

COVID-19 Vaccine Provider Availability and Vaccination Coverage Among Children Aged 5–11 Years — United States, November 1, 2021–April 25, 2022

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COVID-19 can lead to severe outcomes in children, including multisystem inflammatory syndrome, hospitalization, and death (1,2). On November 2, 2021, the Advisory Committee on Immunization Practices issued an interim recommendation for use of the BNT162b2 (Pfizer-BioNTech) vaccine in children aged 5–11 years for the prevention of COVID-19; however, vaccination coverage in this age group remains low (3). As of June 7, 2022, 36.0% of children aged 5–11 years in the United States had received ≥ 1 dose of COVID-19 vaccine (3). Among factors that might influence vaccination coverage is the availability of vaccine providers (4). To better understand how provider availability has affected COVID-19 vaccination coverage among children aged 5–11 years, CDC analyzed data on active COVID-19 vaccine providers and county-level vaccine administration data during November 1, 2021–April 25, 2022. Among 2,586 U.S. counties included in the analysis, 87.5% had at least one active COVID-19 vaccine provider serving children aged 5–11 years. Among the five assessed active provider types, most counties had at least one pharmacy (69.1%) or public health clinic (61.3%), whereas fewer counties had at least one pediatric clinic (29.7%), family medicine clinic (29.0%), or federally qualified health center (FQHC)* (22.8%). Median county-level vaccination coverage was 14.5% (IQR = 8.9%–23.6%). After adjusting for social vulnerability index (SVI)[†] and urbanicity, the analysis found that vaccination coverage among children aged 5–11 years was

higher in counties with at least one active COVID-19 vaccine provider than in counties with no active providers (adjusted rate ratio [aRR] = 1.66). For each provider type, presence of at least one provider in the county was associated with higher coverage; the largest difference in vaccination coverage was observed between counties with and without pediatric clinics (aRR = 1.37). Ensuring broad access to COVID-19 vaccines, in addition to other strategies to address vaccination barriers, could help increase vaccination coverage among children aged 5–11 years.

This cross-sectional analysis used COVID-19 vaccine administration data reported to CDC by jurisdictions, pharmacies, and federal entities through immunization information systems, the Vaccine Administration Management System, and direct data submission.[§] Among 3,142 U.S. counties, 2,586 (82.3%) were included. Two states (Texas and Idaho) and eight California counties with populations <20,000 were excluded because of restrictions on reporting of vaccine administration data to CDC, and Michigan was excluded because of incomplete data on COVID-19 vaccine administration. Counties were also excluded if provider type was missing for >25% of active providers in the county (5.1% of counties). Active providers were defined as those who reported administration of at least one Pfizer-BioNTech pediatric COVID-19 vaccine dose by April 25, 2022. COVID-19 provider enrollment data were used to classify active providers into the following provider types: pharmacies, pediatric clinics, family medicine clinics, FQHCs, and public health clinics. School-located vaccination clinics could not be included because vaccine administration in these locations was not reported separately from other provider types, such as pediatric clinics and pharmacies. For active providers and for each provider type, counties were dichotomized into those with at least one provider versus those with no providers. COVID-19 vaccination coverage was defined as the number of children aged 5–11 years who received at least one dose of pediatric COVID-19 vaccine during November 1, 2021–April 25, 2022, divided by the county population aged 5–11 years.[¶]

* <https://www.hrsa.gov/opa/eligibility-and-registration/health-centers/fqhc/index.html>

