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COVID-19 Antiviral Prescription Receipt Among Outpatients Aged ≥65 Years — United States, June 1, 2023–September 30, 2025

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Abstract

Adults aged ≥65 years have the highest rates of COVID-19–related hospitalization. Despite the proven benefit of COVID-19 antivirals in preventing severe outcomes, data suggest that their use is low among older adults. To assess factors associated with receipt of an antiviral prescription among adults aged ≥65 years examined in outpatient settings who received a positive SARS-CoV-2 test result or COVID-19 diagnosis during June 1, 2023–September 30, 2025, multivariate logistic regression analysis of Truveta real-time deidentified electronic health record data was performed. The percentage of COVID-19 outpatients aged ≥65 years who received an antiviral prescription was lower in spring 2024 (21%), fall–winter 2024–25 (23%), spring 2025 (16%), and summer 2025 (19%) than during other seasons (range = 37%–38%). Among those persons who received a prescription, 99% received it within 7 days of a positive SARS-CoV-2 test result or COVID-19 diagnosis, and 80% were prescribed nirmatrelvir/ritonavir. Among adults aged ≥65 years, the odds of receiving an antiviral prescription were higher among those aged 75–84 and ≥85 years (adjusted odds ratio [aOR] = 1.09 and 1.11, respectively), Asian (aOR = 1.42) or Hispanic or Latino persons (aOR = 1.24), and those who had received ≥1 COVID-19 vaccine dose (aOR = 1.73) than among adults in other age, racial, ethnic, and vaccination status groups. Persons with at least one comorbidity and rural residents had lower odds of receiving an antiviral prescription. Persons with COVID-19 had higher odds of receiving a COVID-19 antiviral prescription in summer 2024 (aOR = 1.05) compared with other analytic periods. Odds of prescribing were lower during periods of lower COVID-19 incidence. Antivirals might be underprescribed among adults aged ≥65 years, and prescribing rates vary temporally. Encouraging annual COVID-19 vaccination and increased prescribing of antivirals among adults aged ≥65 years with COVID-19 could reduce the risk for severe illness and hospitalization in this population.

Introduction

SARS-CoV-2 circulates year-round and typically surges during the summer, fall, and winter, resulting in considerable morbidity and mortality (*1*). During 2020–24, the fall–winter (October–February) COVID-19 surges were consistently more severe than were the summer (June–September) surges; however, the 2024 summer surge resulted in more COVID-19 hospitalizations than did the 2024–25 fall–winter surge (*1*). During recent years, the risk for hospitalization has been highest among adults aged ≥65 years, with risk increasing with age (*1*). Adults aged ≥65 years, persons with multiple comorbidities or immunocompromising conditions, and persons who have not received a seasonal COVID-19 vaccine are at highest risk for severe disease (*2*). Studies suggest that the use of COVID-19 antiviral treatment is low, especially among older adults (*3*,*4*). Real-world effectiveness studies have determined that COVID-19 antiviral treatment with nirmatrelvir/ritonavir in outpatient settings reduces the risk

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for severe outcomes (*5*). To better understand variations in prescribing of antivirals, this study analyzed data from Truveta, a real-time collection of deidentified electronic health records from more than 30 U.S. health systems. This analysis evaluated the frequency of antiviral prescriptions and the factors associated with their receipt among adults aged ≥65 years with COVID-19 who were examined in outpatient settings during June 2023–September 2025.

