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Progress Toward Poliomyelitis Eradication — Afghanistan, January 2022–June 2023

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Abstract

When the Global Polio Eradication Initiative began in 1988, wild poliovirus (WPV) transmission was reported in 125 countries. Since 2017, Afghanistan and Pakistan remain the only countries with uninterrupted endemic WPV type 1 (WPV1) transmission. This report describes activities and progress toward polio eradication in Afghanistan during January 2022–June 2023. Two WPV1 cases were reported during January–December 2022 and five during January–June 2023 (as of August 26), all from three provinces in the southeast and east regions bordering Pakistan. All five 2023 patients had reportedly received ≥16 oral poliovirus vaccine doses. WPV1 was detected in sewage samples from a site in the south region in May 2023 and one in the north region in June 2023, the first detections since February 2021 and March 2020, respectively. Restrictions on house-to-house vaccination limit the effectiveness of vaccination campaigns in parts of the south and northeast regions. Because of population movement, the risk for transmission in Afghanistan and Pakistan will remain if WPV1 circulation continues in either country. Despite operational improvements in vaccination activities, interruption of WPV1 transmission in Afghanistan will require committed, uninterrupted efforts, including ongoing coordination with Pakistan on polio eradication activities, to address vaccination coverage gaps that sustain WPV1 circulation.

Introduction

Worldwide, wild poliovirus (WPV) cases have decreased by more than 99.9% since the Global Polio Eradication Initiative (GPEI) began in 1988, and global eradication of indigenous WPV types 2 and 3 has been certified. However, endemic transmission of indigenous WPV type 1 (WPV1) has never been interrupted in Afghanistan and Pakistan. These countries share a long (1,600 mile [2,600 km]) border frequently traversed by highly mobile populations (*1*). The GPEI 2022–2026 strategic plan set the end of 2023 as the target for interrupting all WPV1 transmission (*2*). Afghanistan reported 56 WPV1 cases during 2020 and four during 2021 (*3*,*4*). After years of active conflict, the Afghanistan government was replaced by Taliban authorities in August 2021. Restrictions on supplementary immunization activities (SIAs)* that prohibited house-to-house oral poliovirus vaccine (OPV) vaccination (the most effective SIA modality) existed for many years in Taliban-held areas. These restrictions remain in parts of the south and northeast regions, where SIA OPV administration is allowed only at health facilities, mosques, and polio vaccination sites.

* SIAs are mass immunization campaigns intended to supplement the routine immunization systems and generally target infants and children aged <5 years with OPV, regardless of their vaccination history. In countries with poliovirus circulation, children frequently receive multiple SIA doses per year. In Afghanistan, SIAs are conducted using a variety of modalities, such as house-to-house, mosque-to-mosque, and site-to-site vaccination.

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Methods

Data and SIA information were provided by the Afghanistan National Emergency Operations Centre, which includes officials from UNICEF, the World Health Organization (WHO), and other GPEI partners. Lot quality assurance sampling (LQAS)[†] surveys assess district-level SIA quality. Acute flaccid paralysis (AFP) surveillance detects recent onset of weakness among children. Detection of ≥2 nonpolio AFP (NPAFP) cases[§] per 100,000 children aged <15 years, coupled with collection of adequate stool specimens[¶] from ≥80% of AFP cases, indicate surveillance that is sufficiently sensitive to detect a case of paralytic polio. Environmental surveillance (ES) for poliovirus in Afghanistan is conducted via systematic sampling of sewage at 37 sites in 17 provinces and virologic testing. Genomic sequencing analyses determine genetic relationships among polioviruses identified in stool and ES specimens. This activity was reviewed by CDC, deemed not research, and was conducted consistent with applicable federal law and CDC policy.[**]

[†] LQAS is a rapid survey method used to assess the quality of vaccination activities after SIAs in predefined areas (lots), such as health districts, using a sample size of 60. LQAS involves dividing the population into lots and ascertaining receipt of vaccination by randomly selecting children within each lot. If more than three children in the sample are unvaccinated, then the SIA quality in that area is classified as failed (i.e., at a pass threshold of ≥90%) and mop-up activities (i.e., search for children recently missed with a focal repeat house-to-house vaccination activity) are recommended. If the 90% threshold is met, the SIA's quality for the area is classified as passed.

[§] NPAFP cases are those that are discarded as not having laboratory or other proof of poliovirus as the cause. The expected background rate of NPAFP is two or more cases per 100,000 children aged <15 years per year, the standard WHO performance indicator target for sufficiently sensitive surveillance to detect a case of polio.

[¶] Adequate stool specimens are defined as two stool specimens of sufficient quality for laboratory analysis, collected ≥24 hours apart, both within 14 days of paralysis onset (i.e., arriving in good condition at a WHO-accredited laboratory with reverse cold chain maintained, without leakage or desiccation, and with proper documentation). The global standard surveillance performance indicator target is ≥80% of AFP cases with adequate stool specimens collected.

Results

Immunization Activities

WHO and UNICEF estimated national 3-dose OPV coverage in Afghanistan among children aged 12–23 months to be 76% during 2022 and 71% during 2021. In 2015, the Global Commission for the Certification of the Eradication of Poliomyelitis declared wild poliovirus type 2 to be eradicated.[††] In 2016, Afghanistan and all other OPV-using countries implemented a global synchronized switch from trivalent OPV (containing Sabin-strain types 1, 2, and 3) to bivalent OPV (bOPV, containing Sabin-strain types 1 and 3) and ≥1 dose of inactivated poliovirus vaccine (IPV), which includes all three serotypes. Estimated 1-dose IPV coverage in Afghanistan was 71% in 2022 and 67% in 2021 (*5*). Vaccination coverage

[**] 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.

[††] https://polioeradication.org/news-post/global-eradication-of-wild-poliovirus-type-2-declared/

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among children with NPAFP, on the basis of review of immunization cards and caregiver recall of routine immunization (RI) and SIA vaccination dose histories, serves as a proxy for RI and SIA coverage and allows for subnational level analyses. Among 3,308 infants and children aged 6–59 months with NPAFP in 2022, 67% had a history of receipt of ≥3 RI OPV doses; 17% had never received any RI OPV dose. During 2023 to date, reported ≥3-dose RI OPV coverage improved to 73%, and the percentage of infants and children with no OPV doses received through RI declined to 13%. The percentage of infants and children who never received OPV through RI or SIAs (zero-dose children) decreased from 1.4% in 2022 to 0.8% during 2023. Among Afghanistan's 34 provinces, 13 (38%) reported zero-dose children with NPAFP during the reporting period; the highest percentages were in provinces in the south region (Kandahar = 6%; Uruzgan = 5%; and Helmand = 4%).

Twelve SIAs were conducted during 2022: six national immunization days (NIDs), three subnational immunization days (SNIDs), and three case-response campaigns. Five SIAs were conducted during January–June 2023: one NID, two SNIDs, and two case-response campaigns. All SIAs used bOPV. The percentage of the target population (children aged <5 years) living in areas where NIDs were conducted without restrictions on house-to-house vaccination varied during 2022 from 50% during January, to 76% during September and was 68% for the March 2023 NID. Reported NID OPV coverage was approximately 100% in areas without restrictions on house-to-house vaccination; in areas with such restrictions, NID coverage ranged from 71% during January 2022 to 86% during March 2023.

LQAS surveys throughout the reporting period included areas with and without restrictions on house-to-house vaccination. One LQAS lot represented a single district, except in some larger urban districts. Total lots assessed per NID increased from 174 during February 2022 to 357 during March 2023. The percentage of lots reported as having passed increased from 51% (March 2022) to 77% (March 2023). Lots in the south and northeast regions constituted 23% of all lots surveyed during the reporting period but 58% of all lots that failed. Only 16% of lots surveyed in the south region passed, and 0% in Kandahar province passed. In the March 2023 NID, 93% of lots passed in districts with no restrictions on house-to-house vaccination, compared with only 6% in districts with restrictions.

Vaccination is offered to children aged ≤10 years along major travel routes throughout Afghanistan and to persons of all ages at two border crossing points with Pakistan. During January 2022–June 2023, a total of 14,106,879 bOPV doses were administered at transit points and 1,690,497 at border crossings.

AFP Surveillance

Afghanistan's AFP surveillance network includes 1,932 active surveillance sites that are visited by surveillance officers, 3,251 sites with passive monthly reporting, and 49,870 community-based reporting volunteers. During 2022, the national NPAFP rate was 24 per 100,000 persons aged <15 years (regional range = 16–42); during January–June 2023, the annualized NPAFP rate was 26 (regional range = 18–42) (Table). The percentage of AFP cases with adequate specimens was 94%

TABLE. Acute flaccid paralysis surveillance performance indicators, reported cases of wild poliovirus type 1, and number of environmental specimens with detection of wild poliovirus type 1, by region and period — Afghanistan, January 2022–June 2023*

	AFP surveillance performance indicators						No. of WPV1 cases reported			No. of ES samples with WPV1 detected†		
	No. of AFP cases		NPAFP rate§		% with adequate stool specimens¶		2022		2023	2022		2023
Region	2022	2023	2022	2023**	2022	2023	Jan–Jun	Jul–Dec	Jan–Jun	Jan–Jun	Jul–Dec	Jan–Jun
All	**5,368**	**2,876**	**24.3**	**25.5**	**94.4**	**94.2**	**1**	**1**	**5**	**3**	**19**	**32**
Badakhshan	121	59	18.6	17.8	94.2	98.3	0	0	0	0	0	0
Central	981	602	19.5	23.5	97.1	97.0	0	0	0	0	0	0
East	930	479	41.9	41.9	95.1	95.2	0	1	5	3	19	30
North	443	262	16.3	18.8	92.1	90.8	0	0	0	0	0	1
Northeast	496	264	20.1	20.9	93.3	94.3	0	0	0	0	0	0
South	1,060	538	27.8	27.6	91.2	88.5	0	0	0	0	0	1
Southeast	565	264	25.7	23.5	96.3	96.6	1	0	0	0	0	0
West	772	408	26.2	27.1	95.2	96.1	0	0	0	0	0	0

Abbreviations: AFP = acute flaccid paralysis; ES = environmental surveillance; NPAFP = nonpolio acute flaccid paralysis; WPV1 = wild poliovirus type 1.

* Data as of July 9, 2023.

† Total number of ES samples by period, January 2022–June 2023.

§ Cases per 100,000 persons aged <15 years. The surveillance performance indicator target for countries with poliovirus circulation is three or more NPAFP cases per year per 100,000 persons aged <15 years.

¶ Adequate stool specimens are defined as two stool specimens of sufficient quality for laboratory analysis, collected ≥24 hours apart, both within 14 days of paralysis onset, and arriving in good condition at a World Health Organization–accredited laboratory with reverse cold chain maintained, without leakage or desiccation, and with proper documentation.

** Annualized from AFP surveillance data through June 2023.

during both 2022 (regional range = 91%–97%) and 2023 to date (regional range = 89%–98%).

Environmental Surveillance

WPV1 was isolated from 22 ES specimens during 2022, all from east region sites (19 from Nangarhar province and three from Kunar province). During January–June 2023, WPV1 was detected in 32 ES samples: 30 from the east (27 from Nangarhar and three from Kunar) and one each from the south (Kandahar province, collected during May) and north (Balkh province, collected during June) regions, the first WPV1 detections in the south and north regions since February 2021 and March 2020, respectively.