[†] SVI is a composite measure calculated from the following 15 indicators: 1) percentage of persons with incomes below poverty threshold, 2) percentage of civilian population (aged ≥ 16 years) unemployed, 3) per capita income, 4) percentage of persons aged ≥ 25 years with no high school diploma, 5) percentage of persons aged ≥ 65 years, 6) percentage of persons aged ≤ 17 years, 7) percentage of civilian noninstitutionalized population with a disability, 8) percentage of single-parent households with children aged <18 years, 9) percentage of persons who are racial or ethnic minorities (i.e., all persons except those who are non-Hispanic White), 10) percentage of persons aged ≥ 5 years who speak English “less than well,” 11) percentage of housing in structures with ≥ 10 units (multiunit housing), 12) percentage of housing structures that are mobile homes, 13) percentage of households with more persons than rooms (crowding), 14) percentage of households with no vehicle available, and 15) percentage of persons in group quarters. The 15 indicators are categorized into four themes: 1) socioeconomic status (indicators 1–4), 2) household composition and disability (indicators 5–8), 3) racial and ethnic minority status and language (indicators 9 and 10), and 4) housing type and transportation (indicators 11–15). These indicators are combined into a final score that is ranked from 0 (lowest vulnerability) to 1 (highest vulnerability). <https://www.atsdr.cdc.gov/placeandhealth/svi/index.html>

[§] <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/distributing/about-vaccine-data.html>

[¶] County population totals used to calculate vaccination coverage among children aged 5–11 years were obtained from the National Center for Health Statistics (NCHS) vintage 2019 bridged-race postcensal population estimates (https://www.cdc.gov/nchs/nvss/bridged_race.htm). The population of children aged 5–11 years in counties included in the analysis ranged from 33 to 839,738.

Associations between provider availability and vaccination coverage among children aged 5–11 years were measured using generalized estimating equation models with negative binomial regression to account for clustering of counties within states.** Because the active provider definition might have undercounted providers that did not report identifying information with their vaccine administrations, a sensitivity analysis was also conducted in which active providers were defined as those reporting either administration or inventory of ≥ 1 Pfizer-BioNTech pediatric COVID-19 vaccine dose. Rate ratios were calculated with 95% CIs to compare vaccination coverage among counties with and without active COVID-19 vaccine providers overall and by each provider type, with multivariable models controlling for SVI and urbanicity.†† P-values < 0.05 were considered statistically significant. Analyses were performed in SAS (version 9.4; SAS Institute). This study was reviewed by CDC and conducted consistent with applicable federal law and CDC policy.§§

Active providers of COVID-19 vaccine to children aged 5–11 years were primarily concentrated in parts of the Northeast, Midwest, and several counties in the West (Figure); this distribution approximately corresponded with COVID-19 vaccination coverage among children aged 5–11 years. Most counties had at least one active provider (87.5%), with the most common being a pharmacy (69.1%) or public health clinic (61.3%); fewer counties had at least one pediatric clinic (29.7%), family medicine clinic (29.0%), or FQHC (22.8%) (Table 1). More than one half (1,322; 51.1%) of counties had no pediatric clinic, family medicine clinic, or FQHC. Among all counties, median vaccination coverage among children aged 5–11 years was 14.5% (IQR = 8.9%–23.6%).

In univariate models, the presence of at least one active provider in a county was associated with higher vaccination coverage when compared with having no active provider in a county, irrespective of provider type (Table 2). These associations remained significant after adjusting for SVI and urbanicity. In the adjusted models, the largest associations with vaccination coverage were found for active providers (aRR = 1.66) and pediatric clinics (aRR = 1.37). Public health clinics were associated with the smallest difference in vaccination coverage (aRR = 1.16). The sensitivity analysis in which active providers were defined as those reporting either administration or inventory of at least one Pfizer-BioNTech pediatric COVID-19 vaccine dose yielded similar results.

** Robust SEs were used.

†† County-level SVI data were obtained from CDC/Agency for Toxic Substances and Disease Registry 2018 SVI database. County-level urbanicity data were obtained from the 2013 NCHS Urban-Rural Classification Scheme. https://www.cdc.gov/nchs/data_access/urban_rural.htm

§§ 45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

Discussion

The availability of any active pediatric COVID-19 vaccine provider in a county was associated with higher county-level vaccination coverage among children aged 5–11 years during November 1, 2021–April 25, 2022. This association remained significant within individual provider types, including pediatric clinics, family medicine clinics, FQHCs, pharmacies, and public health clinics, underscoring the importance of COVID-19 vaccine provider availability to increasing vaccination coverage among children in this age group.

