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Vaccination Coverage with Selected Vaccines and Exemption Rates Among Children in Kindergarten — United States, 2020–21 School Year

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State and local school vaccination requirements serve to protect students against vaccine-preventable diseases (*1*). This report summarizes data collected for the 2020–21 school year by state and local immunization programs* on vaccination coverage among children in kindergarten in 47 states and the District of Columbia (DC), exemptions for kindergartners in 48 states and DC, and provisional enrollment or grace period status for kindergartners in 28 states. Vaccination coverage† nationally was 93.9% for 2 doses of measles, mumps, and rubella vaccine (MMR); 93.6% for the state-required number of doses of diphtheria, tetanus, and acellular pertussis vaccine (DTaP); and 93.6% for the state-required doses of varicella vaccine. Compared with the 2019–20 school year, vaccination coverage decreased by approximately one percentage point for all vaccines. Although 2.2% of kindergartners had an exemption from at least one vaccine,§ an additional 3.9% who did not have a vaccine exemption were not up to date for MMR. The COVID-19 pandemic affected schools' vaccination requirement and provisional enrollment policies, documentation, and assessment activities. As schools continue to return to in-person learning, enforcement of vaccination policies and follow-up with undervaccinated students are important to improve vaccination coverage.

To meet state and local school entry requirements, parents submit children's vaccination or exemption documentation to schools, or schools obtain records from state immunization information systems. Federally funded immunization programs work with departments of education, school nurses, and other school personnel to assess vaccination and exemption status of children enrolled in public and private kindergartens and to report unweighted counts, aggregated by school type, to CDC via a web-based questionnaire in the Secure Access Management System, a federal, web-based system that gives authorized personnel secure access to public health applications operated by CDC. CDC uses these counts to produce state-level and national-level estimates of vaccination coverage.

* Federally funded immunization programs are located in 50 states and DC, five cities, and eight U.S territories and freely associated states (territories). Two cities reported data to CDC, which were also included in data submitted by their state. State-level data were used to calculate national estimates and medians. Immunization programs in territories reported vaccination coverage and exemptions; however, these data were not included in national calculations.

† National and median vaccination coverage was determined using estimates for 47 states and DC; Alaska, Illinois, and West Virginia did not report school coverage data because of the impact of COVID-19 on data collection. Data from cities were included with their state data. Data from territories were not included in national and median calculations.

§ National and median exemption rates were determined using estimates for 48 states and DC; Colorado, Minnesota, and Missouri did not collect information on the number of kindergartners with an exemption but instead reported the number of exemptions for each vaccine, which could count some children more than once. For these states, the percentage of kindergartners exempt from the vaccine with the highest number of exemptions (the lower bound of the potential range of exemptions) was included in the national and median exemption rates. Washington was unable to deduplicate students with both religious and philosophical exemptions, so the nonmedical exemption type with the highest number of kindergartners (the lower bound of the potential range of nonmedical exemptions) was included in the national and median exemption rates for nonmedical exemptions. Illinois and West Virginia did not report school vaccine exemption data because of the impact of COVID-19 on data collection. Data from cities were included with their state data. Data from territories were not included in national estimates.

INSIDE

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During the 2020–21 school year, 47 states and DC reported coverage for all state-required vaccines among public and private school kindergartners;¶ 48 states and DC reported exemption data on public school kindergartners and 47 states and DC on private school kindergartners. Overall national and median vaccination coverage for the state-required number of doses of DTaP, MMR, and varicella vaccine are reported. Hepatitis B and poliovirus vaccination coverage, not included in this report, are available at SchoolVaxView (*2*). Twenty-eight states reported the number of kindergartners who were attending school under a grace period (attendance without proof of complete vaccination or exemption during a set interval) or provisional enrollment (school attendance while completing a catch-up vaccination schedule). Thirty states and DC reported the number of kindergartners who had no documentation of any vaccinations or exemptions. Seventeen states reported the number of kindergartners who were out of compliance; these kindergartners did not have complete documentation of having received all required vaccinations but were not eligible for provisional enrollment and did not have documented exemptions for the missing vaccinations. This measure includes those with no documentation at all. All counts were current as of the time of the assessment.** National estimates, medians, and summary measures include only U.S. states and DC. This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.††

Vaccination coverage and exemption estimates were adjusted according to survey type and response rate.§§ National estimates measure coverage and exemptions among all kindergartners, whereas medians measure the midpoint of state-level

¶ Nine states reported coverage and exemption data for at least some homeschooled kindergartners. Alaska and North Dakota reported some homeschool data separately. California included data for students who attend virtual, partial, or full charter schools with some or all online instruction and students receiving individualized education program services who are medically unable to attend school in public school data. California also included data for homeschools with six or more students in private school data. Montana reported homeschooled students in public school data if the students also attend classes or extracurricular activities at a public school. New Mexico and Pennsylvania included all homeschooled students in public school data. Oregon reported data for students enrolled in exclusively online homeschool programs separately; online students of otherwise traditional public schools were included in public school data. South Carolina and Wisconsin include homeschooled students in their public and private school data if the students also attend classes, extracurricular activities, or have other contact with a school.

** Assessment date varied by state and area. Four states were assessed on the first day of school; 13 states were assessed by December 31; 17 states and DC were assessed by some other date, ranging from 30 days after admission to June 23, 2021; and 16 states were assessed on a rolling basis. Maryland ended data collection early because of COVID-19 response activities.

†† 45 C.F.R. part 46.102(l)(2), 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.

§§ A majority of immunization programs that used census or voluntary response provided CDC with data aggregated at the state or local (city or territory) level. Coverage and exemption data based on a census or voluntary response were adjusted for nonresponse using the inverse of the response rate, stratified by school type (public, private, and homeschool, where available). Programs that used complex sample surveys provided CDC with deidentified data aggregated at the school or county level for weighted analysis. Weights were calculated to account for sample design and adjusted for nonresponse for data collected through complex sample design wherever possible.

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coverage regardless of population size. During the 2020–21 school year, 3,520,205 children in 48 states and DC were reported by immunization programs as enrolled in kindergarten.[¶¶] Reported estimates are based on 3,187,569 of these kindergartners who were surveyed for vaccination coverage; 3,337,916 for exemptions; 2,467,326 for grace period and provisional enrollment; 1,799,190 for documentation; and 1,049,075 for compliance. Kindergarten enrollment reported by the 48 states and DC was approximately 10% lower than that reported for the 2019–20 school year by 48 states. Potentially achievable coverage with MMR, defined as the sum of the percentage of children who were up to date with 2 doses of MMR and those with no documented vaccination exemption but not up to date, was calculated for each state. Nonexempt students include those who were provisionally enrolled in kindergarten, in a grace period, or otherwise without documentation of complete vaccination. SAS software (version 9.4; SAS Institute) was used for all analyses.

Vaccination assessments varied by state because of differences in required vaccines and doses, vaccines assessed, methods of data collection, and data reported (Supplementary Table 1, https://stacks.cdc.gov/view/cdc/116354). Kindergartners were considered up to date for a given vaccine if they received all doses of that vaccine required for school entry,[***] except in nine states[†††] that reported kindergartners as up to date for any given vaccine only if they received all doses of all vaccines required for school entry. States were asked to report any COVID-19–related impact on kindergarten vaccination measurement and coverage.

Nationally, 2-dose MMR coverage was 93.9% (median = 93.7%; range = 78.9% [DC] to ≥98.9% [Mississippi]). Coverage ≥95% was reported by 16 states and <90% by 7 states and DC (Table). DTaP coverage was 93.6% (range = 78.5% [DC] to ≥98.9% [Mississippi]). Coverage ≥95% was reported by 16 states, and coverage <90% by eight states and DC. Varicella vaccine coverage nationally was 93.6% (range = 78.0% [DC] to ≥98.9% [Mississippi]), with 17 states reporting coverage ≥95% and nine states and DC reporting <90% coverage.

The percentage of kindergartners with an exemption for ≥1 required vaccines (not limited to MMR, DTaP, and varicella vaccines) was 2.2% in 2020–21 (range = 0.1% [Mississippi and New York] to 8.2% [Idaho]), similar to the 2.5% reported during the 2019–20 school year (Table). Nationally, 0.2% of kindergartners had a medical exemption and 1.9% had a nonmedical exemption (Supplementary Table 2, https://stacks.cdc.gov/view/cdc/116355). The percentage of kindergartners provisionally enrolled in kindergarten or within a grace period among the 28 states reporting these data was 2.0% (range = 0.1% [Hawaii] to 10.0% [Arkansas]) (Table).

Among states that reported data for both 2019–20 and 2020–21, MMR coverage and exemptions for ≥1 vaccines decreased in approximately 75% of states; grace period or provisional enrollment increased in 18 of the 28 states reporting this measure (Figure 1). The proportion of students who were not fully vaccinated and not exempt increased in a majority of states. Among states reporting these measures in 2020–21, the proportion of kindergartners attending school with no documentation of required vaccinations or exemptions ranged from 0.1% (Pennsylvania and Virginia) to 8.3% (Maryland); the proportion out of compliance with school requirements ranged from 0.2% (Florida) to 16.6% (Indiana) (Table). Among the 33 states and DC with MMR coverage <95%, all but two could potentially achieve ≥95% MMR coverage if all nonexempt kindergartners who were within a grace period, provisionally enrolled, or out of compliance received vaccination (Figure 2).

Discussion

During the 2020–21 school year, vaccination coverage among kindergartners nationwide was lower than during the 2019–20 school year at approximately 94% (*2*,*3*) for MMR, DTaP, and varicella vaccines, a level just under the target of 95%; coverage for all three vaccines decreased in a majority of states. National MMR coverage among kindergartners fell below the Healthy People 2030 target of 95% (*4*). Reported enrollment and response rates also decreased nationally and in a majority of states (*3*). Some of the decreases in enrollment could be because of schools not reporting these data to state immunization programs, or parents might have decided to have the child delay or skip the kindergarten year. The kindergarten assessment for the 2021–22 school year will include these students if they are enrolled in kindergarten for the 2021–22

[¶¶] These totals are the summations of the kindergartners surveyed among programs reporting data for coverage, exemptions, grace periods, and provisional enrollment. Data from cities and territories were not included in these totals.

[***] All states required 2 doses of a measles-containing vaccine. Six states (Georgia, New Jersey, New York, North Carolina, Oregon, and Virginia) require only 1 dose of rubella vaccine. New Jersey and Oregon require only 1 dose of mumps vaccine, and mumps vaccine is not required in Iowa. Local DTaP requirements varied. Nebraska required 3 doses of DTaP, two states (Maryland and Wisconsin) required 4 doses, and all other states required 5 doses, unless dose 4 was administered on or after the fourth birthday. The reported coverage estimates represent the percentage of kindergartners with the state-required number of DTaP doses, except for Kentucky, which required 5 doses of DTaP by age 5 years but reported 4-dose coverage for kindergartners. Two states (Maryland and Nebraska) require only 3 doses of polio vaccine, all other states require 4 doses unless the last dose was given on or after the fourth birthday. Six states required 1 dose of varicella vaccine; 44 states and DC required 2 doses.

[†††] Alabama, Florida, Georgia, Iowa, Mississippi, New Hampshire, New Jersey, Wisconsin, and Wyoming considered kindergartners up to date only if they had received all doses of all vaccines required for school entry.