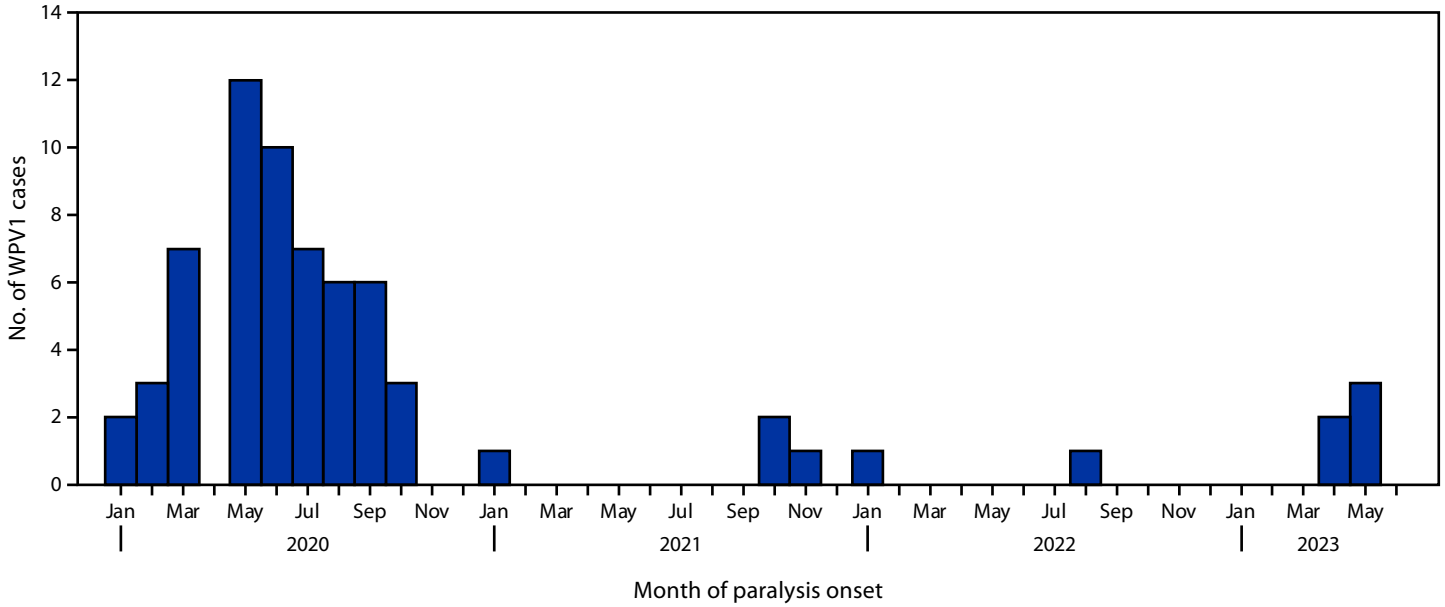
Epidemiology of Poliovirus Cases

After the report of four WPV1 cases during 2021 (one from Ghazni province in the southeast region and three from Kunduz province in the northeast region), two cases were reported during 2022 (one each from Paktika and Kunar provinces in the southeast and east regions, respectively) (Figure 1) (Figure 2). During January–June 2023, five WPV1 cases were reported, all from the eastern province of Nangarhar. The mean patient age at paralysis onset increased from 19 months during 2021 (range = 10–25 months; median = 21 months) to 32 months during 2022 (range = 24–39 months; median = 32 months) and to 66 months during January–June 2023 (range = 30–132 months; median = 48 months). One patient during January 2022–June 2023 (aged 24 months at January 2022 onset) reportedly had never received OPV. The remaining six patients each reportedly received an average of 20 doses via RI and SIA (range = 11–28 doses); all five 2023 patients had received ≥16 total doses each.

Genomic Sequence Analysis of Poliovirus Isolates

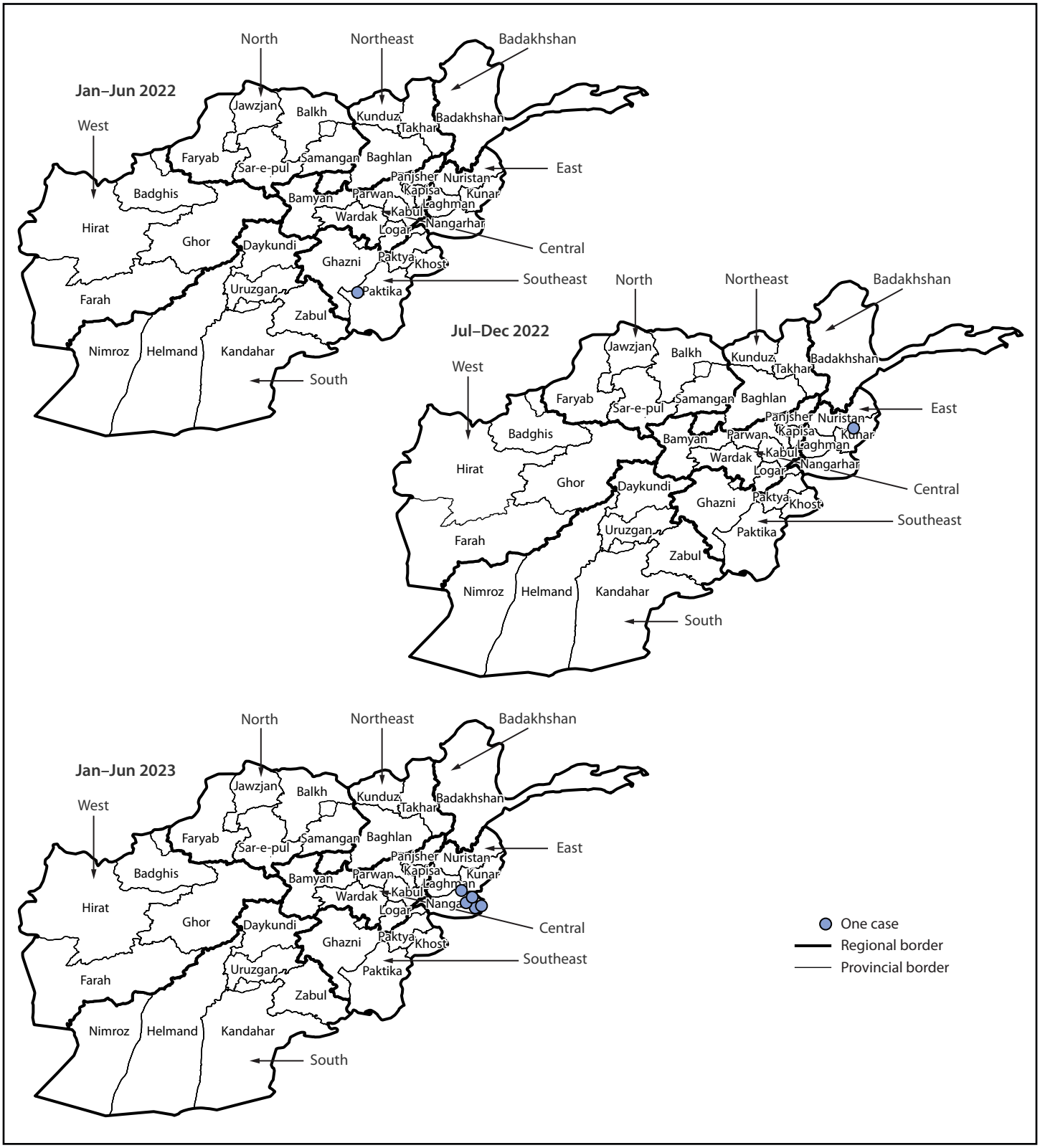
Genomic sequence analysis of the region coding the VP1 capsid protein of poliovirus isolates provided evidence of two genetic clusters (groups of isolates sharing ≥95% of VP1 sequence identity) among recent cases. WPV1 cluster YB3A, the remaining endemic cluster circulating in eastern Afghanistan, was detected in east region AFP cases and environmental specimens from Kunar and Nangarhar provinces during 2022–2023 as well as in environmental specimens from Kandahar (south region) and Balkh (north region) provinces collected during May and June 2023, respectively. A WPV1 cluster YB3C isolate genetically linked to isolates from Pakistan was detected in a January 2022 AFP case in Paktika province near the Pakistan border. Isolates genetically related to circulating YB3A viruses in eastern provinces of Kunar and Nangarhar were detected in ES samples in Khyber Pakhtunkhwa and Punjab provinces, Pakistan (*6*). Two of the five AFP WPV1 viruses detected during 2023 were >1.1% divergent from their closest known genetic matches, suggesting gaps in surveillance,

FIGURE 1. Number of reported cases of polio caused by wild poliovirus type 1 (N = 67), by month of paralysis onset — Afghanistan, January 2020–June 2023*



Abbreviation: WPV1 = wild poliovirus type 1.
* As of August 26, 2023.

FIGURE 2. Reported cases of polio caused by wild poliovirus type 1 (N = 7), by region, province, and period — Afghanistan, January 2022–June 2023*



* As of August 26, 2023.

although this level of divergence did not reach the "orphan virus" threshold.[§§]

Discussion

The geographic distribution of reported polio cases in Afghanistan has narrowed since 2021. The five cases to date during 2023 were from the eastern province of Nangarhar, which conducted the most SIAs during the reporting period. Each of the five patients had reportedly received ≥16 OPV doses through RI and SIAs. The recent scarcity of a reported history of undervaccination among polio patients is consistent with the frequency of SIAs with high reported coverage and with data indicating that malnutrition and diarrheal diseases can interfere with immune response to OPV vaccination; malnutrition affects 54% of Afghanistan's children (*7*,*8*). The current higher median age at paralysis onset might indicate a shift in WPV1 epidemiology, such that the population most susceptible to infection is now dominated by children above the age of the SIA target age group, who might have been missed in some SIAs when they were younger.

The May 2023 detection of WPV1 in Kandahar, the first detection in the south region since February 2021, indicates the continued need to prioritize this region for future vaccination activities. Southern Afghanistan shares a border with Pakistan and is a historical reservoir for poliovirus transmission, with low OPV coverage and restrictions on house-to-house vaccination.

Limitations

The findings in this report are subject to at least two limitations. First, outdated target population estimates might have limited the accuracy of reported SIA coverage. These targets were updated during mid-2023 (increasing by 10% nationwide) and are expected to improve the accuracy of coverage estimates for subsequent SIAs. Second, the history of the reported number of OPV doses received by each patient as reported by the caregiver might be inaccurate depending on caregiver recall and the history-taking methods of the investigator.

Implications for Public Health Practice

Interruption of WPV1 transmission in Afghanistan will require implementation of high-quality house-to-house SIAs, with intense focus on identifying and vaccinating previously missed populations. The risk for WPV1 transmission in Afghanistan and Pakistan will continue as long as WPV1 circulation persists in either country; cross-border synchronization of surveillance and vaccination activities of both countries is essential to interrupting transmission in the two remaining countries with ongoing WPV1 transmission.

[§§] Orphan viruses are ≥1.5% divergent from their closest genetic match (i.e., ≤98.5% identity) and can indicate gaps in AFP surveillance. The Global Polio Laboratory Network bases its findings on the analysis of the genetic divergence of the 906-nucleotide VP1 capsid protein coding region of poliovirus isolates.

Summary

What is already known about this topic?

Wild poliovirus type 1 (WPV1) remains endemic only in Afghanistan and Pakistan.

What is added by this report?

Afghanistan reported two WPV1 cases during 2022 and five during 2023 through June 30. All cases were detected along the Pakistan border, and all patients during 2023 had a history of receipt of ≥16 oral poliovirus vaccine doses. During May 2023, WPV1 circulation was detected for the first time in >2 years in the south region of Afghanistan, where restrictions prohibiting house-to-house vaccination limit the effectiveness of immunization campaigns.

What are the implications for public health practice?

Interruption of WPV1 transmission in Afghanistan is attainable and requires regular and unrestricted supplementary immunization activities (mass campaigns), improved surveillance, and strong coordination of vaccination activities with neighboring Pakistan.

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Thrombocytopenia Associated with Elemental Mercury Poisoning in Two Siblings — Connecticut, July 2022

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Abstract

Two siblings aged 5 and 15 years from Connecticut were hospitalized with petechial rash, oral mucositis, and severe thrombocytopenia approximately 10 days after they played with a jar of elemental mercury they found in their home. Before the mercury exposure was disclosed, the siblings were treated with platelet transfusions, intravenous immune globulin (IVIG) for possible immune thrombocytopenic purpura, and antibiotics for possible infectious causes. When their conditions did not improve after 6 days, poison control facilitated further questioning about toxic exposures including mercury, testing for mercury, and chelation with dimercaptosuccinic acid. The older sibling soon recovered, but the younger child required a prolonged hospitalization for severe thrombocytopenia, ultimately receiving repeated doses of IVIG, steroids, and romiplostim, a thrombopoietin receptor agonist. Close collaboration among multiple agencies was required to identify the extent of mercury contamination, evaluate and treat the other family members, and decontaminate the home. These cases demonstrate the importance of ongoing public health outreach to promote early detection of elemental mercury toxicity, and the need to evaluate for environmental exposures when multiple close contacts experience similar signs and symptoms.