Although most counties had at least one active COVID-19 vaccine provider serving children aged 5–11 years, approximately one half of counties did not have an active pediatric clinic, family medicine clinic, or FQHC. This gap in access to COVID-19 vaccines through providers that serve as a medical home for routine pediatric care has important implications for COVID-19 vaccination coverage. Survey data have indicated that pediatricians are among the most trusted sources of reliable information about COVID-19 vaccines (5). Furthermore, among provider types included in this report, the availability of pediatric clinics was associated with the largest difference in vaccination coverage. Lack of access to a pediatrician or other regular health care provider that administers COVID-19 vaccines could be a barrier to vaccination for children aged 5–11 years.

In counties without a pediatric clinic, family medicine clinic, or FQHC, access to COVID-19 vaccines was primarily available through pharmacies and public health clinics. Leveraging these alternative vaccine access points is critical to reaching parents and children who remain unvaccinated. Pharmacies have played an important role in expanding access to COVID-19 vaccines through their availability and extended hours of operation. A previous study found that 46.4% of COVID-19 pediatric vaccine doses were administered in pharmacies (6), indicating that pharmacy vaccine providers are acceptable to many parents. Strategies to improve vaccination coverage among children aged 5–11 years could include encouraging interactions between pharmacy staff members and parents around COVID-19 vaccination.

Whereas ensuring access to COVID-19 vaccine providers might increase vaccination coverage, several other barriers to COVID-19 vaccination exist in pediatric populations. Concerns about vaccine safety and effectiveness continue to deter many parents from seeking COVID-19 vaccination for their children (7). Parents might also perceive the risk for serious COVID-19–associated illness to be low in children, leading them to defer vaccination (7). Beyond maintaining access to COVID-19 vaccine providers, interventions to overcome vaccine hesitancy are needed to improve vaccination coverage

FIGURE. Number of active COVID-19 vaccine providers per 10,000 children aged 5–11 years and COVID-19 vaccination coverage among children aged 5–11 years, by county — United States, November 1, 2021–April 25, 2022