TABLE. Estimated* vaccination coverage[†] for measles, mumps, and rubella vaccine, diphtheria, tetanus, and acellular pertussis vaccine, and varicella vaccine, grace period or provisional enrollment,[§] and any exemption[¶,] among kindergartners, by immunization program — United States,[††] 2020–21 school year**

Immunization program	Kindergarten population[§§]	% Surveyed[¶¶]	% Vaccine doses: 2 of MMR***	% Vaccine doses: 5 of DTaP[†††]	% Vaccine doses: 2 of varicella[§§§]	% Grace period or provisional enrollment	% Any exemption	Percentage point change in any exemption from 2019–20 school year	% No documentation[¶¶¶]	% Out of compliance****
National estimate[††††]	**3,520,205**	**90.8**	**93.9**	**93.6**	**93.6**	**2.0**	**2.2**	**−0.3**	**1.0**	**3.4**
Median[††††]	**NA**	**NA**	**93.7**	**93.4**	**93.7**	**2.1**	**2.5**	**−0.2**	**0.7**	**2.8**
Alabama[§§§§,¶¶¶¶]	56,974	100.0	≥94.7	≥94.7	≥94.7	NP	1.3	0.1	NR	3.7
Alaska[¶¶¶¶,*****]	9,461	92.5	NR	NR	NR	NR	4.0	−1.9	NR	NR
Arizona[†††††]	76,382	93.4	91.9	92.0	95.5	NR	5.5	0.0	NR	0.6
Arkansas[§§§§§]	37,540	95.6	93.2	92.3	92.8	10.0	2.0	0.1	1.2	NR
California[¶¶¶¶,†††††,§§§§§]	498,214	97.5	95.1	94.7	94.8	0.7	0.5	−0.3	NR	NR
Colorado	63,619	97.3	90.5	90.1	89.4	0.5	≥4.2	−0.7	NR	NR
Connecticut[§§§§,¶¶¶¶]	34,396	100.0	95.3	95.3	95.1	NP	2.6	0.1	NR	NR
Delaware[¶¶¶¶]	10,587	9.2	95.7	94.9	95.3	NR	2.4	NA	0.5	6.1
DC[§§§§,¶¶¶¶]	8,262	100.0	78.9	78.5	78.0	NR	0.3	NA	4.8	NR
Florida[§§§§,¶¶¶¶]	207,026	100.0	≥93.3	≥93.3	≥93.3	3.4	3.1	−0.3	NR	0.2
Georgia[§§§§,¶¶¶¶]	83,191	100.0	≥88.5	≥88.5	≥88.5	0.6	2.9	−0.1	1.0	NR
Hawaii[¶¶¶¶]	13,074	9.3	90.7	91.3	87.2	0.1	3.7	−2.4	0.9	NR
Idaho	22,677	98.3	86.5	86.4	86.2	1.5	8.2	0.6	1.2	7.2
Illinois[¶¶¶¶]	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Indiana[¶¶¶¶,******]	78,694	71.4	93.1	83.9	92.8	NR	1.9	−0.3	0.7	16.6
Iowa[§§§§,¶¶¶¶]	39,141	100.0	≥93.4	≥93.4	≥93.4	3.1	2.2	−0.3	NR	1.3
Kansas[¶¶¶¶,§§§§§,¶¶¶¶¶,******]	34,687	32.7	92.6	90.8	91.8	NR	2.0	−0.1	1.3	NR
Kentucky[¶¶¶¶,§§§§§,******]	59,233	86.4	88.9	89.4	88.3	NR	1.0	−0.8	5.9	NR
Louisiana[§§§§]	61,912	100.0	96.2	96.9	93.2	NP	1.1	−0.4	0.3	NR
Maine	13,477	85.0	94.3	94.0	97.0	NR	4.5	−1.4	2.6	NR
Maryland[¶¶¶¶,§§§§§]	65,764	75.6	87.6	89.7	87.3	NR	0.9	−0.5	8.3	NR
Massachusetts[§§§§,¶¶¶¶,§§§§§]	60,724	100.0	95.9	95.7	95.4	NP	1.1	−0.2	0.7	5.1
Michigan[§§§§]	106,657	100.0	94.6	95.4	94.2	0.4	3.7	−0.7	0.2	2.8
Minnesota[†††††]	66,007	95.2	89.8	89.3	89.0	NR	≥2.8	−1.0	NR	NR
Mississippi[§§§§,¶¶¶¶,†††††]	34,028	100.0	≥98.9	≥98.9	≥98.9	0.6	0.1	−0.1	0.3	NR
Missouri[§§§§,¶¶¶¶]	63,093	100.0	92.6	92.6	92.1	NR	≥2.5	−0.2	1.1	NR
Montana[§§§§,¶¶¶¶]	11,279	100.0	92.9	91.9	91.9	2.0	3.5	−0.8	1.1	NR
Nebraska[¶¶¶¶,§§§§§]	25,681	94.8	95.5	96.1	95.1	2.7	2.2	0.0	NR	NR
Nevada[¶¶¶¶]	34,171	94.7	96.1	95.4	95.8	2.1	4.4	0.4	NR	4.1
New Hampshire[¶¶¶¶,******]	10,242	57.0	≥90.8	≥90.8	≥90.8	4.7	2.8	−0.3	NR	1.7
New Jersey[§§§§,¶¶¶¶]	100,144	100.0	≥94.3	≥94.3	≥94.3	1.2	2.2	−0.4	NR	2.2
New Mexico[§§§§,¶¶¶¶]	20,589	100.0	95.7	95.7	95.3	6.3	0.9	−0.6	0.5	NR
New York (including New York City) [¶¶¶¶,†††††]	216,804	91.5	98.3	97.8	98.1	1.0	0.1	0.0	0.2	NR
New York City[¶¶¶¶,†††††]	91,920	94.2	97.4	96.6	97.1	0.9	<0.1	0.0	0.4	NR
North Carolina[¶¶¶¶,§§§§§,******]	120,995	89.0	95.2	95.2	95.1	1.7	1.5	−0.2	NR	2.6
North Dakota	10,116	99.1	93.3	93.1	93.2	NR	4.2	0.3	0.9	NR
Ohio	128,535	91.1	89.6	89.0	88.7	7.1	2.5	−0.3	1.8	NR
Oklahoma[§§§§§]	52,656	90.0	90.5	90.3	96.1	NR	2.4	−0.3	1.0	NR
Oregon[§§§§,§§§§§]	39,568	100.0	92.7	91.6	95.1	NR	5.4	−1.7	0.6	NR
Pennsylvania	129,307	95.0	95.5	95.9	95.3	3.8	2.7	−0.3	0.1	NR
Rhode Island[¶¶¶¶,§§§§§,******]	10,402	93.0	97.0	96.8	96.7	NR	1.0	−0.3	0.5	NR
South Carolina[¶¶¶¶,¶¶¶¶¶]	56,330	26.5	94.4	95.0	94.2	3.9	2.4	−0.2	0.7	NR
South Dakota[¶¶¶¶]	11,512	99.9	94.6	93.7	94.0	NR	3.4	0.7	NR	NR
Tennessee[§§§§,¶¶¶¶,******]	73,819	100.0	96.6	96.4	96.4	1.0	1.9	−0.1	0.5	NR
Texas (including Houston) [§§§§§,******]	377,840	98.9	95.3	95.0	95.0	1.1	2.3	−0.2	0.3	NR
Houston, Texas[§§§§§,******]	39,627	94.9	83.7	83.9	83.1	0.3	1.3	−0.2	0.7	NR
Utah[§§§§]	46,247	100.0	91.4	91.1	91.2	4.1	5.1	−0.3	0.5	1.7
Vermont[§§§§,¶¶¶¶]	5,535	100.0	94.0	93.6	93.3	5.4	3.2	−0.5	NR	NR
Virginia[¶¶¶¶,¶¶¶¶¶]	88,273	2.0	95.8	97.7	94.1	NR	1.5	−0.2	0.1	NR
Washington[§§§§,******]	74,931	100.0	94.4	93.2	93.2	0.6	3.3	−1.3	NR	5.0
West Virginia[¶¶¶¶,†††††]	NR	NA	NR	NR	NR	NR	NR	NA	NR	NR
Wisconsin[§§§§§,******]	63,486	84.5	≥87.2	≥87.2	≥87.2	5.1	5.2	−0.5	0.6	3.1
Wyoming[§§§§,¶¶¶¶]	6,923	100.0	≥90.2	≥90.2	≥90.2	2.4	3.0	−0.5	NR	2.1
Territories and freely associated states										
American Samoa[¶¶¶¶,††††††]	1,045	100.0	87.7	65.2	56.3	NR	0.0	0.0	NR	NR
Federated States of Micronesia	1,604	96.6	98.4	86.1	Nreq	NR	NR	NA	NR	NR
Guam	NR	NA	NR	NR	NR	NR	NR	NA	NR	NR

See table footnotes on the next page.

TABLE. (*Continued*) Estimated* vaccination coverage† for measles, mumps, and rubella vaccine, diphtheria, tetanus, and acellular pertussis vaccine, and varicella vaccine, grace period or provisional enrollment,§ and any exemption¶, among kindergartners, by immunization program — United States,†† 2020–21 school year**

Immunization program	Kindergarten population§§	% Surveyed¶¶	% Vaccine doses: 2 of MMR***	% Vaccine doses: 5 of DTaP†††	% Vaccine doses: 2 of varicella§§§	% Grace period or provisional enrollment	% Any exemption	Percentage point change in any exemption from 2019–20 school year	% No documentation¶¶¶	% Out of compliance****
Marshall Islands¶¶¶¶,†††††	1,016	100.0	99.7	94.4	Nreq	NR	NR	NA	NR	NR
Northern Mariana Islands§§§§	830	100.0	94.5	84.2	95.3	NR	0.0	0.0	NR	NR
Palau	NR	NA	NR	NR	NR	NR	NR	NA	NR	NR
Puerto Rico¶¶¶¶	26,353	NA	NR	NR	NR	NR	NR	NA	NR	NR
U.S. Virgin Islands	NR	NA	NR	NR	NR	NR	NR	NA	NR	NR

Abbreviations: DC = District of Columbia; DTaP = diphtheria, tetanus, and acellular pertussis vaccine; MMR = measles, mumps, and rubella vaccine; NA = not available; NP = no grace period or provisional policy; NR = not reported to CDC; Nreq = not required.

* Estimates adjusted for nonresponse and weighted for sampling where appropriate.

† Estimates based on a completed vaccine series (i.e., not vaccine specific) use the "≥" symbol. Coverage might include history of disease or laboratory evidence of immunity.

§ A grace period is a set number of days during which a student can be enrolled and attend school without proof of complete vaccination or exemption. Provisional enrollment allows a student without complete vaccination or exemption to attend school while completing a catch-up vaccination schedule. In states with one or both of these policies, the estimates represent the number of kindergartners who were within a grace period, were provisionally enrolled, or were in a combination of these categories.

¶ Some programs did not report the number of children with exemptions, but instead reported the number of exemptions for each vaccine, which could count some children more than once. Lower bounds of the percentage of children with any exemptions were estimated using the individual vaccines with the highest number of exemptions. Estimates based on vaccine-specific exemptions use the "≥" symbol.

** Exemptions, grace period or provisional enrollment, and vaccine coverage status might not be mutually exclusive. Some children enrolled under a grace period or provisional enrollment might be exempt from ≥1 vaccinations, and children with exemptions might be fully vaccinated with ≥1 required vaccines.

†† Includes five territories and three freely associated states.

§§ The kindergarten population is an approximation provided by each program.

¶¶ The number surveyed represents the number surveyed for coverage, except in Alaska. The national number does not include Alaska, which did not report coverage but surveyed 8,756 students for exemptions. In other jurisdictions, exemption estimates are based on 27,421 kindergartners for Kansas, 56,330 for South Carolina, 85,873 for Virginia, and 39,627 for Houston.

*** A majority of states require 2 doses of MMR; Alaska, New Jersey, and Oregon require 2 doses of measles, 1 dose of mumps, and 1 dose of rubella vaccines. Georgia, New York, New York City, North Carolina, and Virginia require 2 doses of measles and mumps vaccines and 1 dose of rubella vaccine. Iowa requires 2 doses of measles vaccine and 2 doses of rubella vaccine.

††† Pertussis vaccination coverage might include some DTP vaccinations if administered in another country. A majority of states require 5 doses of DTaP for school entry or 4 doses if the fourth dose was received on or after the fourth birthday; Maryland requires 4 doses and Nebraska requires 3 doses. The reported coverage estimates represent the percentage of kindergartners with the state-required number of DTaP doses, except for Kentucky, which requires 5 doses of DTaP by age 5 years but reported 4-dose coverage for kindergartners.

§§§ A majority of states require 2 doses of varicella vaccine for school entry; Alabama, Arizona, California, Hawaii, Maine, New Jersey, Oklahoma, and Oregon require 1 dose. Reporting of varicella vaccination status for kindergartners with a history of varicella disease varied within and among states; some kindergartners were reported as vaccinated against varicella and others as medically exempt.

¶¶¶ Estimates represent the number of kindergartners with no documentation of any vaccinations or exemptions.

**** Students were considered out of compliance if they did not have complete documentation of having received all required vaccinations but were not eligible for provisional enrollment and did not have documented exemptions for the missing vaccinations. This measure included those with no documentation at all.