Methods

Data Source

This retrospective cohort study examined deidentified electronic health records from Truveta, which collects data from health care organizations nationwide, including approximately 120 million patients receiving care at approximately 20,000 clinics and 900 hospitals in the United States. Data are transformed using the Truveta Data Model and standardized through the Truveta Language Model. Data from June 1, 2023, through September 30, 2025, were extracted in January 2026 for this analysis. COVID-19 cases were identified among outpatients aged ≥65 years, using one of two criteria: 1) a laboratory-confirmed molecular or antigen SARS-CoV-2 test result or 2) a health care encounter with an *International Classification of Diseases, Tenth Revision, Clinical Modification* (ICD-10-CM) diagnosis code for COVID-19 (U07.1). The index date was defined as the earliest date of documentation of either of these criteria. The analysis was limited to persons identified as outpatients in primary care settings (by Truveta code 1065216 for ambulatory patients) who had not had an inpatient encounter in the month preceding the index date. Only one encounter with a COVID-19 diagnosis per analysis period was included for any individual patient, although a given patient could be included in multiple analysis periods.

A COVID-19 antiviral prescription documented up to 7 days after the index date in any outpatient setting was considered an indication of treatment with one of the following: nirmatrelvir/ritonavir, remdesivir, or molnupiravir. COVID-19 treatment initiation was approximated by the date of the prescription. COVID-19 cases that were not diagnosed during June 1, 2023–September 30, 2025, were excluded. Persons aged <65 years, those who had received a positive SARS-CoV-2 test result or diagnosis for COVID-19 during the 6 months preceding the index date, and patients who received treatment but did not have a COVID-19 diagnosis or positive SARS-CoV-2 test result during the 6 months preceding the index date were also excluded, because the dataset does not capture symptomatology consistently enough to assess the receipt of empiric treatment.

Patient Characteristics and Analysis Periods

Persons with COVID-19 were described by age group, sex, race, ethnicity, COVID-19 vaccination status, comorbidities, use of immunosuppressive medication, and receipt of a COVID-19 antiviral prescription (overall and by medication) for each analysis period. Periods were determined by season

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and then categorized on the basis of incidence into surge and nonsurge periods of SARS-CoV-2 circulation: summer 2023 (June 1–September 30, 2023), fall–winter 2023–24 (October 1, 2023–February 29, 2024), spring 2024 (March 1–May 31, 2024), summer 2024 (June 1–September 30, 2024), fall–winter 2024–25 (October 1, 2024–February 28, 2025), spring 2025 (March 1–May 31, 2025), and summer 2025 (June 1–September 30, 2025). Persons with documentation of receipt of a COVID-19 vaccine dose within the preceding 6 months were considered to be vaccinated. Receipt of vaccination was ascertained using Current Procedural Terminology (CPT) codes, CVX codes, National Drug Codes, or RxNorm codes. Underlying medical conditions were defined by ICD-10-CM, CPT, or Healthcare Common Procedure Coding System codes documented since 2016. The main outcome was receipt of COVID-19 antiviral prescription within 7 days of the index date.

Statistical Analysis

Seasonal variation in the proportion of patients receiving an antiviral prescription was analyzed using a generalized linear model with a binomial error distribution and logit link. Adjusted odds ratios (aORs) for receipt of antiviral prescription were estimated using multivariable logistic regression models across all analysis periods after controlling for age, sex, race, ethnicity, comorbidities, COVID-19 vaccination status, urbanicity,* and analytic period; 95% CIs were used to estimate uncertainty. Analyses were conducted using R software (version 4.2.1; R Foundation). This activity was reviewed by CDC, deemed research not involving human subjects, and was conducted consistent with applicable federal law and CDC policy.†

Results

Patient Characteristics and Receipt of COVID-19 Antiviral Prescriptions

A total of 482,456 patient encounters with a COVID-19 diagnosis were assessed, including 147,715 (31%) during which a COVID-19 antiviral was prescribed and 334,741 (69%) during which one was not. The number of patient encounters in each analysis period ranged from 33,926 (spring 2025) to 117,038 (fall–winter 2023–24) (Table 1).