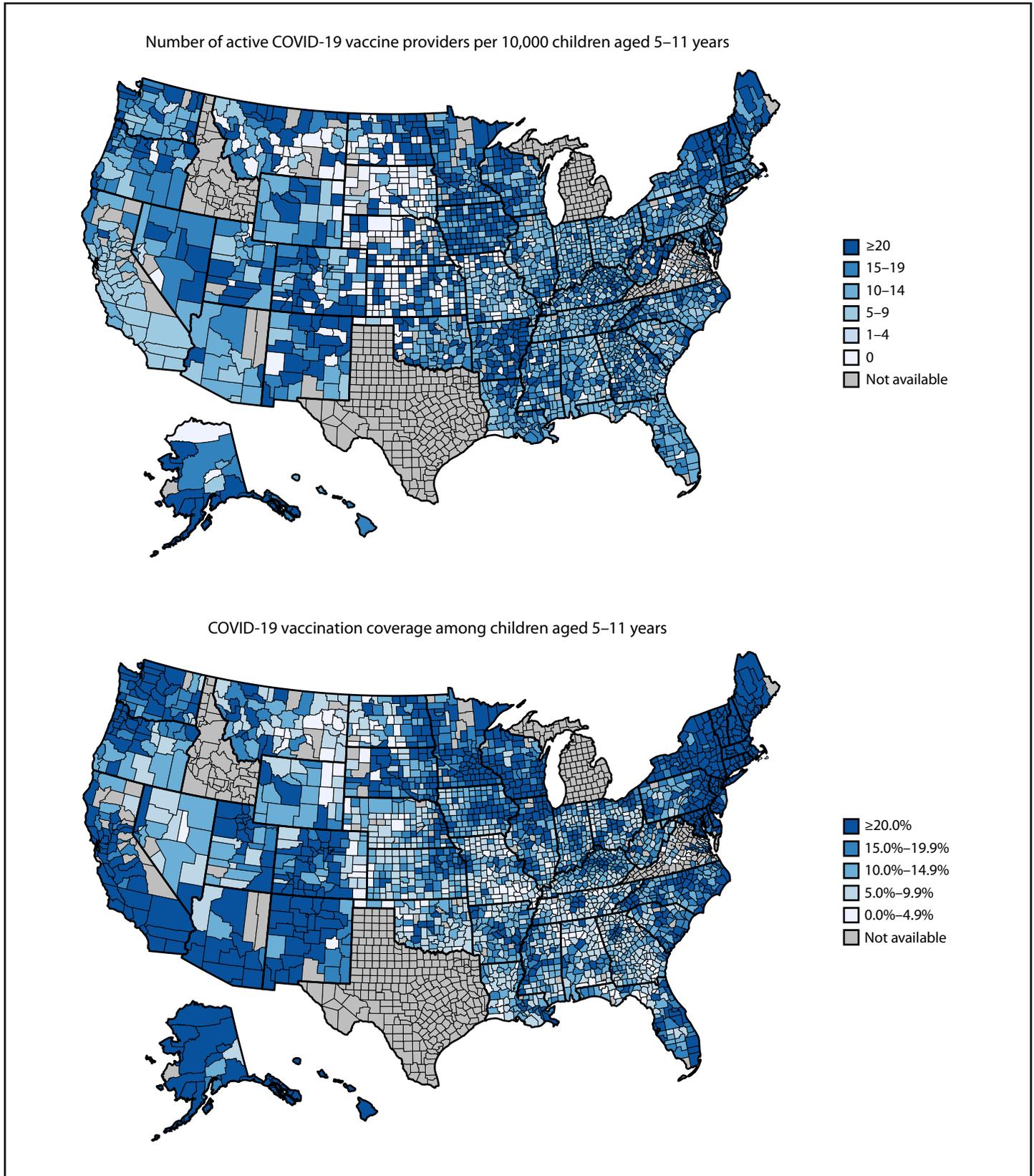


TABLE 1. Number of pediatric COVID-19 vaccine providers per county and county-level vaccination coverage among children aged 5–11 years, by availability of provider type — United States, November 1, 2021–April 25, 2022

Characteristic	No. of counties (%)	Median (IQR)		
		No. of providers per county*	No. of providers per 10,000 children aged 5–11 years per county*	County-level vaccination coverage
Total	2,586 (100.0)	4 (1–9)	14 (9–19)	14.5 (8.9–23.6)
Any active provider				
0	323 (12.5)	0	0	8.4 (5.3–13.1)
≥1	2,263 (87.5)	4 (2–11)	15 (11–20)	15.4 (9.7–25.2)
Provider type				
Pharmacy				
0	800 (30.9)	0	0	10.3 (6.6–16.2)
≥1	1,786 (69.1)	3 (1–8)	8 (5–11)	16.6 (10.5–27.3)
Pediatric clinic				
0	1,817 (70.3)	0	0	11.9 (7.5–18.1)
≥1	769 (29.7)	2 (1–5)	2 (1–4)	23.8 (15.0–37.3)
Family medicine clinic				
0	1,836 (71.0)	0	0	11.8 (7.5–18.2)
≥1	750 (29.0)	1 (1–3)	2 (1–5)	24.0 (15.0–37.1)
Federally qualified health center				
0	1,996 (77.2)	0	0	12.7 (8.0–19.4)
≥1	590 (22.8)	1 (1–3)	2 (1–4)	24.3 (14.7–38.3)
Public health clinic				
0	1,002 (38.7)	0	0	12.9 (7.6–20.9)
≥1	1,584 (61.3)	1 (1–1)	3 (1–8)	15.2 (9.7–25.5)
Social vulnerability index				
Quartile 1 (lowest vulnerability)	697 (27.0)	2 (1–8)	13 (5–20)	17.1 (9.7–29.5)
Quartile 2	656 (25.4)	4 (2–11)	14 (9–19)	15.1 (9.9–25.6)
Quartile 3	612 (23.7)	4 (2–12)	13 (10–18)	12.8 (7.9–21.7)
Quartile 4 (highest vulnerability)	621 (24.0)	4 (2–7)	14 (10–19)	12.9 (8.0–18.8)
Urbanicity				
Large central metropolitan	55 (2.1)	116 (81–184)	14 (10–16)	39.5 (31.7–53.4)
Large fringe metropolitan	301 (11.6)	11 (4–35)	12 (9–15)	23.1 (13.8–35.7)
Medium metropolitan	320 (12.4)	12 (4–33)	13 (10–17)	20.4 (13.6–29.3)
Small metropolitan	297 (11.5)	8 (2–16)	13 (9–16)	16.6 (10.6–25.5)
Micropolitan	535 (20.7)	5 (3–7)	14 (10–19)	13.9 (9.4–20.0)
Noncore	1,078 (41.7)	1 (1–3)	15 (6–25)	10.8 (6.8–16.4)