Clinical Presentations

Three weeks after moving into an older single-family home in Connecticut with her family, a girl aged 5 years (patient A) was evaluated at Connecticut Children's emergency department with a 3-day history of petechial rash, oral ulcers, sore throat, chills, subjective fever, nose bleeds, and malaise. She appeared tired but stable, with vital signs notable for fever to 102.4°F (39.1°C), tachypnea (respiratory rate = 36 breaths per minute [normal for age = 18–25]), and tachycardia (pulse = 140 beats per minute [normal for age = 75–118]), but blood pressure measurement within normal limits for age and height (102/68 mmHg). She had tonsillar exudates and oral ulcerations, a petechial rash on her trunk and extremities, diffuse abdominal tenderness, and an enlarged spleen. The remainder of her physical examination findings were unremarkable, including respiratory examination with normal findings (apart from tachypnea). Results of laboratory tests were significant for severe thrombocytopenia (platelets <2,000/μL [normal for age = 150,000–700,000]), anemia, eosinophilia, and elevated erythrocyte sedimentation rate and C-reactive protein, lactate dehydrogenase, and pro-brain natriuretic peptide, an indicator of poor cardiac function (Table). The patient's chest radiograph indicated mild interstitial edema and borderline cardiac enlargement; subsequent echocardiogram results were normal except for mild tricuspid insufficiency. Abdominal ultrasound findings demonstrated splenomegaly.

The patient's signs and symptoms, the abnormal laboratory findings, and the recognized potential for exposure to multiple pets and mice in the home, led to consideration of a broad range of bacterial (including tickborne) and viral diseases, as well as immune thrombocytopenic purpura, an immune-mediated clotting disorder. The child was treated empirically with ceftriaxone and doxycycline for coverage of tickborne diseases. Her fever resolved within 24 hours; however, severe thrombocytopenia (platelets <10,000/μL) persisted despite a platelet transfusion and administration of intravenous immune globulin (IVIG). On the sixth hospital day, she underwent bone marrow aspiration and biopsy that revealed normocellular marrow with normal trilineage hematopoiesis (i.e., the production of platelets, red blood cells, and white blood cells that is not indicative of malignancy or bone marrow failure), and hematopoietic cellularity of 80% with megakaryocytic hyperplasia demonstrating normal bone marrow function with increased platelet precursor cells. In addition, small nonnecrotizing granulomas, a nonspecific indicator of inflammation, were present.

At the time of patient A's evaluation, her maternal half-brother aged 15 years (patient B) was also evaluated at the same hospital for similar complaints, including a 4-day history of petechial rash, oral ulcers, chills, fatigue, and abdominal pain. When examined, he appeared anxious, but he was afebrile; his blood pressure measurement was elevated (142/63 mm Hg [normal for age <120/80]), he was tachypneic (respiratory rate = 27 [normal for age = 12–20]) and mildly tachycardic (pulse = 106 [normal for age = 60–100]). Physical examination revealed a petechial rash on his trunk and extremities, mouth ulcers, conjunctival injection, and abdominal pain. Apart from his tachypnea, findings from examination of his respiratory system were normal. Although edema was not observed initially, mild bilateral lower extremity edema was subsequently observed. Laboratory findings were notable for severe thrombocytopenia (platelets <2,000/μL [normal for age = 150,000–450,000]),

TABLE. Laboratory values at hospital admission for two siblings with elemental mercury vapor poisoning — Connecticut, July 2022

Laboratory test, units	Laboratory results (hospital laboratory reference range)	
	Patient A (age 5 years)	Patient B (age 15 years)
WBC, thousand/μL	5.8 (5.0–15.5)	5.6 (4.5–14.5)
WBC differential	42% neutrophils, 26% lymphocytes, 21% eosinophils, 9% monocytes	47% neutrophils, 34% lymphocytes, 4% eosinophils, 15% monocytes
Hgb, g/dL	9.9 (10.6–14.6)	13.1 (11.4–15.4)
Hematocrit, %	30.6 (32–43.8)	40.1 (34.2–46.2)
Platelets, thousand/μL	<2 (150–700)	<2 (150–450)
Blood urea nitrogen, mg/dL	8 (5–18)	15 (5–18)
Cr, serum, mg/dL	0.4 (0.2–0.7)	0.7 (0.5–1.3)
Aspartate aminotransferase, U/L	30 (9–45)	98 (10–55)
Alanine transaminase, U/L	7 (10–50)	99 (10–55)
Albumin, g/dL	3.4 (3.8–5.4), stable	3.2 (3.2–4.5), 2 days later, declined to 1.9
Lactate dehydrogenase, U/L	483 (120–300)	581 (120–300)
CRP, mg/dL	5.1 (<0.5)	2 (<0.5)
ESR, mm/hr	43 (3–13)	95 (<15)
Ferritin, μg/L	327 (15–150)	—
Pro-brain natriuretic peptide, pg/mL	961 (<125)	—
Urinalysis	Tr Hgb; Tr leukocytes; negative protein; microscopy not performed	Lg Hgb; Lg protein; 2 RBC, up to >25 by hospital day 6, urine protein/Cr ratio >2.9
Mercury concentration, whole blood, μg/L*	315 (<10)	518 (<10)
Mercury concentration, random spot urine, μg /gCr†	409 (<4)	>1,000 (<4)

Abbreviations: Cr = creatinine; CRP = C-reactive protein; ESR = erythrocyte sedimentation rate; Hgb = hemoglobin; Lg = large; NHANES = National Health and Nutrition Examination Survey; RBC = red blood cells; Tr = trace; U = units; WBC = white blood cells.

* Whole blood: reference range of <10 μg/L is from Quest Diagnostics. 2017–2018 NHANES 95th percentiles are 0.960 μg/L for age 1–5 years (patient A) and 1.71 μg/L for age 12–19 years (patient B). https://www.cdc.gov/exposurereport/data_tables.html

† Random spot urine: reference range of <4 μg/gCr is from Quest Diagnostics. 2017–2018 NHANES 95th percentiles are 0.923 μg/gCr for age 3–5 years (patient A) and 0.643 μg/gCr for age 12–19 years (patient B). https://www.cdc.gov/exposurereport/data_tables.html

elevated liver enzymes (aspartate aminotransferase and alanine transaminase), elevated erythrocyte sedimentation rate and C-reactive protein, hypoalbuminemia, nephrotic-range proteinuria, and microscopic hematuria. Similar to those of patient A, findings from patient B's abdominal ultrasound demonstrated splenomegaly. His chest radiograph was normal. He also received empiric ceftriaxone and doxycycline. Given the findings of elevated blood pressure measurements and a serum albumin level of <2.5g/dL, his treatment included fluid restriction and a low sodium diet to reduce the overall risks for worsening of nephrotic syndrome (clinically diagnosed based on findings of nephrotic-range proteinuria, low albumin, and edema). Thrombocytopenia (≤3,000/μL) persisted despite receipt of two platelet transfusions and IVIG.

Investigation and Outcomes

Toxic Exposure Evaluation

Because results of the patients' infectious disease evaluations remained inconclusive after 6 days of hospitalization, the possibility of a toxic exposure causing the observed signs and symptoms was considered, and the Connecticut Poison Control Center (CPCC) was contacted. Medical toxicologists suggested the possibility of elemental mercury exposure and asked that further history be obtained. Patient B then disclosed that patient A had found a small jar (6–8 fluid ounce capacity) full of mercury approximately 10 days before their hospital admission. The mercury spilled on the carpeted floor of a second-floor bedroom. The boy spent about 30 minutes attempting to clean up the spill with his hands, and he estimated that he was able to collect approximately one half of the mercury and replace it in the jar. Other family members were unaware of the spill. The boy continued to sleep in the room, and the girl continued to play there. A week after the spill (several days before admission), another family member used a vacuum cleaner on the carpet in the room. Whole blood mercury concentrations for patients A and B were 315 μg/L and 518 μg/L, respectively, compared with the normal range of <10 μg/L.

Environmental Surveillance and Identification of Additional Cases

At the recommendation of the CPCC, the Connecticut Department of Energy and Environmental Protection (DEEP) was immediately contacted. In collaboration with the local health department, the family was evacuated from the home without delay and placed in temporary housing. Using mercury vapor analyzers recommended for the site conditions, concentrations of mercury vapor in ambient air were 174.6 μg/m^3 outside the closed front door, 99.4 μg/m^3 outside the closed back door, and >999 μg/m^3 on the second floor (the location of the spill), saturating the sensor. During a mercury spill response,

the Agency for Toxic Substances Disease Registry (ATSDR) and the Environmental Protection Agency have recommended that indoor air mercury vapor concentrations of ≥1 μg/m^3 are unacceptable for normal residential occupancy (*1*).

The seven other family members living in the home received testing for mercury poisoning and results indicated elevated whole blood mercury concentrations (range = 125–310 μg/L [normal <10 μg/L]) for all of them; they were all then referred to an environmental medicine clinic for further evaluation. As part of the ongoing response, extensive efforts were undertaken to characterize the mercury contamination within the home. Results indicated that exposures to the family members were highest in the bedroom where the spill occurred and where the children spent time. The jar of mercury was in the house before the family obtained the title to the property, and its original purpose is unknown. The home was successfully decontaminated, and the family was eventually able to return.

Hospital Treatment and Outcomes

Upon disclosure of the mercury exposure, both siblings were treated with dimercaptosuccinic acid* for chelation (used off-label; non-Food and Drug Administration (FDA)–approved indication). Patient B was discharged on hospital day 15 with a platelet count of 47,000/μL and subsequently completed a 19-day course of chelation as an outpatient (Figure). Although dipstick urinalysis results continued to show proteinuria and hematuria, levels of his urine protein-to-creatinine ratio normalized at 0.1 mg per mg. Aided by fluid and salt restriction, the patient's blood pressure measurements normalized within 2–3 days of starting chelation.

In contrast, patient A continued to experience thrombocytopenia, despite an extended chelation course with dimercaptosuccinic acid (19-day initial course followed by a subsequent 16-day course), initial platelet transfusion, a steroid pulse, and a total of three IVIG infusions. On hospital day 42, treatment with weekly romiplostim,† a thrombopoietin receptor agonist (used off-label; non-FDA–approved indication) was initiated, resulting in rising platelet count, and she was discharged on hospital day 46 with a platelet count of 58,000/μL and a whole blood mercury concentration of 39 μg/L. She continued to receive romiplostim therapy for a total of 7 weekly doses until results of her platelet count normalized at 250,000/μL; and the platelet count remained normal after discontinuation of romiplostim.

Discussion

Elemental mercury poisoning is rare and can manifest as various central nervous system, liver, kidney, hematologic, skin, and cardiovascular abnormalities, which can lead to delays in diagnosis (*2*). CDC and ATSDR warn that inhalation of elemental mercury vapors is a known health hazard.§ Because of the volatility of mercury at room temperature, even small spills can generate dangerous mercury vapor concentrations indoors. Using a vacuum cleaner on a spill can increase vaporization of mercury and spread it to different parts of a home. Children are at higher risk for harmful exposures because of their physiology and closer proximity to vapors from mercury spills on the ground.¶ Although mercury-containing devices are becoming less common in the home, sources of elemental mercury vapor (such as broken compact fluorescent light bulbs and glass thermometers) still exist and mercury spills in residential buildings remain a concern.

Hematologic effects from elemental mercury vapor poisoning affecting all cell lines have been reported but remain rare (*3*). Although autoimmune thrombocytopenia and fevers have also been reported from mercury vapor poisoning (*4*,*5*), these two cases of severe thrombocytopenia were likely due to high blood mercury concentrations resulting from approximately 2 weeks of exposure, with patient A's illness representing a particularly protracted case. Test results for Patient A's bone marrow displayed megakaryocytic hyperplasia, suggesting that the thrombocytopenia she experienced was likely due to peripheral platelet destruction, possibly immune-mediated, which led to splenomegaly from sequestration. In addition to thrombocytopenia, evidence of nephrotic syndrome was observed for patient B and was likely related to membranous nephropathy from mercury toxicity, which has been previously reported (*6*).