The percentage of COVID-19 patients who received an antiviral prescription varied across analysis periods: the percentage who received an antiviral prescription during fall–winter 2024–25 (23.4%) was higher than that during spring 2024 (21.5%), spring 2025 (16.5%), and summer 2025 (19.4%), and lower than that during the summer 2023 (36.7%), fall–winter 2023–24 (37.6%), and summer 2024 (37.6%) analysis periods (Figure). Among COVID-19 outpatients aged ≥65 years who received a COVID-19 antiviral prescription, 99% received it within 7 days of a positive SARS-CoV-2 test result or COVID-19 diagnosis; 80% of treated patients received nirmatrelvir/ritonavir, 13% received molnupiravir, and 7% received remdesivir across seasons (Supplementary Figure).

Factors Associated with COVID-19 Antiviral Prescriptions

For each period examined, significant differences in age, race, ethnicity, number of COVID-19 vaccine doses received, number of comorbidities, and urbanicity were observed between COVID-19 outpatients aged ≥65 years who did and did not receive a COVID-19 antiviral prescription in descriptive analysis (Table 1). In multivariable analysis, compared with adults aged 65–74 years, the odds of receiving an antiviral prescription were higher among adults aged 75–84 years and ≥85 years (aOR = 1.09 and 1.11, respectively) (Table 2). Compared with non-Hispanic White persons, the odds of receiving an antiviral prescription were higher among Asian persons (aOR = 1.42) and Hispanic or Latino persons (aOR = 1.24). Compared with persons who did not receive a COVID-19 vaccine dose during the preceding 6 months, the odds of receiving an antiviral prescription among those who had received 1 or 2 doses were higher (aOR = 1.73). The odds of receiving a COVID-19 antiviral prescription were lower among persons with one comorbidity (aOR = 0.76) and at least two comorbidities (aOR = 0.75) than among those with no comorbidities. Compared with persons who live in urban settings, the odds of receiving an antiviral prescription were lower among those who lived in rural communities (aOR = 0.81). Among persons with COVID-19, the odds of receiving an antiviral prescription were higher in summer 2024 (aOR = 1.05) and lower in spring 2024 (aOR = 0.45), fall–winter 2024–25 (aOR = 0.51), spring 2025 (aOR = 0.34), and summer 2025 (aOR = 0.41) compared with summer 2023.

Discussion

This study of a large national database of COVID-19 cases suggests that antivirals are underprescribed to older adults, a population at increased risk for severe disease (*1*). These findings are consistent with those described in a 2023 analysis of receipt of antiviral medication among outpatients aged ≥65 years with COVID-19. However, unlike the 2023 study, this analysis found that the percentage who received an antiviral increased with increasing age (*3*).

* Because geographic variables were not included in the dataset, whether patients lived in an urban or rural area was determined by whether they lived within a city in their U.S. Department of Health and Human Services region. Rural/urban classification is defined by residential address based on Federal Office of Rural Health Policy Data files from 2024, which contain all zip codes classified as rural areas.

† 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.

TABLE 1. Characteristics of adults aged ≥65 years with COVID-19 who received COVID-19 antiviral prescriptions in outpatient care settings, by analysis period* — Truveta database, United States, June 2023–September 2025