* For social vulnerability and urbanicity, medians and IQRs were calculated using the total number of COVID-19 vaccine providers per county.

among children aged 5–11 years. Educating parents about the impact of COVID-19 illness in children (1,2) and the safety and effectiveness of pediatric COVID-19 vaccines (8,9) is vital.

The findings in this report are subject to at least five limitations. First, 17.7% of U.S. counties were excluded from this analysis because of insufficient data; therefore, findings might not be generalizable to all U.S. counties. Second, providers that did not report identifying information with their vaccine administrations might not have been counted as active providers; however, a sensitivity analysis in which active providers were defined as those with either administration or inventory of ≥1 Pfizer-BioNTech pediatric COVID-19 vaccine dose yielded similar results. Third, providers identified in this analysis refer to provider locations as opposed to individual providers; the capacity of each provider location to administer COVID-19 vaccines might differ. Fourth, because provider-type data were self-reported by providers enrolling in

Summary

What is already known about this topic?

Although COVID-19 vaccination has been recommended for children aged 5–11 years since November 2021, coverage among this age group remains low.

What is added by this report?

By April 25, 2022, most U.S. counties had a pharmacy or public health clinic offering COVID-19 vaccines to children aged 5–11 years; fewer counties had a pediatric clinic, family medicine clinic, or federally qualified health center. The availability of each provider type was associated with higher county-level vaccination coverage among children aged 5–11 years.

What are the implications for public health practice?

Ensuring broad access to COVID-19 vaccines, in addition to other strategies to address vaccination barriers, could help increase vaccination coverage among children aged 5–11 years.

TABLE 2. Univariate and multivariable models* describing the association between county-level pediatric COVID-19 provider availability (≥ 1 versus 0) and county-level vaccination coverage among children aged 5–11 years, by provider type[†] — United States, November 1, 2021–April 25, 2022

Provider type (≥ 1 versus 0)	RR (95% CI)	
	Univariate model	Multivariable model [§]
Active provider	1.82 (1.67–1.99)	1.66 (1.49–1.84)
Pharmacy	1.47 (1.38–1.57)	1.25 (1.17–1.33)
Pediatric clinic	1.69 (1.59–1.79)	1.37 (1.31–1.44)
Family medicine clinic	1.48 (1.38–1.59)	1.25 (1.17–1.34)
Federally qualified health center	1.46 (1.36–1.56)	1.22 (1.15–1.29)
Public health clinic	1.24 (1.14–1.36)	1.16 (1.07–1.26)

Abbreviation: RR = rate ratio.

* Analysis performed using generalized estimating equation models with negative binomial regression to account for clustering of counties within states.

[†] RRs compare the vaccination rate in counties with at least one provider overall and of a given type to counties with 0 providers overall and of the same type.

[§] Models controlled for social vulnerability index quartile and urbanicity.

the COVID-19 vaccination program, some providers might have been misclassified. Finally, the impact of school-located vaccination clinics could not be evaluated, because vaccine administration in these locations was not reported separately from other provider types.

Ensuring widespread access to COVID-19 vaccines in addition to other strategies to address barriers to vaccination could increase vaccination coverage among children aged 5–11 years. Coverage might be improved by engaging health care providers and pharmacists, as well as school officials, community leaders, and faith leaders, to increase vaccine confidence. In areas with few pediatric medical practices, promoting vaccination through alternative sources, including pharmacies, public health clinics, and school-based vaccination clinics, is essential.

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