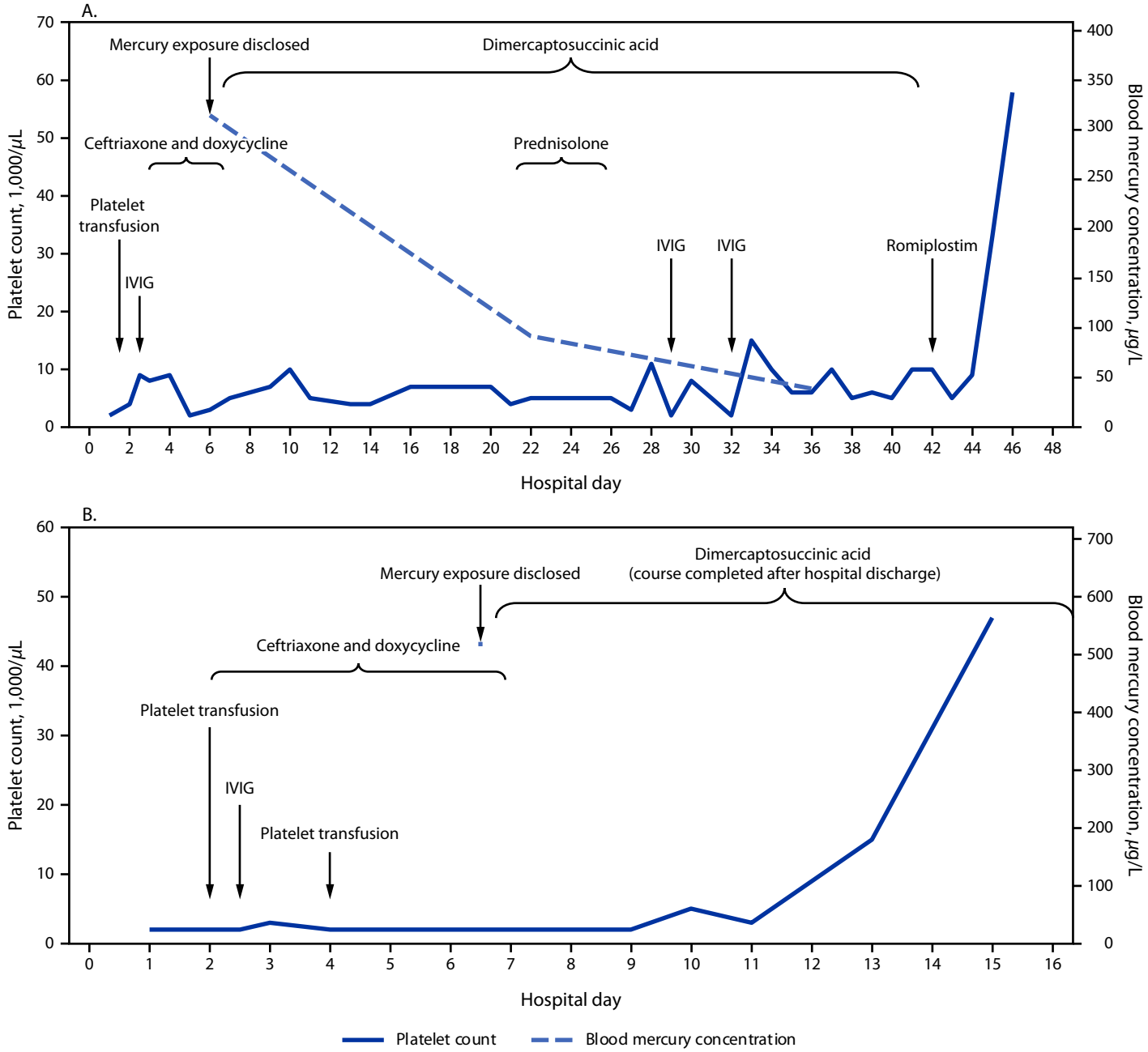
Public Health Implications

These cases highlight the importance of ongoing public health education and outreach to facilitate early detection of elemental mercury toxicity, and the need to consider environmental exposures (in addition to infectious etiologies) when multiple household members experience similar signs and symptoms. ATSDR has prepared materials describing the health effects of mercury exposure, and instructions for proper mercury disposal.** Timely notification of local public health

* https://www.accessdata.fda.gov/drugsatfda_docs/label/2018/019998s021lbl.pdf
† https://www.accessdata.fda.gov/drugsatfda_docs/label/2021/125268s167lbl.pdf

§ https://www.atsdr.cdc.gov/toxfaqs/tfacts46_metallic_mercury.pdf
¶ https://www.atsdr.cdc.gov/mercury/docs/mercuryrtcfinal2013345.pdf
** https://www.atsdr.cdc.gov/mercury/index.html

FIGURE. Platelet count,* blood mercury concentration,† and interventions§ for two siblings,¶ patient A, aged 5 years (A) and patient B, aged 15 years (B) with elemental mercury vapor poisoning resulting from an exposure in the home — Connecticut, July 2022



Abbreviation: IVIG = intravenous immune globulin.
* Platelet counts were <2,000 per /μL on hospital day 1 (patient A) and hospital days 1, 2, 4, 5, 6, 7, 8, and 9 (patient B).
† Blood mercury concentration was measured on only one occasion (hospital day 6) for patient B during hospitalization.
§ Dimercaptosuccinic acid is a chelating agent; romiplostim is a bone marrow stimulant.
¶ The x-axis ranges in panels A and B are different. Patient A was discharged on hospital day 46, and patient B was discharged on hospital day 15.

Summary

What is already known about this topic?

Elemental mercury vapor toxicity can manifest as a variety of clinical signs and symptoms, which can lead to delayed diagnosis, especially when exposure is not disclosed.

What is added by this report?

Two siblings, aged 5 and 15 years, experienced severe thrombocytopenia after elemental mercury vapor exposure. Infectious and hematologic etiologies were considered before the toxic exposure was recognized. Both children required chelation therapy, and the younger child had severe, protracted thrombocytopenia that required multiple medical interventions.

What are the implications for public health practice?

Elemental mercury vapor exposure is still a concern in residential settings, because mercury is used in the manufacture of fluorescent lighting and other devices, and it can still be found in glass thermometers and other sources. Prompt recognition of mercury toxicity and notification of public health authorities is essential for proper treatment and avoidance of further exposure.

and environmental protection agencies is critical for the safe cleanup of elemental mercury spills and possible evacuation or relocation of persons whose homes are found to have unsafe levels of mercury.

This activity was reviewed by CDC, deemed not research, and was conducted consistent with applicable federal law and CDC policy.††

†† 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.

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Seasonal Trends in Emergency Department Visits for Mental and Behavioral Health Conditions Among Children and Adolescents Aged 5–17 Years — United States, January 2018–June 2023

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Abstract

Mental and behavioral health conditions among school-aged children, including substance use disorders and overall emotional well-being, are a public health concern in the United States. Timely data on seasonal patterns in child and adolescent conditions can guide optimal timing of prevention and intervention strategies. CDC examined emergency department (ED) visit data from the National Syndromic Surveillance Program for 25 distinct conditions during January 2018–June 2023 among U.S. children and adolescents aged 5–17 years, stratified by age group. Each year, during 2018–2023, among persons aged 10–14 and 15–17 years, the number and proportion of weekly ED visits for eight conditions increased in the fall school semester and remained elevated throughout the spring semester; ED visits were up to twice as high during school semesters compared with the summer period. Among children aged 5–9 years, the number and proportion of visits increased for five mental and behavioral health conditions. Seasonal increases in ED visits for some conditions among school-aged children warrant enhanced awareness about mental distress symptoms and the challenges and stressors in the school environment. Systemic changes that prioritize protective factors (e.g., physical activity; nutrition; sleep; social, community, or faith-based support; and inclusive school and community environments) and incorporate preparedness for increases in conditions during back-to-school planning might improve child and adolescent mental health.

Introduction

Mental and behavioral health conditions among school-aged children, including substance use disorders and overall emotional well-being, are a public health concern in the United States (*1*–*3*). School, particularly the beginning of a new school year, can be both exciting and increase worries and stress for children and adolescents.* School staff members might also recognize exacerbations of these conditions. Timely data on seasonal patterns in child and adolescent conditions can help guide the optimal timing of prevention and intervention strategies to promote child and adolescent long-term well-being.

Methods

CDC examined emergency department (ED) visit data from the National Syndromic Surveillance Program (NSSP) during January 2018–June 2023 to calculate changes in the number and proportion of ED visits for mental and behavioral health conditions among children and adolescents aged 5–17 years; visits from 1,919 facilities in 46 states were included.† Predetermined *International Classification of Disease, Tenth Revision, Clinical Modification* diagnostic categories from the Healthcare Cost and Utilization Project (HCUP) Clinical Classifications Software Refined§ (version 2022; HCUP) tool were used; categories included were initially limited to those corresponding to 27 distinct conditions using a one-to-many approach (Supplementary Box, https://stacks.cdc.gov/view/cdc/131758). Among these categories, eight (30%) had enough data for reliable visit estimates (relative SE <30%) for all age groups and were retained in the final analysis. Results were reported on categories with consistent and significant increases during the study years.

Surveillance periods were designated as the fall school semester (calendar weeks 37–53; September–December) and spring school semester (calendar weeks 1–23; January–June). Each was compared with the immediately preceding summer period (calendar weeks 24–36; June–September) (Supplementary Table, https://stacks.cdc.gov/view/cdc/132871) (*1*). ED visit ratios and 95% CIs were used to measure relative change in the

* https://www.cdc.gov/childrensmentalhealth/features/COVID-19-helping-children-transition-back-to-school.html; https://www.cdc.gov/healthyyouth/protective/school_connectedness.htm

† To reduce artifactual impact from changes in reporting patterns, analyses were restricted to facilities with a coefficient of variation for ED visits ≤40 and average weekly informative discharge diagnosis ≥75% complete with discharge diagnosis code formatting during January 2018–June 2023. https://www.cdc.gov/nssp/index.html

§ ED visits with multiple codes could be counted across more than one category; however, if multiple codes in a single visit mapped to the same category, the visit was counted only once; a full list of categories and corresponding codes is available at the HCUP website. https://www.hcup-us.ahrq.gov/toolssoftware/ccsr/dxccsr.jsp

proportion of visits. Visit ratio was defined as the proportion of all ED visits for a selected mental and behavioral health condition during the school semester (fall or spring) divided by the proportion of ED visits for that condition during the immediately preceding summer period. Ratios >1 indicated a higher proportion of ED visits with the condition during the surveillance period than during the comparison period; ratios <1 indicated a lower proportion of ED visits with the condition during the comparison period than during the surveillance period. CIs that excluded 1 were considered statistically significant. Absolute differences and percent changes were used to measure the difference in mean weekly ED visit numbers during the school semester (fall or spring) compared with the preceding summer period. Results were stratified by age group: 5–9, 10–14, and 15–17 years. This activity was reviewed by CDC, deemed not research, and was conducted consistent with applicable federal law and CDC policy.[¶]

Results

Each year, during 2018–2023, among persons aged 10–14 and 15–17 years, the number and proportion of weekly ED visits displayed seasonal patterns for depressive disorders, suicidal ideation or self-harm, trauma- and stressor-related disorders, cannabis-related disorders, lifestyle or life management factors, mood disorders, poisoning by drugs, and symptoms of mental and substance use conditions. Compared with the summer period, higher mean weekly visit numbers and relative proportion of visits were observed during the fall school semester (i.e., depressive disorders, suicidal ideation or self-harm, and trauma- and stressor-related disorders) and spring school semester (i.e., depressive disorders, suicidal ideation or self-harm, trauma- and stressor-related disorders, lifestyle or life management factors, mood disorders, poisoning by drugs, and symptoms of mental and substance use conditions). ED visits briefly decreased each year corresponding to the typical winter holiday break period during the last week of November and December, followed by a return to previous levels (Figure) (Supplementary Figure, https://stacks.cdc.gov/view/cdc/132872).