Characteristic	No. (%)													
	Summer 2023 n = 74,953		Fall–winter 2023–24 n = 117,038		Spring 2024 n = 36,153		Summer 2024 n = 94,132		Fall–winter 2024–25 n = 70,371		Spring 2025 n = 33,926		Summer 2025 n = 55,883	
	Pre-scribed	Not pre-scribed	Pre-scribed	Not pre-scribed	Pre-scribed	Not pre-scribed	Pre-scribed	Not pre-scribed	Pre-scribed	Not pre-scribed	Pre-scribed	Not pre-scribed	Pre-scribed	Not pre-scribed
Total (N = 482,456)	**27,482 (36.7)**	**47,471 (63.3)**	**43,951 (37.6)**	**73,087 (62.4)**	**7,760 (21.5)**	**28,393 (78.5)**	**35,414 (37.6)**	**58,718 (62.4)**	**16,651 (23.7)**	**53,720 (76.3)**	**5,610 (16.5)**	**28,316 (83.5)**	**10,847 (19.4)**	**45,036 (80.6)**
Median age, yrs (IQR)	73 (69–79)	73 (69–79)	74 (69–79)	73 (69–79)	74 (69–79)	73 (69–79)	74 (69–79)	73 (69–79)	74 (69–79)	73 (69–79)	74 (69–80)	73 (69–79)	73 (69–79)	73 (69–79)
Age group, yrs														
65–74	15,275 (55.6)	26,976 (56.8)	23,538 (53.6)	40,667 (55.6)	4,130 (53.2)	16,011 (56.4)	18,991 (53.6)	32,181 (54.8)	8,914 (53.5)	30,195 (56.2)	2,836 (50.6)	15,714 (55.5)	5,943 (54.8)	24,948 (55.4)
75–84	9,544 (34.7)	15,791 (33.3)	15,356 (34.9)	24,532 (33.6)	2,788 (35.9)	9,567 (33.7)	12,556 (35.5)	20,434 (34.8)	5,963 (35.8)	18,158 (33.8)	2,075 (37.0)	9,707 (34.3)	3,899 (35.9)	15,633 (34.7)
≥85	2,663 (9.7)	4,704 (9.9)	5,057 (11.5)	7,888 (10.8)	842 (10.9)	2,815 (9.9)	3,867 (10.9)	6,103 (10.4)	1,774 (10.7)	5,367 (10.0)	699 (12.5)	2,895 (10.2)	1,005 (9.3)	4,455 (9.9)
Sex														
Female	15,898 (57.85)	27,299 (57.51)	25,465 (57.94)	41,690 (57.04)	4,522 (58.27)	15,794 (55.63)	20,570 (58.08)	33,603 (57.23)	9,861 (59.22)	30,137 (56.10)	3,374 (60.14)	16,120 (56.93)	6,397 (58.97)	25,832 (57.36)
Male	11,583 (42.15)	20,165 (42.48)	18,477 (42.04)	31,394 (42.95)	3,238 (41.73)	12,597 (44.37)	14,841 (41.91)	25,107 (42.76)	6,788 (40.77)	23,581 (43.90)	2,236 (39.86)	12,195 (43.07)	4,445 (40.98)	19,198 (42.63)
Unknown	1 (—)	7 (—)	9 (—)	3 (—)	0 (—)	2 (—)	3 (—)	8 (—)	2 (—)	2 (—)	0 (—)	1 (—)	5 (—)	6 (—)
Race and ethnicity														
AI/AN	14 (—)	26 (—)	13 (—)	30 (—)	6 (—)	17 (—)	18 (—)	32 (—)	4 (—)	14 (—)	1 (—)	15 (—)	1 (—)	17 (—)
Asian	1,245 (4.53)	1,349 (2.84)	1,591 (3.62)	1,660 (2.27)	343 (4.42)	782 (2.75)	1,354 (3.82)	1,487 (2.53)	369 (2.22)	1,171 (2.18)	155 (2.76)	721 (2.55)	348 (3.21)	1,355 (3.01)