†††† National coverage estimates and medians were calculated using data from 47 states (i.e., does not include Alaska, Illinois, or West Virginia) and DC. National grace period or provisional enrollment estimates and median were calculated using data from the 28 states that have either a grace period or provisional enrollment policy and reported relevant data to CDC. National exemption estimate and median were calculated from data from 48 states (i.e., did not include Illinois or West Virginia) and DC. Other jurisdictions excluded were Houston, New York City, American Samoa, Guam, Marshall Islands, Federated States of Micronesia, Northern Mariana Islands, Palau, Puerto Rico, and the U.S. Virgin Islands. National estimate and median were calculated using data from 30 states and DC for kindergartners with no documentation, and 17 states for kindergartners who were out of compliance. Data reported from 3,187,569 kindergartners were assessed for coverage, 3,337,916 for exemptions, 2,467,326 for grace period or provisional enrollment, 1,799,190 for no documentation, and 1,049,075 for out of compliance. Estimates represent rates for populations of coverage (3,510,744), exemptions (3,520,205), grace period or provisional enrollment (2,608,025), no documentation (2,190,919), and out of compliance (1,109,078).

§§§§ The proportion surveyed likely was <100% but is reported as 100% based on incomplete information about the actual current enrollment.

¶¶¶¶ Philosophical exemptions were not allowed.

***** Alaska did not report kindergarten vaccination coverage because of problems with data collection. Vaccination coverage among children aged 63–75 months in VacTrAK, Alaska's Immunization Information System, was 70.2% for MMR, 83.0% for DTaP, and 67.1% for varicella vaccine.

††††† Religious exemptions were not allowed.

§§§§§ Counted some or all vaccine doses received regardless of Advisory Committee on Immunization Practices recommended age and time interval; vaccination coverage rates reported might be higher than those for valid doses.

¶¶¶¶¶ Vaccination coverage data were collected from a sample of kindergartners; exemption data were collected from a census of kindergartners.

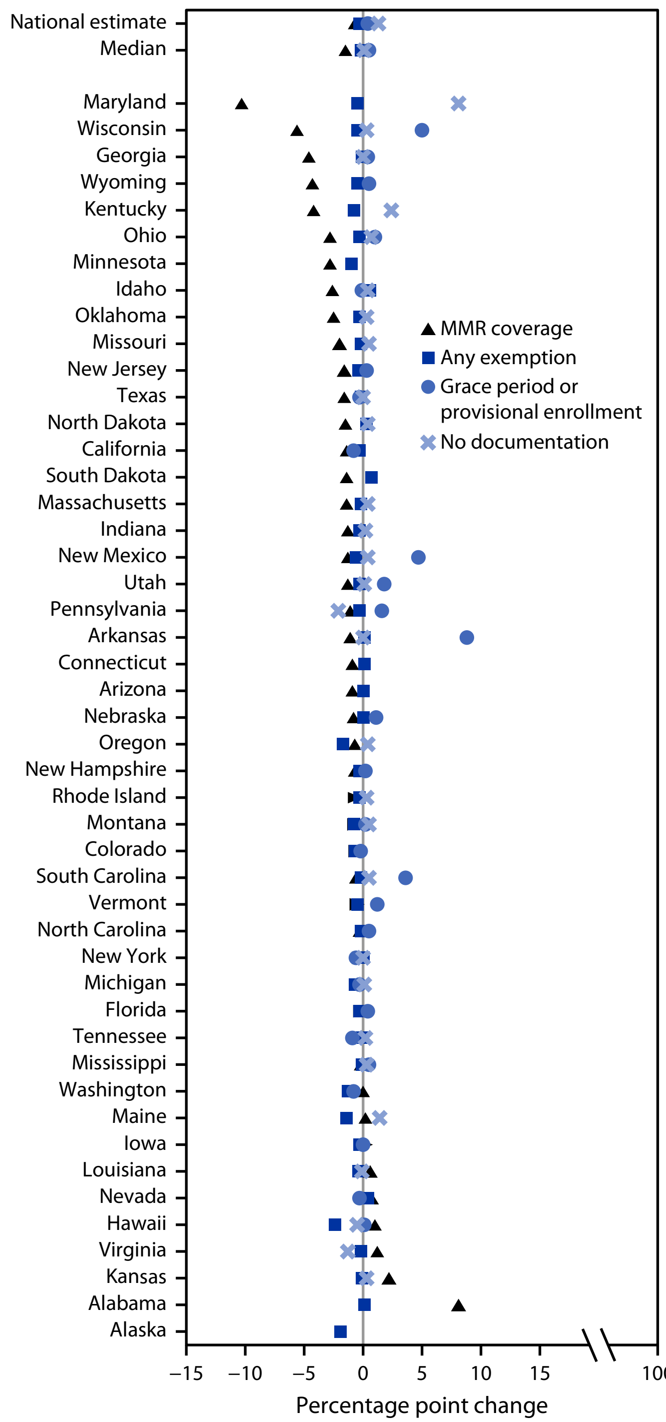
****** Did not include certain types of schools, such as kindergartens in child care facilities, online schools, correctional facilities, or those located on military bases or tribal lands.

†††††† Reported exemption data for public schools only.

school year, but not if they were enrolled in first grade for the 2021–22 school year.

The overall percentage of children with an exemption remained low during the 2020–21 school year at 2.2%; the percentage of children with exemptions decreased in 37 states. Nonexempt undervaccinated students often attend school while in a grace period or are provisionally enrolled; in many states, these policies were expanded either formally or informally during the 2020–21 school year. States described reluctance to schedule and reduced access to well-child appointments, expanded grace period or provisional enrollment, and easing of vaccination requirements for remote learners, reduced submission of documentation by parents, less time for school nurses to follow-up with students missing documentation or vaccines, fewer staff members to conduct kindergarten vaccination coverage assessment and reporting activities, lower response rates from schools, and both extended and compressed kindergarten vaccination coverage data collection schedules, all related to COVID-19 (CDC, School Vaccination Coverage Report, unpublished data, 2021). During the 2020–21 school

FIGURE 1. Change in measles, mumps, and rubella vaccine coverage, any exemption, grace period or provisional enrollment, and no documentation* among kindergartners, by state — 47 states,† 2019–20 to 2020–21 school year



Abbreviation: MMR = measles, mumps, and rubella vaccine.

* States are sorted from lowest to highest by change in MMR coverage (n = 46), any exemption (n = 47), grace period or provisional enrollment (n = 28), and no documentation (n = 29). Not all states reported data for all categories.

† Delaware and District of Columbia did not report for any categories for the 2019–20 school year, and Illinois and West Virginia did not report for any categories for the 2020–21 school year. All were excluded from this analysis.

Summary

What is already known about this topic?

State immunization programs conduct annual kindergarten vaccination assessments to monitor school entry vaccination coverage with all state-required vaccines.

What is added by this report?

For the 2020–21 school year, coverage was approximately 94% for all required vaccines, approximately one percentage point lower than the previous school year. The exemption rate remained low at 2.2%.

What are the implications for public health practice?

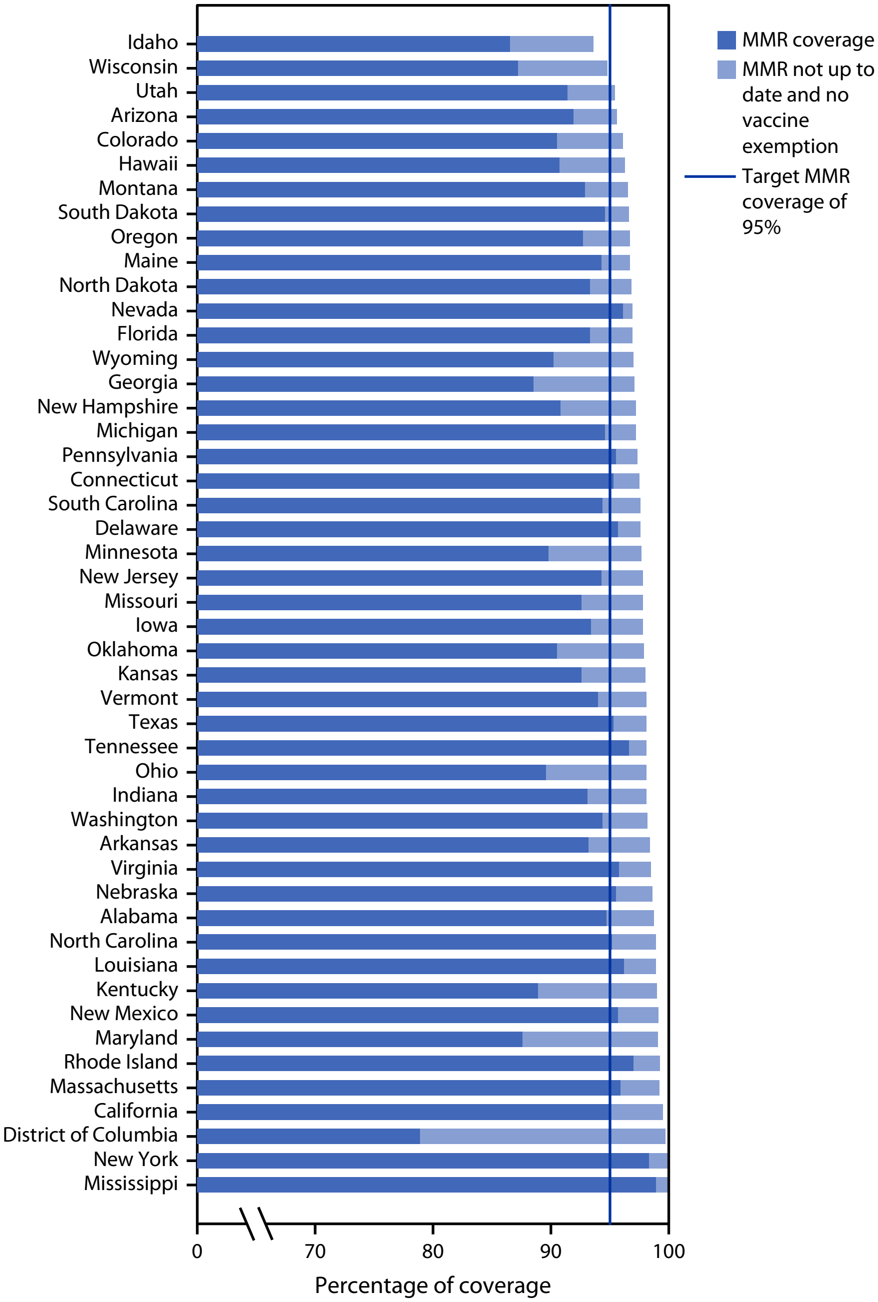
Disruptions caused by COVID-19 reduced reported enrollment, school response rates, and documentation for the 2020–21 school year. Schools and immunization programs can increase follow-up with undervaccinated students to reduce the impact of COVID-19–associated disruptions on vaccination coverage to protect students during the return to in-person learning.

year, 10% of school principals reported that fewer students were fully vaccinated in that school year.§§§ Twenty-seven percent of school nurses reported that fewer students were fully vaccinated in the 2020–21 school year, and 46% of school nurses reported that school vaccination requirements were a somewhat lower or much lower priority compared with previous years (CDC, Impact of the COVID-19 Pandemic on K–12 School Nurses 2020/2021 School Year, unpublished data, 2021). Decreases in vaccine ordering and administration during 2020 also support the measured decreases in coverage (*5*–*8*).

The findings in this report are subject to at least five limitations. First, comparison between states is limited because of variation in states' requirements such as vaccine required, number of doses required, date required, and type of documentation accepted; data collection methods; exemptions allowed; and definitions of grace period and provisional enrollment. Second, representativeness might be negatively affected because of data collection methods that assess vaccination status at different times or miss some schools or students, such as students who were homeschooled. Third, vaccination coverage, exemption rates, or both might be underestimated or overestimated because of inaccurate or absent documentation or missing schools. Fourth, national coverage estimates for the 2020–21 school year include only 47 of 50 states and DC but use lower-bound estimates for nine states; exemption estimates include 48 states and DC but use lower-bound estimates for four states, and grace period or provisional enrollment estimates include only 28 states. Finally, the COVID-19 pandemic response created various barriers that limited the amount and quality of student vaccination data collected and reported

§§§ https://www.cdcfoundation.org/vaccine-triangulation-report?inline

FIGURE 2. Potentially achievable coverage*,† with measles, mumps, and rubella vaccine among kindergartners, by state — 47 states§ and District of Columbia, 2020–21 school year



Abbreviation: MMR = measles, mumps, and rubella vaccine.

* States are ranked from lowest to highest by potentially achievable coverage. Potentially achievable coverage was estimated as the sum of the percentage of students with up-to-date MMR and the percentage of students without up-to-date MMR and without a documented vaccine exemption.