Among persons aged 10–14 years and 15–17 years, the proportion of ED visits for depressive disorders increased in both the fall and spring school semesters each year during 2018–2023 compared with the preceding summer period (range of visit ratios across fall and spring school semesters: 1.19–1.95 among persons aged 10–14 years and 1.16–1.60 among those aged 15–17 years), suicidal ideation or self-harm (1.13–2.00 and 1.15–1.74, respectively) and trauma- and stressor-related disorders (1.07–1.62 and 1.05–1.43, respectively). During the spring school semester, the proportion of visits increased for four additional conditions: lifestyle or life management factors (range of visit ratios for spring school semesters: 1.32–1.88 among persons aged 10–14 years and 1.07–1.64 among those aged 15–17 years, respectively), mood disorders (1.12–1.73 and 1.13–1.56, respectively), poisoning by drugs (1.05–2.03 and 1.10–1.84, respectively), and symptoms of mental and substance use conditions (1.19–1.47 and 1.08–1.55, respectively) when compared with the preceding summer period (Table 1). For cannabis-related disorders, the proportion of ED visits increased among both children and adolescents aged 10–14 years and 15–17 years during fall 2018 (visit ratio: 1.25 among persons aged 10–14 years and 1.13 among those aged 15–17 years, respectively), spring 2019 (1.36 and 1.22, respectively), spring 2020 (1.61 and 1.66, respectively), fall 2021 (1.39 and 1.17, respectively), spring 2022 (1.91 and 1.48, respectively), and spring 2023 (1.62 and 1.24, respectively). The proportion of weekly ED visits increased among children aged 5–9 years for depressive disorders, suicidal ideation or self-harm, trauma- and stressor-related disorders, mood disorders, and symptoms of mental and substance use conditions.

The number of weekly visits also increased for all eight mental and behavioral health conditions in the fall and spring semesters when compared with the preceding summer period among children and adolescents aged 10–14 and 15–17 years, except when comparing the spring 2020 school semester with the preceding summer 2019 period; cannabis-related disorders were the only exception in which negative percent change (–4.6%) in weekly visits was also observed among adolescents aged 15–17 years during fall 2020 (Table 2). Weekly ED visits among children aged 5–9 years were higher during school semesters when compared with corresponding summer periods for depressive disorders, suicidal ideation or self-harm, trauma- and stressor-related disorders, mood disorders, and symptoms of mental and substance use conditions, except during the spring 2020 school semester; the volume of visits was low for conditions examined when compared with children and adolescents aged 5–17 years.

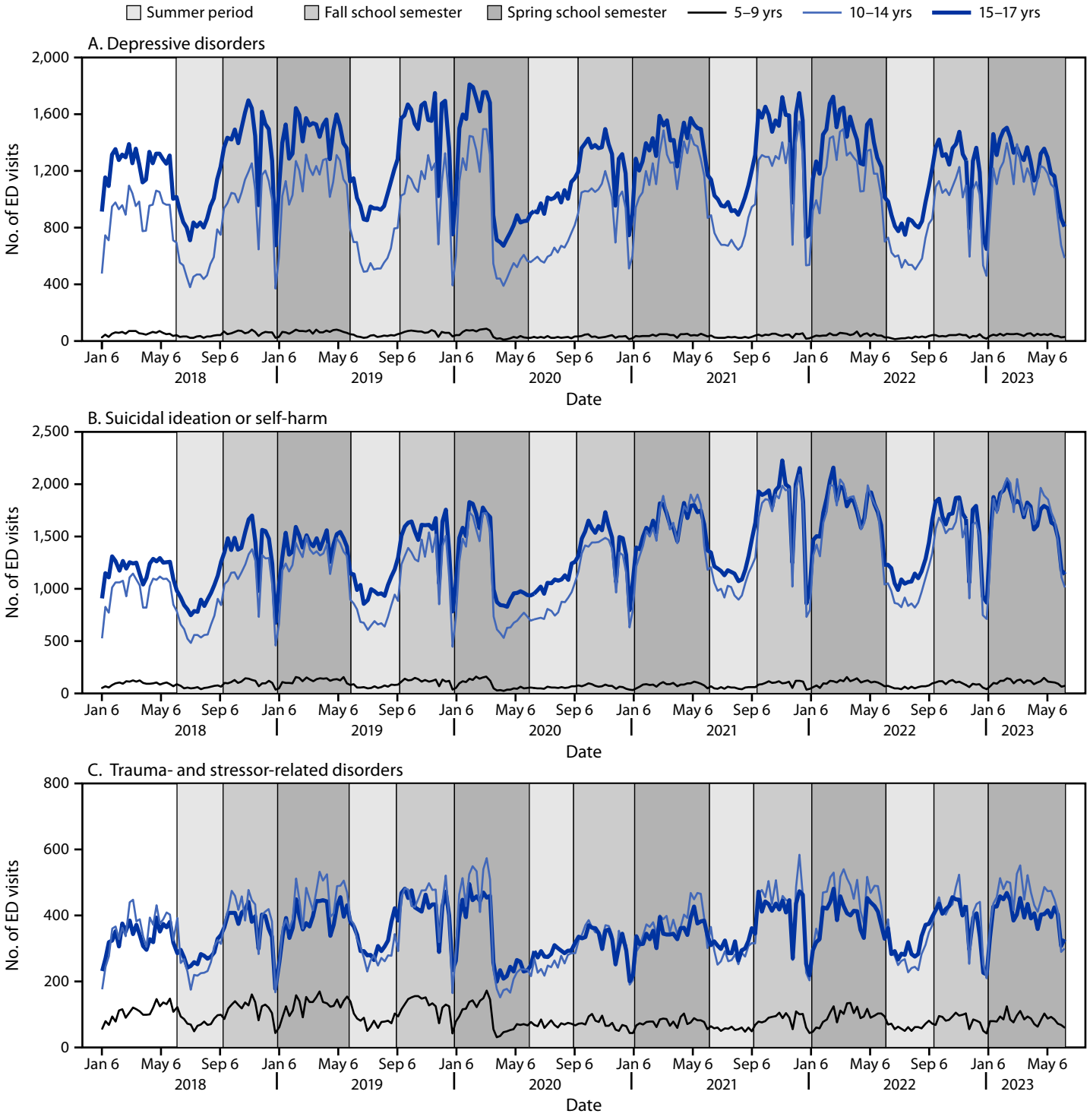
Discussion

Each year, during 2018–2023, the number and proportion of weekly ED visits for eight mental and behavioral health conditions displayed seasonal increases during the fall and spring school semesters compared with the summer period; timing of increase varied by specific conditions. Trends suggest that students might need additional mental health support during the back-to-school period in the fall and throughout the academic year.

Visit patterns during the 2020 spring school semester showed a relative increase in incidence (visit ratio >1) and lower mean

[¶] 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.

FIGURE. Weekly trends in the number of emergency department visits* for depressive disorders (A), suicidal ideation or self-harm (B), and trauma- and stressor-related disorders (C) among children and adolescents aged 5–17 years, by age group — National Syndromic Surveillance Program,† United States, January 2018–June 2023§



Abbreviation: ED = emergency department.

* To reduce artifactual impact from changes in reporting patterns, analyses were restricted to facilities with a coefficient of variation for ED visits ≤40 and average weekly informative discharge diagnosis ≥75% complete with consistent discharge diagnosis code formatting during January 2018–June 2023.

† National Syndromic Surveillance Program is a collaboration among CDC; local and state health departments; and federal, academic, and private sector partners. https://www.cdc.gov/nssp/index.html

§ Summer period (calendar weeks 24–36; June–September); fall school semester (calendar weeks 37–53; September–December); spring school semester (calendar weeks 1–23; January–June).

TABLE 1. Emergency department visit ratios*,† for mental and behavioral health conditions among children and adolescents aged 5–17 years, by age group — National Syndromic Surveillance Program,§ United States, January 2018–June 2023