Black or African American, NH	1,463 (5.32)	3,400 (7.16)	2,310 (5.26)	4,642 (6.35)	412 (5.31)	1,617 (5.70)	2,192 (6.19)	4,072 (6.93)	1,026 (6.16)	3,232 (6.02)	472 (8.41)	1,701 (6.01)	978 (9.02)	2,554 (5.67)
Hispanic or Latino	1,180 (4.29)	1,867 (3.93)	1,801 (4.10)	2,505 (3.43)	287 (3.70)	969 (3.41)	1,719 (4.85)	2,249 (3.83)	922 (5.54)	2,435 (4.53)	254 (4.53)	1,043 (3.68)	710 (6.55)	2,547 (5.66)
NH/PI	45 (0.16)	53 (0.11)	36 (—)	57 (—)	14 (0.18)	34 (0.12)	48 (0.14)	78 (0.13)	4 (—)	55 (0.10)	0 (—)	29 (0.10)	20 (0.18)	63 (0.14)
White, NH	20,316 (73.92)	35,653 (75.10)	33,313 (75.8)	56,479 (77.28)	5,811 (74.88)	22,082 (77.77)	26,078 (73.64)	44,324 (75.49)	12,529 (75.24)	41,046 (76.41)	4,085 (72.82)	21,825 (77.08)	7,463 (68.80)	33,000 (73.27)
Other	521 (1.90)	733 (1.54)	827 (1.88)	1,121 (1.53)	148 (1.91)	406 (1.43)	655 (1.85)	869 (1.48)	114 (0.68)	395 (0.74)	83 (1.48)	438 (1.55)	85 (0.78)	399 (0.89)
Unknown	2,698 (9.82)	4,390 (9.25)	4,060 (9.24)	6,593 (9.02)	739 (9.52)	2,486 (8.76)	3,350 (9.46)	5,607 (9.55)	1,683 (10.11)	5,372 (10.00)	560 (9.98)	2,544 (8.98)	1,242 (11.45)	5,101 (11.33)
Chronic medical condition														
Cancer	6,242 (22.71)	11,151 (23.49)	10,089 (22.96)	17,430 (23.85)	1,934 (24.92)	7,213 (25.40)	8,492 (23.98)	14,433 (24.58)	3,886 (23.34)	13,557 (25.24)	1,399 (24.94)	7,303 (25.79)	2,528 (23.31)	11,255 (24.99)
Cardiac disease	14,666 (53.37)	28,040 (59.07)	24,851 (56.54)	44,323 (60.64)	4,524 (58.30)	17,898 (63.04)	20,491 (57.86)	35,655 (60.72)	9,737 (58.48)	33,884 (63.08)	3,381 (60.27)	18,283 (64.57)	6,310 (58.17)	27,924 (62.00)
Cerebrovascular	4,453 (16.20)	8,496 (17.90)	7,958 (18.11)	13,757 (18.82)	1,441 (18.57)	5,432 (19.13)	6,386 (18.03)	11,187 (19.05)	3,015 (18.11)	10,370 (19.30)	1,057 (18.84)	5,604 (19.79)	1,955 (18.02)	8,646 (19.20)
Chronic liver disease	2,914 (10.60)	5,026 (10.59)	4,782 (10.88)	7,941 (10.87)	910 (11.73)	3,285 (11.57)	4,265 (12.04)	6,830 (11.63)	1,994 (11.98)	6,346 (11.81)	679 (12.10)	3,600 (12.71)	1,397 (12.88)	5,785 (12.85)
Chronic pulmonary disease	9,231 (33.59)	16,523 (34.81)	16,197 (36.85)	27,137 (37.13)	2,969 (38.26)	10,646 (37.50)	13,323 (37.62)	21,696 (36.95)	6,594 (39.60)	20,474 (38.11)	2,324 (41.43)	11,066 (39.08)	4,206 (38.78)	17,459 (38.77)