† The exemptions used to calculate the potential increase in MMR coverage for Arizona, Arkansas, Colorado, District of Columbia, Idaho, Maine, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, Nevada, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Rhode Island, Texas, Utah, Vermont, and Wisconsin were the number of children with exemptions specifically for MMR vaccine. For all other states, numbers were based on an exemption to any vaccine.

§ Alaska, Illinois, and West Virginia did not report kindergarten vaccination coverage for the 2020–21 school year and are excluded from this analysis.

by local health departments. These barriers included schools closing or shifting to virtual learning, many states effectively easing vaccination requirements, and the reassigning of state and local health departments' staff members to response activities.

Among children aged 4–6 years, vaccination coverage is higher among those in kindergarten than among those not yet in kindergarten (*9*). Although coverage among kindergartners was lower in the 2020–21 school year than in 2019–20 for all reported vaccines, vaccination coverage might be lower among kindergarten-age children whose school entry has been delayed. Vaccination coverage could be improved by increased outreach by schools and immunization programs to first-time students, including kindergartners and first graders, and by follow-up with undervaccinated students. As schools return to in-person learning, high vaccination coverage is necessary to continue protecting students from vaccine-preventable diseases.

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Poisoning Associated with Consumption of a Homemade Medicinal Liquor — Chongqing, China, 2018

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On May 3, 2018, Chongqing Center for Disease Control and Prevention (CQCDC) received a report of 15 persons with numbness of the tongue or limbs and vomiting of unknown etiology; all ill persons had attended an adult birthday luncheon in Bishan District, Chongqing municipality, in southwest China. Initial reports indicated that one person had died. Within 2 hours, CQCDC and Western Chinese Field Epidemiology Training Program staff members launched an investigation that included identification of cases, laboratory testing of drinks, and patient interviews to identify the cause of what appeared to be a poisoning. Among the 15 cases, five persons died. The investigation of this apparent mass intoxication implicated a homemade alcoholic beverage produced from a highly toxic flowering plant in the genus *Aconitum* used in traditional Chinese medicine. Although the risk of aconite toxicity is known, approximately 5,000 cases of aconite poisoning incidents were reported in China, Germany, Japan, and other countries during 1993–2005; most cases of fatal poisoning occurred in China (*1*). This event highlights the importance of enforcing and complying with existing regulations regarding sale and purchase of *Aconitum* species (also known as wolfbane), and of dissemination of critical public health messages.

Investigation and Findings

Fifty-three persons had attended the birthday luncheon at a hotel restaurant. A case was defined as the onset of numbness of the tongue or limbs, vomiting, heart palpitations, or sudden death in any person who participated in the birthday luncheon. Demographic information and a list of food and beverages consumed by all attendees were obtained through in-person interviews using a structured questionnaire. Medical records for inpatients were requested and abstracted from hospital and outpatient providers.

A total of 15 cases were identified among the 53 attendees (attack rate = 28%). One patient died on the way to the hospital. Among the remaining 14 patients, all were hospitalized, including nine who were admitted to an intensive care unit; four hospitalized patients died. All patients were men with a median age of 52 years (range = 44–65 years). Among the 15 patients, all reported numbness of the tongue or extremities, 14 reported vomiting, nine reported heart palpitations, and nine reported dizziness (Table). Among the 14 hospitalized patients, 11 had cardiac involvement, including ventricular tachycardia (six patients) and premature ventricular contractions (five patients). Myoglobin was elevated in eight patients, and α-hydroxybutyrate dehydrogenase, a marker of myocardial damage, was elevated in five patients. Other indicators of myocardial damage included abnormal levels of creatine kinase isoenzyme and phosphocreatine kinase. The four patients who died in the hospital all had cardiogenic shock and severe lactic acidosis; two also experienced gastrointestinal bleeding.

On the day of the luncheon, the hotel entertained no other guests; all the attendees had eaten breakfast at home. The luncheon started at 12:10 p.m. The 53 attendees sat around five round tables and were all served identical dishes. Beverages consisted of beer, orange juice, soy milk purchased from a local store, and "baijiu," a Chinese liquor generally distilled from fermented sorghum or other whole grains, provided by the hotel. Some attendees also drank a homemade medicinal liquor prepared by the host. All the drinks except for the homemade medicinal liquor were sealed before being opened and consumed. The hotel tap water was from the local water plant.

Symptom onset in the first case was reported at 12:20 p.m., and the last symptom onset occurred 70 minutes later at 1:30 p.m. (Figure 1). The first death occurred at 2:10 p.m. and the last at 10:10 p.m. The median interval from the beginning of the luncheon until symptom onset was 18 minutes among the five fatal cases and 40 minutes among the 10 surviving persons.

The 15 cases occurred among persons seated at three tables (tables C [nine cases among 10 guests and the host], D [two of 10], and E [four of 10]); no cases occurred among the 11 guests seated at table A or the 11 at table B (Figure 2). All 15 attendees who became ill drank the medicinal liquor (100%), including nine who drank only the medicinal liquor (five also consumed the baijiu, and one also drank beer). Five of the nine patients who drank only the medicinal liquor died. All attendees who drank the medicinal liquor became ill. None of the 10 hotel employees serving became ill, nor were any similar cases reported in the surrounding area.

The host of the luncheon had made the liquor, and also died after drinking it; therefore, details of how it was prepared were not available. His wife recalled that aconite roots were given to her husband by a friend several years earlier. The medicinal liquor was prepared several years before, distilled spirits were added to the roots for soaking, and the mixture was kept at the host's home until the day of the birthday luncheon. The host's wife speculated that aconite roots were mistaken by her husband for *Lepidium meyenii*, a nontoxic plant root also reported to be used as medicine.

Examination of the plant roots remaining in the bottle of medicinal liquor were morphologically similar to aconite roots used in traditional Chinese medicine. Samples were sent to the CQCDC Physicochemical and Toxicology Testing Laboratory. The alkaloid database was built by Thermo Trace Finder software (https://www.thermofisher.com/us/en/home.html), and rapidly screened for 42 alkaloids by ultra-performance liquid chromatography-quadrupole/electrostatic field orbitrap high-resolution mass spectrometry. Bullatine A, bullatine B, aconitine, and mesaconitine, which are aconite byproducts, were detected in the medicinal liquor, and all four of these *Aconitum* alkaloids are known to be toxic. Bullatine A and aconitine concentrations were 81.9 μg/mL (a highly toxic dose) and 0.393 μg/mL, respectively. The concentrations of the other two components were extremely low. On the basis of the evidence, the medicinal liquor was suspected to be the cause of the poisoning, most likely the result of bullatine A ingestion. No toxicology testing was performed on any of the persons who were poisoned.

Public Health Response

The local government immediately responded to this public health emergency. The response included patient treatment and joint investigation by public security (police), health departments, and regulatory authorities. At the conclusion of the investigation, public health safety messages were disseminated through the media to ensure public awareness of the poisonous qualities of *Aconitum* species.

Discussion

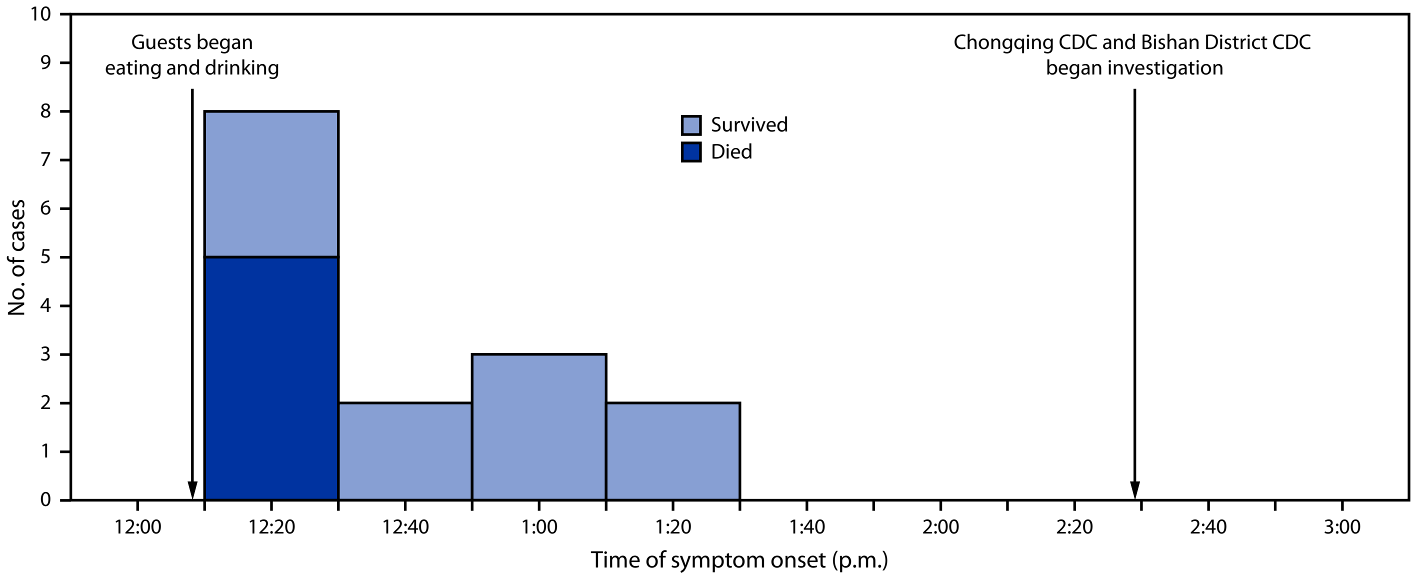
This investigation provides compelling evidence that this mass intoxication was caused by homemade medicinal liquor containing *Aconitum* alkaloids. *Aconitum lycoctonum* is included in the *Aconitum* genus of >250 species of flowering plants belonging to the Ranunculaceae family. These herbaceous perennial plants are native to the mountainous parts of the Northern Hemisphere, growing in the moisture-retentive but well-draining soils of mountain meadows, mainly in southwestern China. Among medicinal herbs, *Aconitum* species are unique: while reportedly considered a beneficial herb root used historically and extensively for medicinal purposes in China,

TABLE. Demographic characteristics, clinical signs and symptoms, laboratory values indicative of myocardial damage, and outcomes of patients with aconite poisoning from homemade medicinal liquor — Bishan District, Chongqing, China, 2018

Patient	Age, yrs	Signs and symptoms	Myoglobin (μg/L)*	α-hydroxybutyrate dehydrogenase (U/L)†	Creatine kinase isoenzyme (IU/L)§	Phosphocreatine kinase (IU/L)¶	Hospitalized	Outcome
A	45	Numbness, vomiting, heart palpitations	NA	NA	NA	NA	No	Died
B**	49	Numbness, vomiting, heart palpitations	81	184	NA	NA	Yes	Died
C**	51	Numbness, vomiting, heart palpitations	247	149	18	100	Yes	Died
D**	55	Numbness, vomiting, heart palpitations	221	239	42	245	Yes	Died
E**	52	Numbness, vomiting	192	216	43	139	Yes	Died
F**	55	Numbness, vomiting, heart palpitations, dizziness	90	NA	NA	NA	Yes	Survived
G	49	Numbness, vomiting, dizziness	41	131	9	129	Yes	Survived
H	65	Numbness, vomiting, heart palpitations, dizziness	NA	198	12	138	Yes	Survived
I	53	Numbness, vomiting, dizziness	58	151	11	122	Yes	Survived
J**	44	Numbness, vomiting, dizziness	98	163	12	220	Yes	Survived
K**	53	Numbness, vomiting, heart palpitations, dizziness	118	NA	NA	NA	Yes	Survived
L**	53	Numbness, vomiting, heart palpitations, dizziness	137	180	39	160	Yes	Survived
M**	52	Numbness, vomiting, heart palpitations, dizziness	NA	139	25	70	Yes	Survived
N	47	Numbness, vomiting	NA	165	24	161	Yes	Survived
O	49	Numbness, dizziness	NA	214	14	148	Yes	Survived