Mental and behavioral health condition/ Age group, yrs	Period	Visit ratio (95% CI)				
		2018–2019	2019–2020	2020–2021	2021–2022	2022–2023
Depressive disorders						
5–9	Fall	1.66 (1.47–1.87)	1.45 (1.29–1.63)	1.27 (1.10–1.47)	1.44 (1.25–1.65)	0.99 (0.86–1.14)
	Spring	1.59 (1.40–1.79)	1.57 (1.37–1.81)	1.23 (1.07–1.41)	1.38 (1.19–1.58)	1.31 (1.13–1.51)
10–14	Fall	1.63 (1.58–1.67)	1.46 (1.42–1.50)	1.47 (1.43–1.51)	1.42 (1.39–1.46)	1.19 (1.16–1.22)
	Spring	1.57 (1.53–1.62)	1.95 (1.89–2.01)	1.46 (1.42–1.50)	1.32 (1.29–1.36)	1.38 (1.34–1.42)
15–17	Fall	1.40 (1.37–1.43)	1.31 (1.28–1.34)	1.25 (1.22–1.27)	1.33 (1.31–1.36)	1.16 (1.14–1.19)
	Spring	1.35 (1.32–1.38)	1.60 (1.56–1.63)	1.20 (1.17–1.23)	1.29 (1.27–1.32)	1.21 (1.18–1.24)
Suicidal ideation or self-harm						
5–9	Fall	1.62 (1.48–1.77)	1.48 (1.36–1.61)	1.27 (1.15–1.40)	1.64 (1.49–1.80)	1.07 (0.98–1.17)
	Spring	1.64 (1.50–1.79)	1.56 (1.41–1.73)	1.20 (1.09–1.32)	1.71 (1.56–1.88)	1.39 (1.27–1.52)
10–14	Fall	1.52 (1.48–1.56)	1.41 (1.38–1.44)	1.52 (1.48–1.55)	1.45 (1.42–1.48)	1.13 (1.11–1.15)
	Spring	1.50 (1.46–1.54)	2.00 (1.94–2.05)	1.51 (1.48–1.55)	1.38 (1.35–1.41)	1.38 (1.35–1.41)
15–17	Fall	1.37 (1.34–1.40)	1.28 (1.26–1.31)	1.32 (1.30–1.35)	1.36 (1.34–1.39)	1.15 (1.12–1.17)
	Spring	1.31 (1.28–1.34)	1.74 (1.70–1.78)	1.30 (1.28–1.33)	1.34 (1.31–1.37)	1.25 (1.22–1.28)
Trauma- and stressor-related disorders						
5–9	Fall	1.31 (1.21–1.42)	1.29 (1.19–1.39)	1.04 (0.95–1.13)	1.35 (1.23–1.47)	0.87 (0.80–0.95)
	Spring	1.30 (1.20–1.40)	1.64 (1.50–1.79)	0.82 (0.75–0.89)	1.43 (1.31–1.57)	1.00 (0.91–1.09)
10–14	Fall	1.36 (1.31–1.42)	1.25 (1.20–1.30)	1.24 (1.18–1.29)	1.36 (1.31–1.42)	1.07 (1.03–1.11)
	Spring	1.35 (1.29–1.41)	1.62 (1.55–1.70)	1.18 (1.13–1.23)	1.38 (1.33–1.44)	1.27 (1.22–1.33)
15–17	Fall	1.20 (1.15–1.25)	1.13 (1.09–1.18)	1.08 (1.04–1.13)	1.21 (1.16–1.26)	1.05 (1.01–1.09)
	Spring	1.24 (1.19–1.30)	1.43 (1.37–1.50)	1.06 (1.01–1.10)	1.23 (1.18–1.28)	1.15 (1.11–1.20)
Cannabis-related disorders						
5–9	Fall	1.23 (0.73–2.07)	0.95 (0.64–1.39)	0.98 (0.76–1.27)	0.47 (0.37–0.60)	0.63 (0.52–0.77)
	Spring	1.28 (0.77–2.15)	2.94 (2.02–4.27)	1.27 (1.00–1.61)	0.85 (0.69–1.05)	1.04 (0.86–1.26)
10–14	Fall	1.25 (1.14–1.38)	1.07 (0.98–1.16)	0.99 (0.91–1.07)	1.39 (1.28–1.50)	1.13 (1.06–1.21)
	Spring	1.36 (1.24–1.49)	1.61 (1.47–1.76)	1.08 (0.99–1.17)	1.91 (1.77–2.05)	1.62 (1.52–1.73)
15–17	Fall	1.13 (1.09–1.18)	1.06 (1.02–1.10)	0.98 (0.94–1.02)	1.17 (1.12–1.21)	0.99 (0.96–1.03)
	Spring	1.22 (1.17–1.27)	1.66 (1.59–1.73)	0.98 (0.94–1.02)	1.48 (1.42–1.54)	1.24 (1.19–1.28)
Lifestyle or life management factors						
5–9	Fall	1.29 (1.00–1.66)	1.17 (0.91–1.50)	0.87 (0.66–1.16)	0.94 (0.72–1.23)	0.92 (0.71–1.21)
	Spring	1.04 (0.80–1.36)	1.32 (0.98–1.78)	0.86 (0.65–1.13)	1.08 (0.83–1.41)	1.56 (1.21–2.02)
10–14	Fall	1.44 (1.33–1.56)	1.25 (1.17–1.35)	1.28 (1.19–1.37)	1.30 (1.22–1.39)	0.98 (0.92–1.05)
	Spring	1.39 (1.28–1.50)	1.88 (1.74–2.04)	1.39 (1.30–1.49)	1.32 (1.24–1.41)	1.41 (1.32–1.51)
15–17	Fall	1.08 (1.02–1.15)	1.05 (1.00–1.11)	1.08 (1.03–1.14)	1.15 (1.09–1.21)	0.93 (0.88–0.98)
	Spring	1.07 (1.01–1.14)	1.64 (1.54–1.74)	1.11 (1.05–1.18)	1.19 (1.12–1.25)	1.16 (1.10–1.23)
Mood disorders						
5–9	Fall	1.62 (1.45–1.81)	1.31 (1.18–1.45)	1.24 (1.09–1.40)	1.32 (1.17–1.48)	0.81 (0.72–0.91)
	Spring	1.47 (1.31–1.65)	1.41 (1.24–1.60)	1.12 (0.99–1.26)	1.27 (1.13–1.43)	1.08 (0.96–1.21)
10–14	Fall	1.31 (1.24–1.40)	1.28 (1.21–1.35)	1.12 (1.06–1.18)	1.24 (1.18–1.31)	0.96 (0.92–1.01)
	Spring	1.32 (1.24–1.40)	1.73 (1.62–1.84)	1.12 (1.05–1.18)	1.32 (1.25–1.39)	1.22 (1.16–1.28)
15–17	Fall	1.17 (1.09–1.25)	1.08 (1.01–1.15)	1.08 (1.01–1.15)	1.26 (1.19–1.33)	1.01 (0.95–1.07)
	Spring	1.18 (1.10–1.26)	1.56 (1.46–1.68)	1.13 (1.06–1.20)	1.37 (1.29–1.45)	1.20 (1.13–1.27)
Poisoning by drugs, initial encounter						
5–9	Fall	0.76 (0.69–0.84)	0.76 (0.69–0.84)	0.86 (0.78–0.96)	0.72 (0.66–0.80)	0.61 (0.56–0.67)
	Spring	0.73 (0.66–0.81)	1.33 (1.20–1.49)	0.76 (0.69–0.84)	0.83 (0.76–0.91)	0.82 (0.75–0.90)
10–14	Fall	1.20 (1.14–1.26)	1.04 (0.99–1.09)	1.37 (1.31–1.43)	1.14 (1.10–1.19)	0.90 (0.86–0.93)
	Spring	1.18 (1.11–1.24)	2.03 (1.93–2.14)	1.34 (1.29–1.40)	1.05 (1.00–1.09)	1.08 (1.03–1.13)
15–17	Fall	1.22 (1.18–1.27)	1.11 (1.07–1.15)	1.20 (1.16–1.24)	1.20 (1.16–1.24)	1.01 (0.97–1.04)
	Spring	1.15 (1.11–1.20)	1.84 (1.76–1.91)	1.16 (1.12–1.21)	1.18 (1.14–1.22)	1.10 (1.06–1.14)
Symptoms of mental and substance use conditions						
5–9	Fall	1.42 (1.35–1.50)	1.23 (1.18–1.29)	1.29 (1.22–1.37)	1.20 (1.14–1.27)	0.84 (0.80–0.88)
	Spring	1.42 (1.35–1.50)	1.32 (1.24–1.40)	1.12 (1.06–1.19)	1.25 (1.18–1.31)	1.07 (1.01–1.12)
10–14	Fall	1.39 (1.34–1.44)	1.16 (1.12–1.20)	1.29 (1.25–1.34)	1.23 (1.19–1.27)	0.97 (0.95–1.00)
	Spring	1.43 (1.38–1.49)	1.47 (1.42–1.53)	1.27 (1.23–1.31)	1.34 (1.30–1.38)	1.19 (1.16–1.23)
15–17	Fall	1.22 (1.17–1.27)	1.05 (1.01–1.09)	1.11 (1.07–1.15)	1.16 (1.12–1.20)	0.99 (0.96–1.02)
	Spring	1.30 (1.25–1.35)	1.55 (1.49–1.61)	1.08 (1.04–1.12)	1.33 (1.28–1.37)	1.19 (1.15–1.23)

Abbreviation: ED = emergency department.

* Visit ratio was defined as the proportion of all ED visits for a selected mental and behavioral health condition during the school semester (fall school semester [calendar weeks 37–53, September–December]; spring school semester [calendar weeks 1–23, January–June]) divided by the proportion of ED visits for that condition during the immediately preceding summer period (calendar weeks 24–36, June–September).

† To reduce artifactual impact from changes in reporting patterns, analyses were restricted to facilities with a coefficient of variation of ED visits ≤40 and average weekly informative discharge diagnosis ≥75% complete with consistent discharge diagnosis code formatting during January 2018–June 2023.

§ National Syndromic Surveillance Program is a collaboration among CDC; local and state health departments; and federal, academic, and private sector partners. https://www.cdc.gov/nssp/index.html

TABLE 2. Total and weekly emergency department visits* and percentage change† from the fall and spring school semester compared with the summer period for mental and behavioral health conditions among children and adolescents aged 5–17 years, by year and age group — National Syndromic Surveillance Program,§ United States, January 2018–June 2023

Mental and behavioral health condition/ School year	Age group, yrs	Mean weekly no. of visits			Change in mean weekly no. of visits (% Change)	
		Summer	Fall	Spring	Fall	Spring
Depressive disorders						
2018–2019	5–9	28.5	55.6	62.5	27.1 (95.1)	34.0 (119.3)
	10–14	528.7	1,013.1	1,132.6	484.4 (91.6)	603.9 (114.2)
	15–17	904.3	1,413.4	1,434.1	509.1 (56.3)	529.8 (58.6)
2019–2020	5–9	31.4	58.0	27.2	26.6 (84.7)	−4.2 (−13.4)
	10–14	591.5	1,072.9	638.6	481.4 (81.4)	47.1 (8.0)
	15–17	1,003.8	1,516.3	931.6	512.5 (51.1)	−72.2 (−7.2)
2020–2021	5–9	23.2	28.4	38.5	5.2 (22.4)	15.3 (65.9)
	10–14	645.2	972.4	1,238.1	327.2 (50.7)	592.9 (91.9)
	15–17	1,006.9	1,263.9	1,413.4	257.0 (25.5)	406.5 (40.4)
2021–2022	5–9	22.8	37.1	40.6	14.3 (62.7)	17.8 (78.1)
	10–14	748.9	1,194.5	1,167.4	445.6 (59.5)	418.5 (55.9)
	15–17	1,017.8	1,458.1	1,367.1	440.3 (43.3)	349.3 (34.3)
2022–2023	5–9	22.2	33.1	38.6	10.9 (49.1)	16.4 (73.9)
	10–14	617.7	986.5	1,065.8	368.8 (59.7)	448.1 (72.5)
	15–17	886.5	1,219.7	1,180.9	333.2 (37.6)	294.4 (33.2)
Suicidal ideation or self-harm						
2018–2019	5–9	52.9	100.7	119.7	47.8 (90.4)	66.8 (126.3)
	10–14	628.2	1,126.2	1,282.5	498.0 (79.3)	654.3 (104.2)
	15–17	913.2	1,394.1	1,404.4	480.9 (52.7)	491.2 (53.8)
2019–2020	5–9	59.2	111.7	51.0	52.5 (88.7)	−8.2 (−13.9)
	10–14	727.5	1,271.0	804.2	543.5 (74.7)	76.7 (10.5)
	15–17	1,016.1	1,504.5	1,029.5	488.4 (48.1)	13.4 (1.3)
2020–2021	5–9	49.9	61.0	80.7	11.1 (22.2)	30.8 (61.7)
	10–14	817.9	1,275.1	1,626.8	457.2 (55.9)	808.9 (98.9)
	15–17	1,075.3	1,431.9	1640.0	356.6 (33.2)	564.7 (52.5)
2021–2022	5–9	47.7	88.8	105.9	41.1 (86.2)	58.2 (122.0)
	10–14	1,037.5	1,689.6	1,685.6	652.1 (62.9)	648.1 (62.5)
	15–17	1,227.7	1,795.4	1,708.6	567.7 (46.2)	480.9 (39.2)
2022–2023	5–9	54.5	87.7	101.3	33.2 (60.9)	46.8 (85.9)
	10–14	956.8	1,455.4	1,648.8	498.6 (52.1)	692.0 (72.3)
	15–17	1,177.5	1,594.3	1,619.4	416.8 (35.4)	441.9 (37.5)
Trauma- and stressor-related disorders						
2018–2019	5–9	75.8	116.6	136.1	40.8 (53.8)	60.3 (79.6)
	10–14	249.5	400.5	458.9	151.0 (60.5)	209.4 (83.9)
	15–17	278.8	373.9	407.8	95.1 (34.1)	129.0 (46.3)
2019–2020	5–9	76.8	125.9	69.4	49.1 (63.9)	−7.4 (−9.6)
	10–14	280.0	435.0	250.9	155.0 (55.4)	−29.1 (−10.4)
	15–17	320.2	419.2	266.5	99.0 (30.9)	−53.7 (−16.8)
2020–2021	5–9	68.8	68.8	75.8	0 (—)	7.0 (10.2)
	10–14	255.5	324.2	396.5	68.7 (26.9)	141 (55.2)
	15–17	290.6	316.9	359.4	26.3 (9.1)	68.8 (23.7)
2021–2022	5–9	55.1	84.1	102.4	29 (52.6)	47.3 (85.8)
	10–14	280.8	427.6	457.7	146.8 (52.3)	176.9 (63.0)
	15–17	309.7	402.8	395.9	93.1 (30.1)	86.2 (27.8)
2022–2023	5–9	61.2	80.2	81.5	19.0 (31.0)	20.3 (33.2)
	10–14	276.5	398.2	440.6	121.7 (44.0)	164.1 (59.3)
	15–17	310.5	385.2	394.1	74.7 (24.1)	83.6 (26.9)
Cannabis-related disorders						
2018–2019	5–9	1.7	2.4	3.0	0.7 (41.2)	1.3 (76.5)
	10–14	49.9	73.8	92.4	23.9 (47.9)	42.5 (85.2)
	15–17	290.2	366.6	417.2	76.4 (26.3)	127 (43.8)
2019–2020	5–9	3.3	4.0	5.4	0.7 (21.2)	2.1 (63.6)
	10–14	73.0	96.6	65.0	23.6 (32.3)	−8.0 (−11.0)
	15–17	331.0	405.8	319.4	74.8 (22.6)	−11.6 (−3.5)
2020–2021	5–9	8.1	7.6	13.9	−0.5 (−6.2)	5.8 (71.6)
	10–14	74.2	75.1	105.0	0.9 (1.2)	30.8 (41.5)
	15–17	341.7	337.1	389.9	−4.6 (−1.3)	48.2 (14.1)

See table footnotes on page 1038.