Diabetes mellitus	7,385 (26.87)	13,995 (29.48)	12,466 (28.36)	21,517 (29.44)	2,126 (27.40)	8,453 (29.77)	10,265 (28.99)	17,216 (29.32)	4,995 (30.00)	16,007 (29.80)	1,745 (31.11)	8,635 (30.50)	3,297 (30.40)	13,473 (29.92)
Disability	8,205 (29.86)	13,272 (27.96)	13,762 (31.31)	21,519 (29.44)	2,630 (33.89)	8,657 (30.49)	11,691 (33.01)	17,779 (30.28)	5,522 (33.16)	16,829 (31.33)	1,905 (33.96)	9,323 (32.92)	3,492 (32.19)	15,167 (33.68)
HIV	35 (0.13)	107 (0.23)	60 (0.14)	130 (0.18)	9 (0.12)	58 (0.20)	59 (0.17)	104 (0.18)	33 (0.20)	121 (0.23)	14 (0.25)	75 (0.26)	17 (0.16)	105 (0.23)
Mental health disorder	7,199 (26.20)	11,447 (24.11)	12,052 (27.42)	18,611 (25.46)	2,131 (27.46)	7,189 (25.32)	9,855 (27.83)	15,152 (25.80)	4,756 (28.56)	13,871 (25.82)	1,593 (28.40)	7,692 (27.16)	2,876 (26.51)	12,210 (27.11)
Neurologic disease/ dementia	5,668 (20.62)	9,501 (20.01)	10,003 (22.76)	15,129 (20.70)	1,826 (23.53)	5,609 (19.75)	8,150 (23.01)	12,226 (20.82)	3,780 (22.70)	11,218 (20.88)	1,402 (24.99)	6,381 (22.53)	2,237 (20.62)	10,072 (22.36)
Obesity	5,958 (21.68)	10,389 (21.88)	10,327 (23.50)	16,940 (23.18)	1,766 (22.76)	6,910 (24.34)	8,478 (23.94)	13,845 (23.58)	4,340 (26.06)	13,780 (25.65)	1,460 (26.02)	7,480 (26.42)	2,853 (26.30)	11,526 (25.59)
Physical inactivity	458 (1.67)	625 (1.32)	807 (1.84)	1,196 (1.64)	151 (1.95)	419 (1.48)	855 (2.41)	1,076 (1.83)	423 (2.54)	1,100 (2.05)	150 (2.67)	575 (2.03)	392 (3.61)	1,037 (2.30)
Renal disease	6,465 (23.52)	11,941 (25.15)	11,107 (25.27)	18,974 (25.96)	1,952 (25.15)	7,550 (26.59)	9,178 (25.92)	15,230 (25.94)	4,533 (27.22)	14,327 (26.67)	1,581 (28.18)	7,711 (27.23)	2,944 (27.14)	11,951 (26.54)
Smoking	6,416 (23.35)	11,766 (24.79)	10,948 (24.91)	19,201 (26.27)	1,966 (25.34)	7,551 (26.59)	8,555 (24.16)	14,929 (25.42)	4,100 (24.62)	14,690 (27.35)	1,367 (24.37)	8,034 (28.37)	2,293 (21.14)	11,996 (26.64)
Steroid medications	1,267 (4.61)	2,069 (4.36)	2,154 (4.90)	3,465 (4.74)	411 (5.30)	1,310 (4.61)	1,768 (4.99)	2,715 (4.62)	818 (4.91)	2,666 (4.96)	294 (5.24)	1,489 (5.26)	476 (4.39)	2,305 (5.12)
Other immune-modulating medication	259 (0.94)	590 (1.24)	440 (1.00)	885 (1.21)	71 (0.91)	401 (1.41)	329 (0.93)	710 (1.21)	183 (1.10)	690 (1.28)	61 (1.09)	397 (1.40)	97 (0.89)	586 (1.30)

