine is expected to be available in the United States.

Multi-component vaccines are an important tool to ensure that infants and children are appropriately immunized.

³⁸ As of May 2021, three COVID-19 vaccines have been shown to be safe and effective, and authorized for emergency use in the United States by the FDA. The two-dose Moderna and one-dose Johnson & Johnson vaccines are authorized for emergency use in adults 18 and older. The two-dose Pfizer/BioNTech vaccine is the only vaccine currently authorized for emergency use in children 12 and older, but clinical trials among younger children are underway. In December 2020, Moderna began clinical trials in children ages 12-17, and in March 2021 the company started clinical trials in babies as young as 11 months and up to children 11 years old.

³⁹ Simonson, M., et al., “The COVID States Project #45: Vaccine Hesitancy and Resistance Among Parents,” *OSF Preprint* (March 2021), available at <https://osf.io/e95bc/>.

⁴⁰ Woodworth, K. op. cit.

⁴¹ “Expanding COVID-19 Vaccine Distribution to Primary Care Providers to Address Disparities in Immunization: Guide for Jurisdictions,” Centers for Disease Control and Prevention, National Center for Immunization and Respiratory Diseases, April 14, 2021, available at <https://www.cdc.gov/vaccines/covid-19/downloads/Guide-for-Jurisdictions-on-PCP-COVID-19-Vaccination.pdf>.

⁴² Fact Sheet for Healthcare Providers Administering Vaccine: Emergency Use Authorization of the Pfizer-BioNTech COVID-19 Vaccine to Prevent Coronavirus Disease 2019 (COVID-19), Revised May 19, 2021, available at <http://labeling.pfizer.com/ShowLabeling.aspx?id=14471&format=pdf>.

⁴³ Madan, M., Roarty, A., and Wilner, M., “Undocumented Immigrants in Florida Getting Shut Out of Access to COVID-19 Vaccine,” *The Miami Herald*, April 8, 2021, available at https://www.miamiherald.com/news/local/immigration/article250466306.html?utm_source=pushly&intcid=pushly_921645.

⁴⁴ Lou, C., Adams, G., and Bernstein, H., “Part of Us: A Data-Driven Look at Children of Immigrants” (Washington DC: The Urban Institute, March 2019), available at <https://www.urban.org/features/part-us-data-driven-look-children-immigrants>.

⁴⁵ Ibid.

⁴⁶ Orris, A. and Polaris, J., “Ensuring Access to the COVID-19 Vaccine for Adult Medicaid Enrollees: A Roadmap for States” (State Health and Value Strategies, October 30, 2020), available at <https://www.shvs.org/ensuring-access-to-the-covid-19-vaccine-for-adult-medicaid-enrollees-a-road>.

⁴⁷ Corlette, S. and O’Brien, M., “The COVID-19 Vaccine is Coming, but Will It Be Paid For? Federal and State Policies to Fill Gaps in Insurance Coverage” (Washington DC: The Commonwealth Fund, December 2020), available at <https://www.commonwealthfund.org/blog/2020/covid-19-vaccine-coming-will-it-be-paid-federal-and-state-policies-fill-gaps-insurance>.

⁴⁸ “Frequently Asked Questions (FAQs) regarding implementation of the Families First Coronavirus Response Act (FFCRA), the Coronavirus Aid, Relief, and Economic Security Act (CARES Act), Part 44,” Centers for Medicare & Medicaid Services, February 26, 2021, available at <https://www.cms.gov/files/document/faqs-part-44.pdf>.