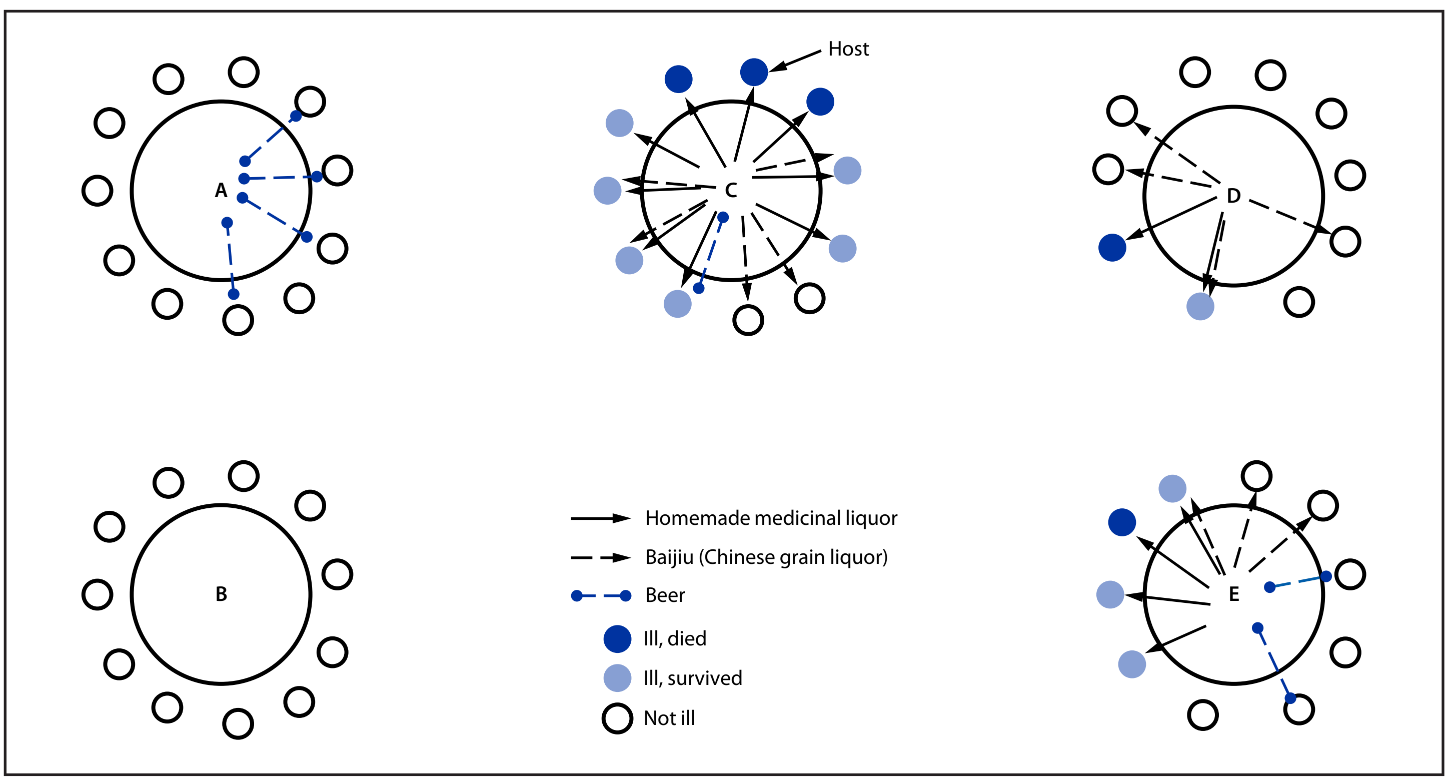
Abbreviations: IU = international units; NA = not available; U = units.
* Normal: <72 μg/L.
† Normal: <182 U/L.
§ Normal: <25 IU/L.
¶ Normal: <200 IU/L.
** Admitted to an intensive care unit.

FIGURE 1. Time line of symptom onset and outcomes among patients with illness and sudden death associated with aconite poisoning from homemade medicinal liquor (N = 15) — Bishan District, Chongqing, China, May 3, 2018



Abbreviation: CDC = Center for Disease Control and Prevention.

FIGURE 2. Seat locations of 53 lunch attendees, drinks consumed, and outcomes among patients with illness and sudden death associated with aconite poisoning from homemade medicinal liquor — Bishan District, Chongqing, China, May 3, 2018



Aconitum species, also known as wolfbane, are highly toxic, and if not prepared correctly, consumption can be rapidly fatal.

Aconite tubers and roots are traditionally used in medications to treat pain and a range of diverse ailments, including diarrhea, edema, asthma, various tumors, rheumatism, rheumatoid arthritis, and other inflammatory disorders (*2*,*3*). They are frequently used in traditional Chinese medicine, and, although the sale of unprocessed *Aconitum* species is prohibited, they can be illicitly acquired in open markets in China, especially in Yunnan and Guizhou provinces. These sales of unprocessed roots occur, even though the activity is forbidden by drug safety regulation stipulated by the State Administration for Market Regulation, and even though the pharmaceutical use of drugs containing *Aconitum* alkaloids is strictly monitored in China.

The medicinal use of *Aconitum* species requires strict adherence to processing and cooking guidance, which is based on the prescribed dosage (*4*). Only licensed manufacturers or authorized practitioners are allowed to prepare *Aconitum* species for medical use. Traditional Chinese methods for processing herbs (páo zhì), including heating, soaking, and boiling for several hours, are reported to enhance the properties or reduce or eliminate toxicity, and in the case of *Aconitum* species, convert the alkaloids to comparatively less toxic or nontoxic derivatives (*5*), so that medicinal liquors containing aconite roots may be safely drunk for health promotion (*3*). If the products are misused or not prepared correctly, aconite ingestion can result in rapid death. Aconite roots and leaves, as well as honey made from aconite nectar, are all highly toxic. If they are not properly decocted for oral consumption, *Aconitum* plant products can be safely used only when applied topically. As little as 0.2 mg (200 μg) of *Aconitum* alkaloids can cause poisoning, and 2.0 mg (2,000 μg) is sufficient to result in death.

Although the risk of aconite toxicity is known, in some areas of China, *Aconitum* plant products are still sought for their purported health benefits. Approximately 5,000 cases of aconite poisoning were reported in China, Germany, Japan, and other countries during 1993–2005; most cases of fatal poisoning occurred in China (*1*). Aconite roots contain various chemical constituents, such as aconitine, mesaconitine, and bullatine A, which have significant pharmacologic activity and are also toxic. The *Aconitum* alkaloids primarily affect the central nervous system, heart, and muscle cells (*6*–*8*), with cardiac damage the most serious consequence. As was the case with most of the victims of this intoxication, severe cases of cardiac toxicity from consumption of aconitine-containing herbal preparations typically manifest clinically as ventricular tachycardia and fibrillation, frequently resulting in death. *Aconitum* alkaloids bind to cardiac muscle cell receptors that regulate sodium-ion channels, preventing repolarization of cells, and resulting in paralysis and death (*9*,*10*).

Summary

What is already known about this topic?

Aconite tubers and roots are used to prepare traditional Chinese medicinal drinks; fatal aconite poisonings resulting from improper production occur every year.

What is added by this report?

Fifteen cases of poisoning, including five deaths, were reported among persons who attended a birthday luncheon at a Chongqing hotel. Intoxication was most likely caused by homemade unlabeled medicinal liquor containing extremely high concentrations of toxic *Aconitum* alkaloids.

What are the implications for public health practice?

Public prevention strategies should focus on increasing recognition of the toxicity of *Aconitum* species and the identification of similar plants, strengthening existing regulation of the sale of raw materials containing *Aconitum* alkaloids, and appropriately labeling homemade products.

The findings in this report are subject to at least three limitations. First, no toxicology testing was done on the victims. However, the hypothesis that the toxicant was a homemade medicinal liquor containing products from *Aconitum* species is supported by the fact that 100% of persons who drank it and none of those who did not drink it became ill. Second, it was not possible to ascertain the precise volume of medicinal liquor consumed by each person, but the amount consumed by each person ranged from 5–125 mL (approximately 1–25 tsp). On the basis of the concentration of residue identified by toxicology testing (81.9 μg/mL), it can be inferred that as little as 25 mL (approximately 5 tsp) contained sufficient *Aconitum* alkaloids to be lethal. Finally, the source of *Aconitum* species could not be ascertained. In a retrospective analysis of case reports of aconite poisoning in China during 2004–2015, the most commonly reported route of exposure was drinking medicinal liquors containing *Aconitum* alkaloids; concurrent ethanol ingestion could rapidly increase the absorption of *Aconitum* alkaloids into the blood (*3*), which might have contributed to the rapid onset and five fatal cases in persons who drank only the medicinal liquor in this event. In addition, the absence of labeling of the root might have contributed to its mistaken inclusion in the recipe.

Although *Aconitum* species can be used medicinally if properly prepared by a licensed manufacturer or authorized practitioner, ingestion can also result in fatal intoxication; therefore, regulations and public health messaging to increase awareness of the toxicity of *Aconitum* species can help prevent inadvertent aconite poisoning. Emphasizing the danger of drinking medicinal liquors containing *Aconitum* alkaloids and the identification of plants that are easily confused are critical to ensure the safe use of *Aconitum* species. Conspicuous labeling of bottles containing homemade brews might prevent misuse, especially oral consumption of products that are only appropriate for topical use. In addition, existing safety monitoring of materials containing *Aconitum* alkaloids and surveillance of the poison control network are critical.

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Hospitalizations of Children Aged 5–11 Years with Laboratory-Confirmed COVID-19 — COVID-NET, 14 States, March 2020–February 2022

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On April 19, 2022, this report was posted as an MMWR *Early Release on the* MMWR *website (https://www.cdc.gov/mmwr).*

On October 29, 2021, the Food and Drug Administration expanded the Emergency Use Authorization for Pfizer-BioNTech COVID-19 vaccine to children aged 5–11 years; CDC's Advisory Committee on Immunization Practices' recommendation followed on November 2, 2021.* In late December 2021, the B.1.1.529 (Omicron) variant of SARS-CoV-2 (the virus that causes COVID-19) became the predominant strain in the United States,† coinciding with a rapid increase in COVID-19–associated hospitalizations among all age groups, including children aged 5–11 years (*1*). COVID-19–Associated Hospitalization Surveillance Network (COVID-NET)§ data were analyzed to describe characteristics of COVID-19–associated hospitalizations among 1,475 U.S. children aged 5–11 years throughout the pandemic, focusing on the period of early Omicron predominance (December 19, 2021–February 28, 2022). Among 397 children hospitalized during the Omicron-predominant period, 87% were unvaccinated, 30% had no underlying medical conditions, and 19% were admitted to an intensive care unit (ICU). The cumulative hospitalization rate during the Omicron-predominant period was 2.1 times as high among unvaccinated children (19.1 per 100,000 population) as among vaccinated¶ children (9.2).** Non-Hispanic Black (Black) children accounted for the largest proportion of unvaccinated children (34%) and represented approximately one third of COVID-19–associated hospitalizations in this age group. Children with diabetes and obesity were more likely to experience severe COVID-19. The potential for serious illness among children aged 5–11 years, including those with no underlying health conditions, highlights the importance of vaccination among this age group. Increasing vaccination coverage among children, particularly among racial and ethnic minority groups disproportionately affected by COVID-19, is critical to preventing COVID-19-associated hospitalization and severe outcomes.

COVID-NET conducts population-based surveillance for laboratory-confirmed COVID-19–associated hospitalizations in 99 counties across 14 U.S. states.†† COVID-19–associated hospitalizations are defined as receipt of a positive SARS-CoV-2 nucleic acid amplification tests or rapid antigen detection test result during hospitalization or during the 14 days preceding admission. This analysis describes hospitalization rates among children aged 5–11 years during March 1, 2020–February 28, 2022. Clinical data from the Omicron-predominant period were compared with those from the Delta-predominant (June 27–December 18, 2021) and pre-Delta (March 1, 2020–June 26, 2021) periods; a variant that accounted for >50% of sequenced isolates was considered predominant. Unadjusted weekly COVID-19–associated hospitalization rates (COVID-19–related hospitalizations per 100,000 children) were calculated by dividing the total number of COVID-19–associated hospitalizations by the population estimates for the counties included in the surveillance area.§§ ICU admission rates were calculated using 2-week periods. Population-based hospitalization rates and data for hospitalized children were compared by COVID-19 vaccination status for the Omicron-predominant period using linkage to state immunization information systems data.¶¶

* https://www.fda.gov/news-events/press-announcements/fda-authorizes-pfizer-biontech-covid-19-vaccine-emergency-use-children-5-through-11-years-age; https://www.cdc.gov/media/releases/2021/s1102-PediatricCOVID-19Vaccine.html

† Omicron became the predominant variant during the week ending December 25, 2021 at 74% of sequenced isolates. https://covid.cdc.gov/covid-data-tracker/#variant-proportions

§ https://www.cdc.gov/coronavirus/2019-ncov/covid-data/covid-net/purpose-methods.html

¶ Vaccinated children aged 5–11 years were defined as those who had received the final dose in their primary series ≥14 days before receiving a positive SARS-CoV-2 test result associated with their hospitalization. Children who had received only 1 vaccine dose ≥14 days before the SARS-CoV-2 test date or had received a single dose of vaccine <14 days before the positive SARS-CoV-2 test results were considered partially vaccinated; these children were not included in rates and were grouped with unvaccinated children in other analyses.