See table footnotes on the next page.

TABLE 1. (*Continued*) Characteristics of adults aged ≥65 years with COVID-19 who received COVID-19 antiviral prescriptions in outpatient care settings, by analysis period* — Truveta database, United States, June 2023–September 2025

Characteristic	No. (%)													
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	Pre-scribed	Not pre-scribed	Pre-scribed	Not pre-scribed	Pre-scribed	Not pre-scribed	Pre-scribed	Not pre-scribed	Pre-scribed	Not pre-scribed	Pre-scribed	Not pre-scribed	Pre-scribed	Not pre-scribed
Transplant recipient	185 (0.67)	410 (0.86)	322 (0.73)	690 (0.94)	58 (0.75)	290 (1.02)	251 (0.71)	537 (0.91)	150 (0.90)	502 (0.93)	49 (0.87)	291 (1.03)	89 (0.82)	422 (0.94)
Tuberculosis	137 (0.50)	171 (0.36)	156 (0.35)	239 (0.33)	36 (0.46)	105 (0.37)	164 (0.46)	221 (0.38)	63 (0.38)	193 (0.36)	21 (0.37)	106 (0.37)	36 (0.33)	184 (0.41)
No. of comorbidities†														
None	3,780 (13.75)	5,006 (10.55)	5,296 (12.05)	7,086 (9.70)	900 (11.60)	2,115 (7.45)	3,879 (10.95)	5,833 (9.93)	1,811 (10.88)	4,384 (8.16)	588 (10.48)	2,005 (7.08)	1,333 (12.29)	4,075 (9.05)
1	4,083 (14.86)	6,978 (14.70)	5,720 (13.01)	10,079 (13.79)	981 (12.64)	3,897 (13.73)	4,548 (12.84)	7,909 (13.47)	2,114 (12.70)	6,875 (12.80)	675 (12.03)	3,415 (12.06)	1,348 (12.43)	5,567 (12.36)
2	4,244 (15.44)	8,056 (16.97)	6,726 (15.30)	12,114 (16.57)	1,181 (15.22)	4,870 (17.15)	5,410 (15.28)	9,481 (16.15)	2,471 (14.84)	8,727 (16.25)	778 (13.87)	4,594 (16.22)	1,566 (14.44)	6,810 (15.12)
≥3	15,375 (55.95)	27,431 (57.78)	26,209 (59.63)	43,808 (59.94)	4,698 (60.54)	17,511 (61.67)	21,577 (60.93)	35,495 (60.45)	10,255 (61.59)	33,734 (62.80)	3,569 (63.62)	18,302 (64.63)	6,600 (60.85)	28,584 (63.47)
No. of COVID-19 vaccine doses received in last 6 months														
None recorded	24,946 (90.77)	45,417 (95.67)	34,206 (77.83)	63,631 (87.06)	5,975 (77.00)	25,013 (88.10)	32,486 (91.73)	56,252 (95.80)	13,558 (81.42)	45,933 (85.50)	5,015 (89.39)	26,072 (92.08)	10,553 (97.29)	42,516 (94.40)
1	2,530 (9.21)	2,050 (4.32)	9,389 (21.36)	9,168 (12.54)	1,768 (22.78)	3,340 (11.76)	2,880 (8.13)	2,435 (4.15)	3,023 (18.16)	7,628 (14.20)	592 (10.55)	2,238 (7.90)	289 (2.66)	2,438 (5.41)
2	6 (—)	4 (—)	356 (0.81)	288 (0.39)	17 (0.22)	40 (0.14)	48 (0.14)	31 (—)	70 (0.42)	159 (0.30)	3 (—)	6 (—)	5 (—)	82 (0.18)
Rural/Urban classification§														
Rural	1,154 (4.20)	2,772 (5.84)	2,277 (5.18)	4,440 (6.07)	283 (3.65)	1,727 (6.08)	1,563 (4.41)	3,288 (5.60)	988 (5.93)	3,321 (6.18)	243 (4.33)	1,552 (5.48)	405 (3.73)	2,887 (6.41)