TABLE 2. (*Continued*) Total and weekly emergency department visits* and percentage change† from the fall and spring school semester compared with the summer period for mental and behavioral health conditions among children and adolescents aged 5–17 years, by year and age group — National Syndromic Surveillance Program,§ United States, January 2018–June 2023

Mental and behavioral health condition/ School year	Age group, yrs	Mean weekly no. of visits			Change in mean weekly no. of visits (% Change)	
		Summer	Fall	Spring	Fall	Spring
2021–2022	5–9	12.9	6.9	14.3	−6.0 (−46.5)	1.4 (10.9)
	10–14	75.9	117.9	170.6	42.0 (55.3)	94.7 (124.8)
	15–17	318.6	398.9	488.5	80.3 (25.2)	169.9 (53.3)
2022–2023	5–9	13.4	12.8	18.6	−0.6 (−4.5)	5.2 (38.8)
	10–14	99.9	152.6	202.6	52.7 (52.8)	102.7 (102.8)
	15–17	367.6	431.4	500.1	63.8 (17.4)	132.5 (36.0)
Lifestyle or life management factors						
2018–2019	5–9	7.0	10.6	10.1	3.6 (51.4)	3.1 (44.3)
	10–14	69.3	117.6	131.1	48.3 (69.7)	61.8 (89.2)
	15–17	150.1	181.6	188.9	31.5 (21.0)	38.8 (25.8)
2019–2020	5–9	7.5	11.1	5.4	3.6 (48.0)	−2.1 (−28.0)
	10–14	83.3	129.5	86.8	46.2 (55.5)	3.5 (4.2)
	15–17	160.8	195.4	153.3	34.6 (21.5)	−7.5 (−4.7)
2020–2021	5–9	6.9	5.8	8.0	−1.1 (−15.9)	1.1 (15.9)
	10–14	94.7	124.1	172.7	29.4 (31.0)	78.0 (82.4)
	15–17	165.9	180.8	216.1	14.9 (9.0)	50.2 (30.3)
2021–2022	5–9	7.1	7.6	9.9	0.5 (7.0)	2.8 (39.4)
	10–14	112.6	164.1	175.6	51.5 (45.7)	63 (56.0)
	15–17	167.6	206.6	206.4	39.0 (23.3)	38.8 (23.2)
2022–2023	5–9	6.5	9.0	13.5	2.5 (38.5)	7.0 (107.7)
	10–14	104.0	137.4	183.8	33.4 (32.1)	79.8 (76.7)
	15–17	155.7	170.8	199.4	15.1 (9.7)	43.7 (28.1)
Mood disorders						
2018–2019	5–9	33.2	63.1	67.5	29.9 (90.1)	34.3 (103.3)
	10–14	124.2	192.2	222.9	68.0 (54.8)	98.7 (79.5)
	15–17	112.2	146.3	155.6	34.1 (30.4)	43.4 (38.7)
2019–2020	5–9	42.1	70.1	32.7	28.0 (66.5)	−9.4 (−22.3)
	10–14	145.4	230.1	139.0	84.7 (58.3)	−6.4 (−4.4)
	15–17	125.2	155.4	113.9	30.2 (24.1)	−11.3 (−9.0)
2020–2021	5–9	31.9	38.0	48.1	6.1 (19.1)	16.2 (50.8)
	10–14	147.5	169.2	216.4	21.7 (14.7)	68.9 (46.7)
	15–17	124.5	134.9	164.4	10.4 (8.4)	39.9 (32.0)
2021–2022	5–9	33.0	49.4	54.5	16.4 (49.7)	21.5 (65.2)
	10–14	168.5	234.1	261.8	65.6 (38.9)	93.3 (55.4)
	15–17	136.1	183.7	193.0	47.6 (35.0)	56.9 (41.8)
2022–2023	5–9	36.2	44.1	52.1	7.9 (21.8)	15.9 (43.9)
	10–14	187.4	243.2	285.5	55.8 (29.8)	98.1 (52.3)
	15–17	157.1	187.1	207.4	30.0 (19.1)	50.3 (32.0)
Poisoning by drugs, initial encounter						
2018–2019	5–9	55.9	50.1	56.6	−5.8 (−10.4)	0.7 (1.3)
	10–14	167.0	235.6	267.5	68.6 (41.1)	100.5 (60.2)
	15–17	318.3	434.9	431.2	116.6 (36.6)	112.9 (35.5)
2019–2020	5–9	55.8	53.9	41.1	−1.9 (−3.4)	−14.7 (−26.3)
	10–14	195.4	250.8	219.6	55.4 (28.4)	24.2 (12.4)
	15–17	347.2	445.3	370.6	98.1 (28.3)	23.4 (6.7)
2020–2021	5–9	56.5	46.9	57.7	−9.6 (−17.0)	1.2 (2.1)
	10–14	231.5	324.7	408.7	93.2 (40.3)	177.2 (76.5)
	15–17	381.8	460.0	519.3	78.2 (20.5)	137.5 (36.0)
2021–2022	5–9	61.6	50.6	66.4	−11.0 (−17.9)	4.8 (7.8)
	10–14	301.3	386.1	371.5	84.8 (28.1)	70.2 (23.3)
	15–17	413.6	532.2	506.9	118.6 (28.7)	93.3 (22.6)
2022–2023	5–9	66.2	61.2	72.6	−5.0 (−7.6)	6.4 (9.7)
	10–14	264.9	319.3	358.1	54.4 (20.5)	93.2 (35.2)
	15–17	397.1	472.4	481.2	75.3 (19.0)	84.1 (21.2)
Symptoms of mental and substance use conditions						
2018–2019	5–9	152.8	255.2	299.6	102.4 (67.0)	146.8 (96.1)
	10–14	343.5	563.6	671.4	220.1 (64.1)	327.9 (95.5)
	15–17	289.8	394.1	441.9	104.3 (36.0)	152.1 (52.5)

See table footnotes on page 1038.

TABLE 2. (*Continued*) Total and weekly emergency department visits* and percentage change† from the fall and spring school semester compared with the summer period for mental and behavioral health conditions among children and adolescents aged 5–17 years, by year and age group — National Syndromic Surveillance Program,§ United States, January 2018–June 2023

Mental and behavioral health condition/ School year	Age group, yrs	Mean weekly no. of visits			Change in mean weekly no. of visits (% Change)	
		Summer	Fall	Spring	Fall	Spring
2019–2020	5–9	194.5	306.2	141.4	111.7 (57.4)	−53.1 (−27.3)
	10–14	470.1	675.6	382.9	205.5 (43.7)	−87.2 (−18.5)
	15–17	384.6	465.5	346.3	80.9 (21.0)	−38.3 (−10.0)
2020–2021	5–9	148.4	184.7	224.4	36.3 (24.5)	76.0 (51.2)
	10–14	420.2	556.9	700.4	136.7 (32.5)	280.2 (66.7)
	15–17	393.3	438.2	496.5	44.9 (11.4)	103.2 (26.2)
2021–2022	5–9	175.7	240.2	284.4	64.5 (36.7)	108.7 (61.9)
	10–14	532.5	732.7	842.7	200.2 (37.6)	310.2 (58.3)
	15–17	433.2	537.9	595.7	104.7 (24.2)	162.5 (37.5)
2022–2023	5–9	198.5	251.1	282.5	52.6 (26.5)	84.0 (42.3)
	10–14	560.2	734.2	835.8	174.0 (31.1)	275.6 (49.2)
	15–17	477.5	556.9	623.5	79.4 (16.6)	146.0 (30.6)

* To reduce artifactual impact from changes in reporting patterns, analyses were restricted to facilities with a coefficient of variation of emergency department visits ≤40 and average weekly informative discharge diagnosis ≥75% complete with consistent discharge diagnosis code formatting during January 2018–June 2023.
† Percent change was calculated as visits during the fall school semester (calendar weeks 37–53, September–December) and spring school semester (calendar weeks 1–23, January–June) separately compared with visits during the summer period (calendar weeks 24–36, June–September).
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weekly visit counts (percent change <0) compared with the 2019 summer period. These findings indicate that the relative proportion of visits was higher while the mean weekly number of visits was lower and was likely influenced by the public health emergency declaration for the COVID-19 pandemic in March 2020 (*1,3*).

These findings raise concerns about the challenges U.S. children and adolescents face in the school environment (*4*). Several factors might contribute to these increases. Children and adolescents can experience unique school-related stressors,** including transitioning into the school year or attending a new school, academic performance pressure and testing, and in-school bullying and peer victimization. Social anxiety might lead to worsening mental health, resulting in a visit to an ED (*5–7*). School- and provider-based screenings and assessments for mental health usually increase at the start of the school year, prompting referral for care (*8*). Mental and behavioral health conditions might be recognized by school staff members when they manifest in classroom behavioral issues (e.g., disruption in class, poor attendance, and poor academic performance), or when students disclose mental health challenges.

Engaging children and adolescents in social and emotional learning (SEL) programs can promote their emotional well-being. School-based SEL programs†† provide students and teachers with tools to cope with stressors. Other strategies that have been shown to be effective at promoting and maintaining emotional well-being among children and adolescents include pediatric mental health care access programs; suicide prevention gatekeeper trainings; trauma and grief interventions; crisis intervention and response services; peer-led approaches to encourage students to seek help; evidence-based comprehensive school health–education curriculum that includes lessons on mental health disorders, self-care, substance use prevention and sexual health education, providing access to local and national mobile crisis services, and expanding community-based service alternatives (*2,9,10*).

Multisector collaboration and coordination, including government, education, and community organizations, are needed to promote and prioritize child and adolescent mental health and to avoid placing the responsibility of improvement solely on educational institutions.§§ Evidence-based strategies (e.g., CDC's Preventing Adverse Childhood Experiences [ACEs]: Leveraging the Best Available Evidence resource)¶¶ offer options for a comprehensive and systems-level approach to supporting children and families. State and local government agencies and school partners can collaborate when addressing the behavioral health of children. CDC approaches, including the Whole School, Whole Community, Whole Child model,*** What Works in Schools program,††† Suicide Prevention Resource

** https://www.scientificamerican.com/article/childrens-risk-of-suicide-increases-on-school-days/
†† https://www.apa.org/monitor/2020/09/classroom-connections
§§ https://www.hhs.gov/sites/default/files/surgeon-general-youth-mental-health-advisory.pdf
¶¶ https://www.cdc.gov/violenceprevention/pdf/ACEs-Prevention-Resource_508.pdf
*** https://www.cdc.gov/healthyschools/wscc/index.htm
††† https://www.cdc.gov/healthyyouth/whatworks/index.htm

for Action,[§§§] and ACEs training module can be useful for schools seeking to support or enhance protective factors and respond using trauma-informed methods (*7,9*). Government agencies can collaborate to establish tailored and culturally responsive messaging[¶¶¶,****,††††] for various audiences (e.g., parents and caregivers, students, community leaders, health care providers, and educational professionals), including social media campaigns about students' mental health needs during certain times of the year.[§§§§]

Limitations

The findings in this report are subject to at least five limitations. First, NSSP ED visit data are a convenience sample and are not nationally representative. Second, ED visits represent unique events, not individual persons, and might reflect multiple visits for one person. Third, HCUP Clinical Classifications Software Refined categories are not mutually exclusive; codes can appear in more than one category. Fourth, results for children aged 5–9 years should be interpreted with caution, particularly data about suicidal ideation or self-harm, because of low visit volume and uncertainty about intentionality. Finally, because school start and end dates vary within and across regions, some ED visits might be misclassified, resulting in underestimation of the extent of the increase in number of ED visits for mental and behavioral health conditions; many such visits can occur outside of EDs and reasons for changes in ED visit patterns cannot be ascertained from these data.