** https://covid.cdc.gov/covid-data-tracker/#covidnet-hospitalizations-vaccination

†† California, Colorado, Connecticut, Georgia, Iowa, Maryland, Michigan, Minnesota, New Mexico, New York, Ohio, Oregon, Tennessee, and Utah.

§§ Rates are calculated using the National Center for Health Statistics' vintage 2020 bridged-race postcensal population estimates for the counties included in surveillance. https://www.cdc.gov/nchs/nvss/bridged_race.htm

¶¶ COVID-NET sites, through agreements with state health departments and other partners, collect COVID-19 vaccination information on COVID-19–associated hospitalizations through state-based vaccination registries. When possible, sites collect COVID-19 vaccination status on all persons with COVID-19 cases who are hospitalized, including the number of vaccine doses received, the vaccine product, and dates of vaccine administration. Vaccination information was not available for Iowa, Maryland, and Michigan and only available for sampled cases in Minnesota.

Trained surveillance officers abstracted medical charts for hospitalized pediatric patients using standardized case report forms through November 2021. Because of the surge in hospitalizations during December 2021–February 2022, some sites examined clinical data on a representative sample of hospitalized children during this period.*** The representative sample included 1,252 of 1,475 (84.9%) children with positive SARS-CoV-2 test results; complete clinical data were available for 595 of 596 (99.8%), 438 of 468 (93.6%), and 219 of 225 (97.3%) sampled children aged 5–11 years during the pre-Delta period, Delta-predominant period, and Omicron-predominant period.

Data regarding likely primary reason for hospital admission,††† symptoms at admission,§§§ underlying medical conditions,¶¶¶ vaccination status (complete versus incomplete), and indicators of severe disease (e.g., length of stay, ICU admission, receipt of invasive mechanical ventilation [IMV],**** and in-hospital death) were collected (*2*). Children who completed their primary COVID-19 vaccination series were defined as those who had received the second dose of a 2-dose series ≥14 days before receipt of a positive SARS-CoV-2 test result associated with their hospitalization. Wilcoxon rank-sum tests and chi-square tests were used to compare medians and proportions, respectively; $p<0.05$ was considered statistically significant. Percentages were weighted to account for probability of selection for sampled cases and adjusted to account for nonresponse. Association of underlying medical conditions with severe COVID-19 (defined as requiring ICU admission or IMV, or in-hospital death) was modeled using multivariable generalized estimating equations (*2*). Multivariable models were limited to children whose primary reason for admission was likely COVID-19–related. Unadjusted risk ratios (RRs), adjusted RRs (aRRs), and 95% CIs were calculated for the association of demographic characteristics, underlying medical conditions, and variant periods with severe COVID-19. Data were analyzed using SAS (version 9.4; SAS Institute). This activity was reviewed by CDC and conducted consistent with applicable federal law and CDC policy.††††

During the Delta- and Omicron-predominant periods, weekly hospitalization rates of children aged 5–11 years peaked during the weeks ending September 25, 2021 and January 22, 2022, respectively; the Omicron-predominant peak (2.8 per 100,000 children) was 2.3 times the Delta-predominant peak (1.2).§§§§ Peak ICU admission rates were 1.7 times as high during Omicron predominance (2-week period ending January 25, 2022 [1.2]) than during Delta predominance (2-week period ending October 2, 2021 [0.7]).

During the Omicron-predominant period, cumulative hospitalization rates among unvaccinated children aged 5–11 years were 2.1 times as high (19.1) as those among vaccinated children (9.2) (Figure). Most (87%) children aged 5–11 years hospitalized during the Omicron-predominant period were unvaccinated (Supplemental Table, https://stacks.cdc.gov/view/cdc/116353). Among unvaccinated children, the largest proportion were Black (34%), followed by White (31%), and Hispanic (19%). There were no significant differences for severe outcomes by vaccination status. However, the number of vaccinated children was small. No vaccinated children required higher level O_2 support (e.g., bilevel positive airway pressure/continuous positive airway pressure [BiPAP/CPAP], high flow nasal canula, or IMV).

COVID-19–related illness was the primary reason for admission among a lower proportion of hospitalized children aged 5–11 years during the Omicron period (73%) compared with the Delta period (84%) ($p<0.01$); across all periods, a majority (78%) of children were hospitalized with COVID-19 as the likely primary reason for admission (Table 1). Of the hospitalized children, 67% had one or more underlying medical conditions. During the period of Omicron predominance, a larger proportion of children hospitalized with COVID-19 had neurologic disorders (33%) compared with those hospitalized during the pre-Delta period (21%) ($p<0.01$), and a lower proportion had obesity (33% and 21%, respectively; $p = 0.01$). Similar trends were observed when

*** During December 2021–February 2022, sites sampled pediatric patients at rates of 12%–100%. Random numbers (1–100) were automatically generated and assigned to each patient on entry into the surveillance database to produce random samples of hospitalized patients for medical record abstraction. Percentages were weighted to account for the probability of selection for sampled patients.

††† Among sampled cases, COVID-NET collects data on the primary reason for admission to differentiate hospitalizations of patients with laboratory-confirmed SARS-CoV-2 infection who are likely admitted primarily for COVID-19 illness from those admitted for other reasons, including inpatient surgery or trauma. During chart review, if the surveillance officer finds that the chief complaint or history of present illness mentions fever/respiratory illness, COVID-19–like illness, or a suspicion for COVID-19, then the case is categorized with COVID-19–related illness as the primary reason for admission.

§§§ COVID-19–related symptoms included respiratory symptoms (congestion/runny nose, cough, hemoptysis/bloody sputum, shortness of breath/respiratory distress, sore throat, upper respiratory infection, influenza-like illness, and wheezing) and nonrespiratory symptoms (abdominal pain, altered mental status/confusion, anosmia/decreased smell, chest pain, conjunctivitis, diarrhea, dysgeusia/decreased taste, fatigue, fever/chills, headache, muscle aches/myalgias, nausea/vomiting, rash, and seizures). Symptoms were abstracted from the medical chart and might be incomplete.

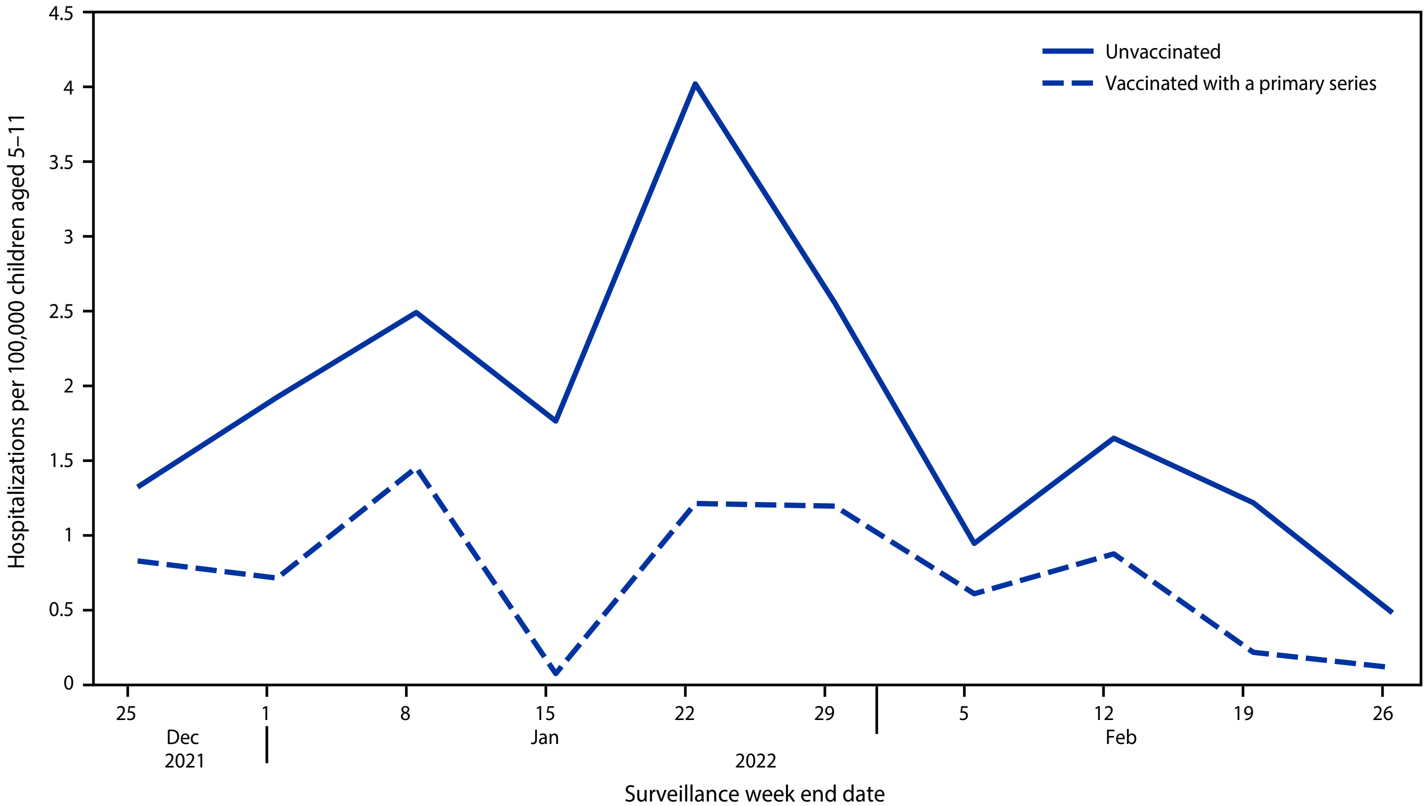
¶¶¶ Thirteen underlying conditions were considered, including airway abnormality, asthma, blood disorders, cardiovascular disease, developmental delay, diabetes mellitus (type 1 or 2), feeding tube dependence, immunocompromising conditions, obesity (body mass index [kg/m^2] ≥95th percentile for age and sex based on CDC growth charts; *International Classification of Diseases*, *Tenth Revision*, *Clinical Modification* codes for obesity; or obesity selected on the case report form), nonasthma chronic lung disease, nondiabetes chronic metabolic disease, nondevelopmental delay neurologic disorders, or other conditions (gastrointestinal or liver disease; renal disease; or rheumatologic, autoimmune, or inflammatory disease).

**** ICU admission and need for mechanical ventilation are not mutually exclusive categories, and patients could have received both.

†††† 45 C.F.R. part 46.102(l)(2), 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.

§§§§ https://covid.cdc.gov/covid-data-tracker/#covidnet-hospitalization-network

FIGURE. Weekly COVID-19–associated hospitalization rates* among children aged 5–11 years, by vaccination status† during the Omicron-predominant period — COVID-NET,§ 11 states, December 25, 2021–February 26, 2022



Abbreviation: COVID-NET = COVID-19–Associated Hospitalization Surveillance Network.

* Number of children aged 5–11 years with laboratory-confirmed COVID-19–associated hospitalizations per 100,000 population; rates are subject to change as additional data are reported.

† Children who completed their primary COVID-19 vaccination series were defined as those who had received the second dose of a 2-dose series ≥14 days before receipt of a positive SARS-CoV-2 test result associated with their hospitalization.

§ COVID-NET sites during the period shown are in the following 11 states: California, Colorado, Connecticut, Georgia, Minnesota, New Mexico, New York, Ohio, Oregon, Tennessee, and Utah.

comparing the Omicron- and Delta-predominant periods. Among children hospitalized during the Omicron-predominant period, 19% required ICU admission, including 15% with no underlying medical conditions; 5% received IMV; none died.

Across periods, 32% of hospitalized children aged 5–11 years had severe COVID-19; 44% of Black children and 26% of Hispanic children experienced severe disease, compared with 22% of White children, but the association between severe COVID-19 and race or Hispanic ethnicity was not statistically significant (Table 2). The risk for severe COVID-19 among hospitalized children was significantly higher among those with diabetes (aRR = 2.5) and obesity (aRR = 1.2). Risk for severe disease was lower among children with asthma (aRR = 0.8), immunocompromising conditions (aRR = 0.7), and those hospitalized during the Delta-predominant (aRR = 0.8) and Omicron-predominant periods (aRR = 0.6). Other conditions were not significantly associated with severe COVID-19 among hospitalized children.