Public Health Implications

Systemic changes that prioritize protective factors (e.g., physical activity; nutrition; sleep; social, community, or faith-based support; and inclusive school and community environments) and well-being promotion might improve mental health among children and adolescents long before a trip to an ED is needed. These changes include consideration of the seasonal timing of increases in child and adolescent mental and behavioral health conditions; efforts to incorporate preparedness for mental health concerns into programmatic planning, especially during back-to-school; prevention of conditions that increase risk for mental disorders; early identification of mental health disorders; and targeted interventions. Parents and caregivers, educators, health care providers, and others who regularly interact with children and adolescents can learn about signs and symptoms of mental distress[¶¶¶¶] and monitor children and adolescents for possible increases in mental distress in the weeks leading up to and during the academic year.

Summary

What is already known about this topic?

Mental and behavioral health conditions are common among school-aged children in the United States.

What is added by this report?

Each year, during 2018–2023, among children and adolescents aged 10–17 years, the number and proportion of weekly emergency department visits for eight mental and behavioral health conditions displayed seasonal increases during the fall and spring school semesters relative to the summer period; timing of increases varied by specific condition.

What are the implications for public health practice?

Systemic changes that prioritize protective factors, such as physical activity, social support, and inclusive school environments, and incorporate preparedness for increases in mental and behavioral health conditions during back-to-school planning might help improve child and adolescent mental health.

[§§§] https://www.cdc.gov/suicide/resources/prevention.html

[¶¶¶] https://www2.ed.gov/documents/students/supporting-child-student-social-emotional-behavioral-mental-health.pdf

[****] https://store.samhsa.gov/product/Identifying-Mental-Health-and-Substance-Use-Problems-of-Children-and-Adolescents-A-Guide-for-Child-Serving-Organizations/SMA12-4700

[††††] https://vetoviolence.cdc.gov/apps/aces-training/#/edu#top

[§§§§] https://knowledgerepository.syndromicsurveillance.org/mental-and-behavioral-health-resources

[¶¶¶¶] https://www.cdc.gov/childrensmentalhealth/basics.html

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Notes from the Field

Circulating Vaccine-Derived Poliovirus Type 2 Emergences Linked to Novel Oral Poliovirus Vaccine Type 2 Use — Six African Countries, 2021–2023

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Circulating vaccine-derived poliovirus (cVDPV) outbreaks can occur when oral poliovirus vaccine strains (most often, Sabin monovalent oral poliovirus vaccine type 2 [mOPV2]) undergo prolonged circulation in undervaccinated populations, resulting in genetic reversion to neurovirulence. A novel type 2 oral poliovirus vaccine (nOPV2) has been developed, which has been shown in clinical trials to be less likely than mOPV2 to revert to paralytic variants and to have limited genetic modifications in initial field use (*1*–*4*). Approximately 700 million doses of nOPV2 have been administered worldwide in response to outbreaks of cVDPV type 2 (cVDPV2). cVDPV2 detections originating from nOPV2 use from initial rollout during March 2021–September 7, 2023, are described in this report.

Investigation and Outcomes

Polio surveillance and laboratory data collected through the Global Polio Eradication Initiative were reviewed. During August 2021–July 2023, seven cVDPV2 emergences of nOPV2 origin from 61 paralytic cases and 39 environmental surveillance (sewage) samples were detected in six countries, all in Africa: Burundi, Central African Republic (CAR), Democratic Republic of the Congo (DRC), Nigeria, Tanzania, and Zambia (Figure). The isolates have limited divergence from the parental nOPV2 vaccine strain in the VP1 capsid protein coding area (six to 16 nucleotide substitutions), indicating that surveillance detected emergence relatively early after vaccination. This activity was reviewed by CDC, deemed not research, and was conducted consistent with applicable federal law and CDC policy.*

Circulation of four of the seven cVDPV2 emergences derived from nOPV2 use has been detected only in subnational areas of the countries in which they originated (CAR, DRC, and Nigeria), two have spread to other areas of the originating country (CAR and DRC), and one has spread from the originating country (DRC) to neighboring countries (Burundi, Tanzania, and Zambia). Three emergences spreading within or outside of the originating country (all from DRC) might be ongoing, with most recent detections in July 2023. The largest and widest-spreading emergence, RDC-SKV-1, was first detected in DRC's South Kivu province in September 2022; viruses from this emergence have been identified in six provinces of DRC and in neighboring Burundi, Tanzania, and Zambia. RDC-SKV-1 has been detected as recently as July 2023 in Tanzania.

Preliminary Conclusions and Actions

The potential for mutation and reversion to neurovirulence is a rare but recognized risk for all live attenuated oral poliovirus vaccines; extensive use of nOPV2 worldwide since March 2021 suggests that reversion occurs less frequently than with mOPV2 (*4*). A preliminary estimate suggests that cVDPV2 emergences occur after mOPV2 use at a rate of one emergence per 10 million mOPV2 doses administered; for nOPV2, this rate is approximately 10 times lower, at one emergence per 100 million doses. As with all cVDPV emergences, cVDPV2 outbreaks of nOPV2 origin are more likely to occur when nOPV2 supplementary immunization activities (SIAs) do not achieve high coverage in populations with persistently low immunity against polioviruses (*5*). To combat all cVDPV2 outbreaks and reduce future emergences, responding with prompt SIAs that reach all targeted children is essential.

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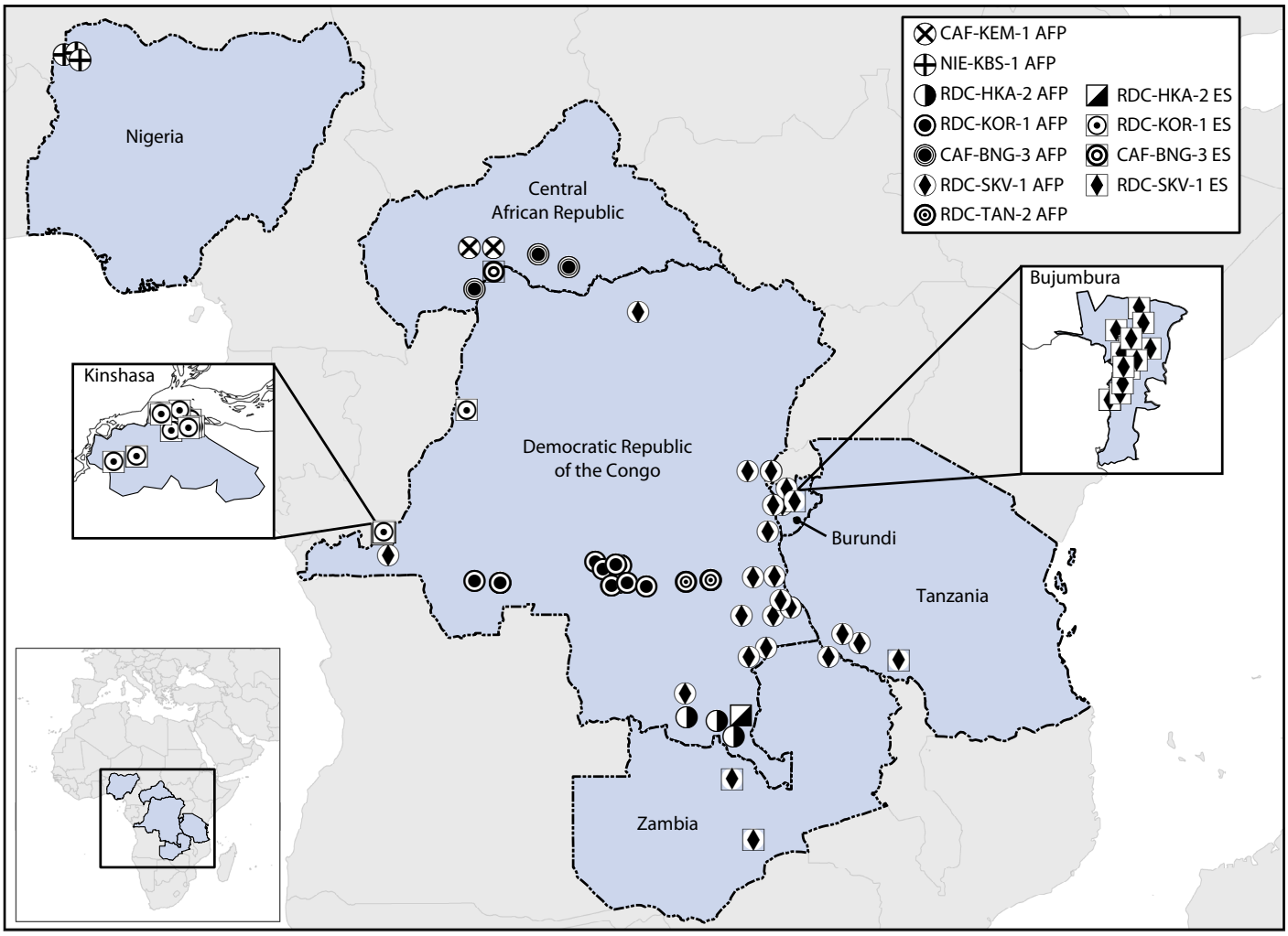
* 45 C.F.R. part 46.102(l)(2), 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

FIGURE. Detections of circulating vaccine-derived poliovirus type 2 linked to novel oral poliovirus type 2 vaccine use, by emergence group — Africa, 2021–2023



Abbreviations: AFP = acute flaccid paralysis case; ES = environmental surveillance isolate.

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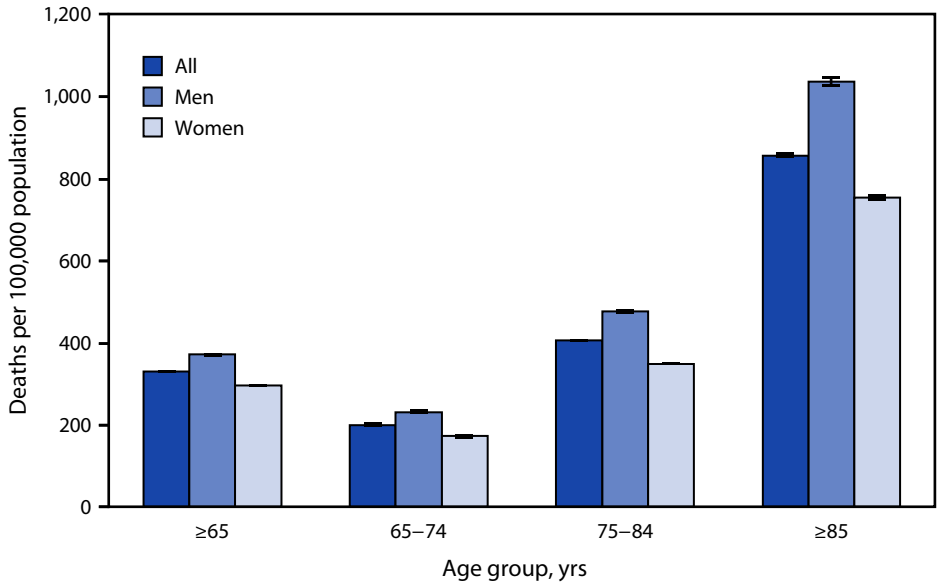
QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Sepsis-Related* Death Rates† Among Persons Aged ≥65 Years, by Age Group and Sex — National Vital Statistics System, United States, 2021



* Deaths with septicemia or sepsis as the underlying or a contributing cause were identified using the *International Classification of Diseases, Tenth Revision* multiple cause of death codes A40–A41. For mortality statistics, sepsis and septicemia are synonymous and used interchangeably for classification purposes.
† Crude rate of deaths per 100,000 population; 95% CIs indicated by error bars.

In 2021, the sepsis-related death rate among persons aged ≥65 years was 330.9 deaths per 100,000 population; the rate among men (371.7) was higher than that among women (297.4). Sepsis-related death rates among men were higher than those among women in each age group: 232.7 versus 173.0 (65–74 years), 477.3 versus 349.8 (75–84 years), and 1,037.8 versus 755.5 (≥85 years). Sepsis-related death rates increased with age from 201.1 among persons aged 65–74 years to 858.3 among those aged ≥85 years. Sepsis-related death rates increased with age among both men and women.

Source: National Center for Health Statistics, National Vital Statistics System, Mortality Data, 2021. https://wonder.cdc.gov/mcd.html

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For more information on this topic, CDC recommends the following link: https://www.cdc.gov/sepsis/

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