Discussion

Peak weekly COVID-19–associated hospitalization rates among children aged 5–11 years were higher during the Omicron-predominant period than during the Delta-predominant period. During Omicron predominance, shortly after the Food and Drug Administration authorized COVID-19 vaccination for this age group, population-based hospitalization rates among unvaccinated children were twice as high as were those among vaccinated children. Most hospitalized children were unvaccinated, and nearly one in three were Black. Approximately one third had no underlying medical conditions, and nearly one fifth required ICU admission. The potential for serious illness among children aged 5–11 years, including those with no underlying health conditions, highlights the importance of vaccination among this age group.

Vaccination eligibility was expanded to include children aged 5–11 years on November 2, 2021. As of March 5, 2022, 32% of children in this age group had completed a COVID-19

TABLE 1. Demographic and clinical characteristics and outcomes among children aged 5–11 years with laboratory-confirmed COVID-19, by variant period — COVID-NET, 14 states,* March 1, 2020–February 28, 2022

		Variant period, no. (%) of hospitalizations†				
Characteristic	**Total**	**Pre-Delta Mar 1, 2020–Jun 26,2021**	**Delta predominant Jun 27, 2021–Dec 18, 2021**	**Omicron predominant Dec 19, 2021–Feb 28, 2022**	**p-value§ (Omicron versus pre-Delta)**	**p-value§ (Omicron versus Delta)**
Total no. of hospitalized children	**1,475¶**	**596¶**	**482¶**	**397¶**	**NA**	**NA**
Age, yrs, median (IQR)	**8 (6–10)**	8 (6–10)	9 (6–10)	8 (6–10)	0.03	0.01
Sex						
Male	**829 (56.2)**	353 (59.2)	258 (53.6)	218 (54.9)	0.18	0.71
Female	**645 (43.8)**	243 (40.8)	223 (46.4)	179 (45.1)		
Race/Ethnicity**						
White, non-Hispanic	**430 (29.2)**	129 (21.6)	163 (33.9)	138 (34.8)	<0.01	0.42
Black, non-Hispanic	**484 (32.8)**	197 (33.1)	167 (34.7)	120 (30.2)		
Asian or Pacific Islander, non-Hispanic	**64 (4.3)**	24 (4.0)	19 (4.0)	21 (5.3)		
Hispanic	**420 (28.5)**	212 (35.6)	114 (23.7)	94 (23.7)		
Persons of all other races††	**26 (1.8)**	14 (2.3)	6 (1.2)	6 (1.5)		
Unknown race/ethnicity	**50 (3.4)**	20 (3.4)	12 (2.5)	18 (4.5)		
Primary reason for admission§§						
Likely COVID-19–related	**944 (78.2)**	420 (76.7)	364 (84.2)	160 (72.9)	0.31	<0.01
Underlying medical conditions						
One or more underlying medical condition¶¶	**824 (66.7)**	383 (64.9)	288 (66.6)	153 (69.6)	0.25	0.48
Obesity	**302 (29.0)**	152 (33.0)	111 (30.6)	39 (21.3)	0.01	0.03
Neurologic disorder***	**306 (25.3)**	124 (21.0)	106 (24.5)	76 (33.4)	<0.01	0.02
Asthma	**282 (22.4)**	133 (22.6)	100 (23.1)	49 (21.4)	0.73	0.63
Chronic lung disease, not including asthma†††	**130 (10.5)**	62 (10.6)	41 (9.5)	27 (11.4)	0.74	0.46
Cardiovascular disease§§§	**141 (11.8)**	53 (9.1)	55 (13.0)	33 (14.9)	0.02	0.50
Blood disorder¶¶¶	**111 (9.1)**	47 (8.0)	42 (9.9)	22 (9.9)	0.43	0.99
Immunocompromising conditions****	**117 (10.0)**	49 (8.4)	38 (9.1)	30 (13.8)	0.03	0.09
Feeding tube dependence	**78 (6.5)**	32 (5.4)	25 (6.0)	21 (9.0)	0.07	0.18
Diabetes mellitus	**58 (5.0)**	24 (4.1)	18 (4.1)	16 (7.7)	0.06	0.07
Chronic metabolic disease, not including diabetes mellitus††††	**40 (3.3)**	11 (1.9)	19 (4.6)	10 (3.9)	0.09	0.69
Rheumatologic/Autoimmune/Inflammatory disorders§§§§	**44 (3.6)**	19 (3.2)	16 (3.7)	9 (4.2)	0.54	0.79
GI/Liver disease¶¶¶¶	**35 (2.9)**	17 (3.0)	15 (3.5)	3 (2.1)	0.59	0.42
Renal disease*****	**29 (2.4)**	11 (1.8)	11 (2.7)	7 (3.2)	0.25	0.77
Genetic disease†††††	**27 (2.2)**	11 (1.9)	7 (1.6)	9 (3.7)	0.13	0.09
Viral codetections§§§§§						
Positive test results	**85 (12.3)**	33 (12.3)	37 (14.6)	15 (9.7)	0.43	0.17

See table footnotes on the next page.

primary vaccination series.¶¶¶¶ In this study, approximately one half (53%) of unvaccinated hospitalized children were Black or Hispanic, two groups known to have lower vaccination rates (*3*). Implementing strategies that result in equitable receipt of COVID-19 vaccine among children is a public health priority.

The finding that hospitalization rates in unvaccinated children were double those of vaccinated children suggests that vaccines are effective in preventing COVID-19–associated morbidities. This is consistent with recent studies, which suggest that vaccination reduces the risk for Omicron infection, protects against COVID-19–associated illness among children aged 5–11 years and prevents multisystem inflammatory syndrome in children, a severe postinfectious hyperinflammatory condition with a higher incidence in this age group than in other age groups (*4*–*7*).

Consistent with other studies, this analysis demonstrated that the Omicron-predominant period was associated with less severe disease among hospitalized children (*8*). However, both population-based peak hospitalization and ICU admission rates were higher during the Omicron-predominant period compared with those during the Delta-predominant period, likely because of the high transmissibility of the Omicron variant and greater number of persons infected. Although a higher proportion of children hospitalized with laboratory-confirmed SARS-CoV-2 infection were admitted for reasons that were not likely primarily COVID-19–related during the Omicron period compared with the Delta period, most children admitted during both periods were hospitalized primarily for COVID-19. These findings suggest that incidental admissions do not account for the increase in hospitalization rates observed during the Omicron period and reinforce that children continued to experience serious COVID-19 illness.

¶¶¶¶ https://covid.cdc.gov/covid-data-tracker/#vaccination-demographics-trends

TABLE 1. (*Continued*) Demographic and clinical characteristics and outcomes among children aged 5–11 years with laboratory-confirmed COVID-19, by variant predominant period — COVID-NET, 14 states,* March 1, 2020–February 28, 2022

Characteristic	Total	Variant period, no. (%) of hospitalizations† Pre-Delta Mar 1, 2020–Jun 26,2021	Delta predominant Jun 27, 2021–Dec 18, 2021	Omicron predominant Dec 19, 2021–Feb 28, 2022	p-value§ (Omicron versus pre-Delta)	p-value§ (Omicron versus Delta)
Hospitalization outcomes¶¶¶¶¶						
Length of hospital stay, days, median (IQR)	**3 (2–5)**	3 (2–6)	3 (1–5)	3 (1–5)	0.01	0.54
ICU admission	**349 (27.0)**	191 (32.6)	114 (26.1)	44 (18.9)	<0.01	0.05
Invasive mechanical ventilation	**79 (6.2)**	40 (6.7)	29 (6.8)	10 (4.6)	0.28	0.28
In-hospital death	**4 (0.3)**	4 (0.7)	0 (—)	0 (—)	—	—

Abbreviations: COVID-NET = COVID-19–Associated Hospitalization Surveillance Network; GI = gastrointestinal; ICU = intensive care unit; NA = not applicable.

* Includes persons admitted to a hospital during March 1, 2020–February 28, 2022. Maryland contributed data through November 26, 2021. Counties included in COVID-NET surveillance during this period: California (Alameda, Contra Costa, and San Francisco counties); Colorado (Adams, Arapahoe, Denver, Douglas, and Jefferson counties); Connecticut (Middlesex and New Haven counties); Georgia (Clayton, Cobb, DeKalb, Douglas, Fulton, Gwinnett, Newton, and Rockdale counties); Iowa (one county represented); Maryland (Allegany, Anne Arundel, Baltimore, Baltimore City, Calvert, Caroline, Carroll, Cecil, Charles, Dorchester, Frederick, Garrett, Harford, Howard, Kent, Montgomery, Prince George's, Queen Anne's, St. Mary's, Somerset, Talbot, Washington, Wicomico, and Worcester counties); Michigan (Clinton, Eaton, Genesee, Ingham, and Washtenaw counties); Minnesota (Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington counties); New Mexico (Bernalillo, Chaves, Doña Ana, Grant, Luna, San Juan, and Santa Fe counties); New York (Albany, Columbia, Genesee, Greene, Livingston, Monroe, Montgomery, Ontario, Orleans, Rensselaer, Saratoga, Schenectady, Schoharie, Wayne, and Yates counties); Ohio (Delaware, Fairfield, Franklin, Hocking, Licking, Madison, Morrow, Perry, Pickaway and Union counties); Oregon (Clackamas, Multnomah, and Washington counties); Tennessee (Cheatham, Davidson, Dickson, Robertson, Rutherford, Sumner, Williamson, and Wilson counties); and Utah (Salt Lake County).

† Data are from a weighted sample of hospitalized children with completed medical record abstractions. Sample sizes presented are unweighted with weighted percentages.

§ Proportions between the Omicron and Delta- and Omicron-predominant and pre-Delta periods were compared using chi-square tests, and medians were compared using Wilcoxon rank-sum tests; p<0.05 was considered statistically significant.

¶ Data are missing for <3% of observations for all variables.

** If ethnicity was unknown, non-Hispanic ethnicity was assumed.

†† Includes non-Hispanic persons reported as other or multiple races.

§§ Primary reason for admission was collected beginning June 1, 2020; hospitalizations before June 1, 2020 (42) are excluded. Among sampled patients, COVID-NET collects data on the primary reason for admission to differentiate hospitalizations of patients with laboratory-confirmed SARS-CoV-2 infection who are likely admitted primarily for COVID-19 illness rather than for other reasons. During chart review, if the surveillance officer finds that the chief complaint or history of present illness mentions fever or respiratory illness, COVID-19–like illness, or suspected COVID-19, then the case is categorized with COVID-19–related illness as the primary reason for admission. Reasons for admission that are likely primarily not related to COVID-19 include the following categories: inpatient surgery or procedures, psychiatric admission requiring acute medical care, trauma, other, or unknown. Reasons categorized as "other" are reviewed by two physicians to determine whether the admission is likely COVID-19–related.

¶¶ Defined as one or more of the following: chronic lung disease, chronic metabolic disease, blood disorder/hemoglobinopathy, cardiovascular disease, neurologic disorder, immunocompromising condition, renal disease, gastrointestinal/liver disease, rheumatologic/autoimmune/inflammatory condition, obesity, feeding tube dependency, and wheelchair dependency.

*** Includes children with development delay (211), seizure disorders (139), cerebral palsy (62), and other neurologic disorders such as Down Syndrome, neural tube defect, neuropathy, paralysis, and mitochondrial disorders.

††† Includes children with obstructive sleep apnea (74), oxygen dependency (18), bronchopulmonary dysplasia (22), and other chronic lung conditions such as airway abnormality, tracheostomy dependency, restrictive lung disease, pulmonary fibrosis, chronic obstructive pulmonary disease, idiopathic lung disease, chronic bronchitis, bronchiolitis obliterans, and bronchiectasis.

§§§ Includes children with congenital heart disease (55), aortic regurgitation (45), aortic stenosis (30) and other cardiological disorders such as cardiomyopathy and dysrhythmias.

¶¶¶ Includes children with sickle cell anemia (81), asplenia (20), thrombocytopenia (11), and other blood disorders such as thalassemia, coagulopathy, and myelodysplastic syndromes.

**** Includes children with immunosuppressive therapy (70), leukemia (40), immunoglobulin deficiency (13), and other immunocompromising conditions including lymphoma and solid organ malignancies.

†††† Includes children with thyroid dysfunction (20), adrenal disorders (13), and other metabolic conditions such as pituitary dysfunction, inborn errors of metabolism, parathyroid dysfunction, and glycogen or other storage diseases.

§§§§ Includes children with rheumatoid arthritis (32), lupus erythematosus (four), systemic sclerosis (four), and other autoimmune or inflammatory disorders such as Kawasaki disease and juvenile idiopathic arthritis.

¶¶¶¶ Includes children with ulcerative colitis (six), Crohn's disease (two), chronic liver disease (two), and other GI/liver diseases such as nonalcoholic fatty liver disease, hepatitis B, and esophageal strictures.

***** Includes children with renal insufficiency (13), nephrotic syndrome (five), and other renal diseases, such as glomerulonephritis, polycystic kidney disease, and end stage renal disease.

††††† Excludes genetic diseases listed above.

§§§§§ Across periods, the number of children aged 5–11 years tested for additional viral pathogens was 654 (55%); 85 (12%) had received a positive test result. Positive test results include those for respiratory syncytial virus (13), influenza (four), rhinovirus/enterovirus (52), and other viruses (19).

¶¶¶¶¶ Hospitalization outcomes are not mutually exclusive; patients can be included in more than one category.

As in previous investigations, diabetes and obesity were associated with increased risk for severe COVID-19 in children (*2*). One third of hospitalized children aged 5–11 years had underlying neurologic disorders during the Omicron-predominant period, an increase from previous periods. Neurologic disorders have been shown to increase risk for severe illness in other respiratory diseases such as influenza (*9*). Consistent with findings from influenza-associated hospitalizations, this study found

TABLE 2. Demographic characteristics, underlying conditions, and variant periods associated with severe COVID-19* among children aged 5–11 years hospitalized with COVID-19 as the primary reason for admission† — COVID-NET, March 1, 2020–February 28, 2022

	No. (%) of hospitalized children§				Bivariate models	Multivariable models
Characteristic	**Severe disease**		**No severe disease**		**RR (95% CI)**	**aRR (95% CI)**
Age, yrs, median (IQR)	304	8 (6–10)¶	639	8 (6–10)¶	1.02 (1.00–1.04)	1.02 (0.99–1.05)
Sex						
Male	165	53.5	345	52.9	1.02 (0.86–1.21)	1.03 (0.87–1.21)
Female	139	46.5	294	47.1	Ref	Ref
Race/Ethnicity						
White, non-Hispanic	67	22.4	180	28.0	Ref	Ref
Black, non-Hispanic	134	43.6	224	34.9	1.36 (0.85–2.18)	1.38 (0.95–2.00)
Asian or Pacific Islander, non-Hispanic	13	4.4	28	4.6	1.15 (0.44–3.01)	1.13 (0.47–2.76)
Hispanic	78	25.9	172	27.2	1.13 (0.79–1.63)	1.15 (0.70–1.88)
Unknown/Other races**	12	3.7	35	5.2	0.91 (0.35–2.36)	0.97 (0.41–2.27)
Underlying medical conditions†						
Diabetes mellitus††	34	12.2	18	3.3	2.16 (1.46–3.20)	2.47 (2.12–2.87)
Chronic lung disease§§	45	15.2	69	10.8	1.29 (0.89–1.88)	1.35 (0.81–2.24)
Feeding tube dependence	31	10.3	35	5.9	1.46 (1.29–1.66)	1.28 (0.97–1.69)
Neurologic disorder	91	31.3	159	24.9	1.24 (1.03–1.50)	1.23 (0.92–1.63)
Chronic metabolic disease§§	14	4.6	22	3.5	1.22 (0.81–1.85)	1.20 (0.85–1.70)
Obesity	87	27.1	151	23.7	1.13 (1.00–1.28)	1.19 (1.06–1.34)
Cardiovascular disease	42	14.4	84	13.5	1.05 (0.91–1.21)	0.99 (0.82–1.19)
Asthma	64	21.0	177	26.7	0.80 (0.66–0.97)	0.75 (0.65–0.86)
Immunocompromising condition	18	6.1	71	11.7	0.59 (0.50–0.70)	0.68 (0.60–0.78)
Blood disorder	18	6.2	81	12.6	0.55 (0.28–1.12)	0.56 (0.29–1.07)
Other¶¶	39	13.3	80	12.9	1.02 (0.90–1.16)	0.91 (0.71–1.17)
Variant periods						
Pre-Delta	154	47.7	266	36.4	Ref	Ref
Delta-predominant	112	34.8	251	35.7	0.82 (0.72–0.93)	0.83 (0.69–0.99)
Omicron-predominant	38	17.5	122	28.0	0.59 (0.47–0.74)	0.57 (0.43–0.76)

Abbreviations: aRR = adjusted risk ratio; COVID-NET = COVID-19–Associated Hospitalization Surveillance Network; ICU = intensive care unit; Ref = referent group; RR = risk ratio.
* Defined as requiring ICU admission or invasive mechanical ventilation, or in-hospital death.
† Among sampled patients, COVID-NET collects data on the primary reason for admission to differentiate hospitalizations of patients with laboratory-confirmed SARS-CoV-2 infection who are likely admitted primarily for COVID-19 illness rather than for other reasons. During chart review, if the surveillance officer finds that the chief complaint or history of present illness mentions fever or respiratory illness, COVID-19–like illness, or suspected COVID-19, then the case is categorized with COVID-19–related illness as the primary reason for admission. Reasons for admission that are likely primarily not related to COVID-19 include the following categories: inpatient surgery or procedures, psychiatric admission requiring acute medical care, trauma, other, or unknown. Reasons categorized as "other" are reviewed by two physicians to determine whether the admission is likely COVID-19–related.
§ Data are from a weighted sample of hospitalized children with completed medical record abstractions. Sample sizes presented are unweighted with weighted percentages.
¶ Age was modeled as a continuous variable and presented as the median and IQR.
** Includes non-Hispanic persons reported as other, multiple races, and unknown race or ethnicity.
†† Includes type 1 and type 2 diabetes mellitus.
§§ Chronic lung disease excludes asthma and chronic metabolic disease excludes diabetes mellitus.
¶¶ Includes liver disease; renal disease; rheumatologic, autoimmune, and inflammatory conditions; and other conditions specified on the case report form.

that some underlying medical conditions, including asthma and immunocompromising conditions, were not associated with increased risk for severe COVID-19, which might be explained by a lower threshold for hospital admission in children with these conditions (*10*).

The findings in this report are subject to at least five limitations. First, COVID-19–associated hospitalizations might have been missed because of testing practices and availability. Second, stratification of hospitalization rate by vaccination status is subject to error if misclassification of vaccination status occurred. Third, analyses based on vaccination status are biased toward the null because partially vaccinated children were grouped with unvaccinated children. Fourth, primary reason for admission was not always clear, and medical charts might not completely capture underlying conditions, potentially resulting in misclassification. Finally, COVID-NET catchment areas include approximately 10% of the U.S. population; thus, these findings might not be generalizable to the rest of the United States.

Potential for serious disease requiring hospitalization, ICU admission, or IMV among children aged 5–11 years reinforces the importance of increasing vaccination coverage among this population. Black children accounted for the highest percentage of unvaccinated children in this analysis and represented one third of COVID-19–associated hospitalizations in this age group. Increasing COVID-19 vaccination coverage among children aged 5–11 years, with particular attention to racial and ethnic minority groups disproportionately affected by COVID-19, is critical to reducing COVID-19–associated morbidity.*****

***** https://www.cdc.gov/coronavirus/2019-ncov/vaccines/stay-up-to-date.html

Summary

What is already known about this topic?

COVID-19 can cause severe illness in children. Children aged 5–11 years became eligible for COVID-19 vaccination on November 2, 2021.

What is added by this report?

During the period of Omicron predominance (December 19, 2021–February 28, 2022), COVID-19–associated hospitalization rates in children aged 5–11 years were approximately twice as high among unvaccinated as among vaccinated children. Non-Hispanic Black children represented the largest group of unvaccinated children. Thirty percent of hospitalized children had no underlying medical conditions, and 19% were admitted to an intensive care unit. Children with diabetes and obesity were more likely to experience severe COVID-19.

What are the implications for public health practice?

Increasing COVID-19 vaccination coverage among children aged 5–11 years, particularly among racial and ethnic minority groups disproportionately affected by COVID-19, can prevent COVID-19–associated hospitalization and severe outcomes.

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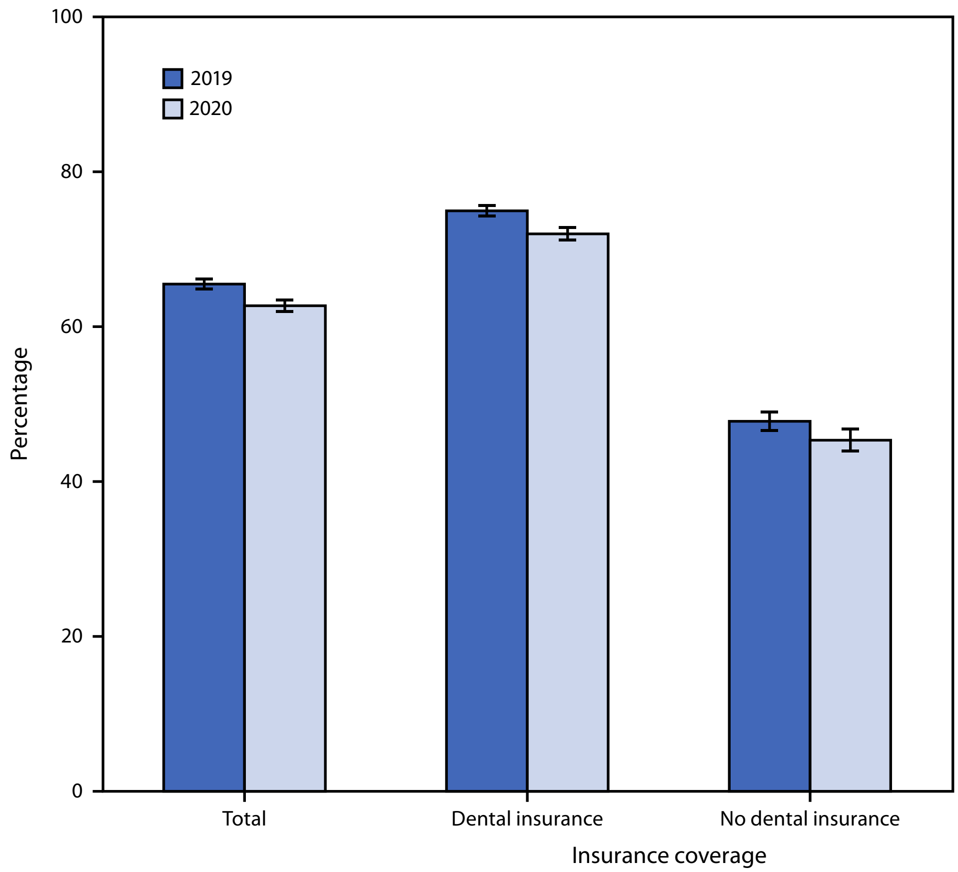
QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage* of Adults Aged 18–64 Years Who Had a Dental Visit in the Past 12 Months,† by Dental Insurance§ and Year — National Health Interview Survey, United States, 2019–2020¶



* 95% CIs indicated by error bars.

† Based on responses to the question, "About how long has it been since you last had a dental examination or cleaning?" Response of "Within the past year (anytime less than 12 months ago)" was considered as having had a dental visit in the past 12 months.

§ Based on responses to survey questions, adults were classified as having dental insurance if they had a private plan with dental benefits, a single service dental plan, or were covered by Medicaid with extensive dental benefits.

¶ Estimates are based on household interviews of a sample of the civilian, noninstitutionalized U.S. population.

The percentage of adults aged 18–64 years who had a dental visit during the past 12 months decreased from 65.5% in 2019 to 62.7% in 2020. From 2019 to 2020, the percentage of adults aged 18–64 years who had a dental visit during the past 12 months decreased for those with dental insurance (75.0% to 72.0%) and those without dental insurance (47.8% to 45.4%). In both 2019 and 2020, adults with dental insurance were more likely to have a dental visit than those without dental insurance.

Source: National Center for Health Statistics, National Health Interview Survey, 2019 and 2020. https://www.cdc.gov/nchs/nhis.htm

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For more information on this topic, CDC recommends the following link: https://www.cdc.gov/oralhealth/oral_health_disparities/index.htm

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