Urban	25,641 (93.30)	43,047 (90.68)	40,304 (91.70)	65,799 (90.03)	7,266 (93.63)	25,704 (90.53)	32,939 (93.01)	53,420 (90.98)	15,233 (91.48)	48,888 (91.01)	5,223 (93.10)	25,865 (91.34)	10,221 (94.23)	41,076 (91.21)
Unknown	687 (2.50)	1,652 (3.48)	1,370 (3.12)	2,848 (3.90)	211 (2.72)	962 (3.39)	912 (2.58)	2,010 (3.42)	430 (2.58)	1,511 (2.81)	144 (2.57)	899 (3.17)	221 (2.04)	1,073 (2.38)
HHS region¶														
1	36 (0.13)	43 (—)	57 (0.13)	102 (0.14)	3 (—)	35 (0.12)	29 (—)	62 (0.11)	27 (0.16)	62 (0.12)	9 (0.16)	20 (—)	10 (—)	34 (—)
2	761 (2.77)	4,614 (9.72)	1,714 (3.90)	7,875 (10.77)	313 (4.03)	2,625 (9.25)	995 (2.81)	4,904 (8.35)	681 (4.09)	5,081 (9.46)	394 (7.02)	2,897 (10.23)	450 (4.15)	3,292 (7.31)
3	523 (1.90)	3,005 (6.33)	1,112 (2.53)	3,897 (5.33)	179 (2.31)	1,616 (5.69)	767 (2.17)	2,823 (4.81)	929 (5.58)	5,578 (10.38)	204 (3.64)	2,198 (7.76)	524 (4.83)	3,948 (8.77)
4	5,963 (21.70)	8,485 (17.87)	9,200 (20.93)	11,400 (15.60)	1,548 (19.95)	4,010 (14.12)	8,222 (23.22)	10,920 (18.60)	3,451 (20.73)	8,337 (15.52)	1,440 (25.67)	4,174 (14.74)	3,788 (34.92)	7,828 (17.38)
5	1,473 (5.36)	6,490 (13.67)	4,369 (9.94)	11,936 (16.33)	691 (8.90)	5,462 (19.24)	2,787 (7.87)	8,847 (15.07)	2,781 (16.70)	10,350 (19.27)	619 (11.03)	4,937 (17.44)	1,080 (9.96)	6,466 (14.36)
6	3,965 (14.43)	8,358 (17.61)	7,453 (16.96)	12,806 (17.52)	1,116 (14.38)	4,576 (16.12)	5,350 (15.11)	10,344 (17.62)	3,249 (19.51)	7,612 (14.17)	1,378 (24.56)	3,577 (12.63)	3,007 (27.72)	4,045 (8.98)
7	326 (1.19)	1,775 (3.74)	768 (1.75)	2,643 (3.62)	128 (1.65)	1,110 (3.91)	601 (1.70)	2,020 (3.44)	457 (2.74)	2,041 (3.80)	101 (1.80)	1,220 (4.31)	195 (1.80)	1,523 (3.38)
8	404 (1.47)	330 (0.70)	616 (1.40)	882 (1.21)	147 (1.89)	850 (2.99)	682 (1.93)	1,274 (2.17)	322 (1.93)	1,231 (2.29)	75 (1.34)	738 (2.61)	115 (1.06)	1,155 (2.56)
9	5,437 (19.78)	5,648 (11.90)	7,469 (16.99)	8,273 (11.32)	1,314 (16.93)	3,046 (10.73)	6,696 (18.91)	6,797 (11.58)	2,284 (13.72)	5,360 (9.98)	655 (11.68)	3,504 (12.37)	926 (8.54)	7,236 (16.07)
10	7,775 (28.29)	6,620 (13.95)	9,484 (21.58)	9,560 (13.08)	2,100 (27.06)	3,853 (13.57)	8,165 (23.06)	8,087 (13.77)	1,849 (11.10)	5,645 (10.51)	559 (9.96)	3,838 (13.55)	390 (3.60)	7,657 (17.00)
Unknown	819 (2.98)	2,103 (4.43)	1,709 (3.89)	3,713 (5.08)	221 (2.85)	1,210 (4.26)	1,120 (3.16)	2,640 (4.50)	621 (3.73)	2,423 (4.51)	176 (3.14)	1,213 (4.28)	362 (3.34)	1,852 (4.11)

Abbreviations: AI/AN = American Indian or Alaska Native; HHS = U.S. Department of Health and Human Services; NH = non-Hispanic; NH/PI = Native Hawaiian or Pacific Islander.

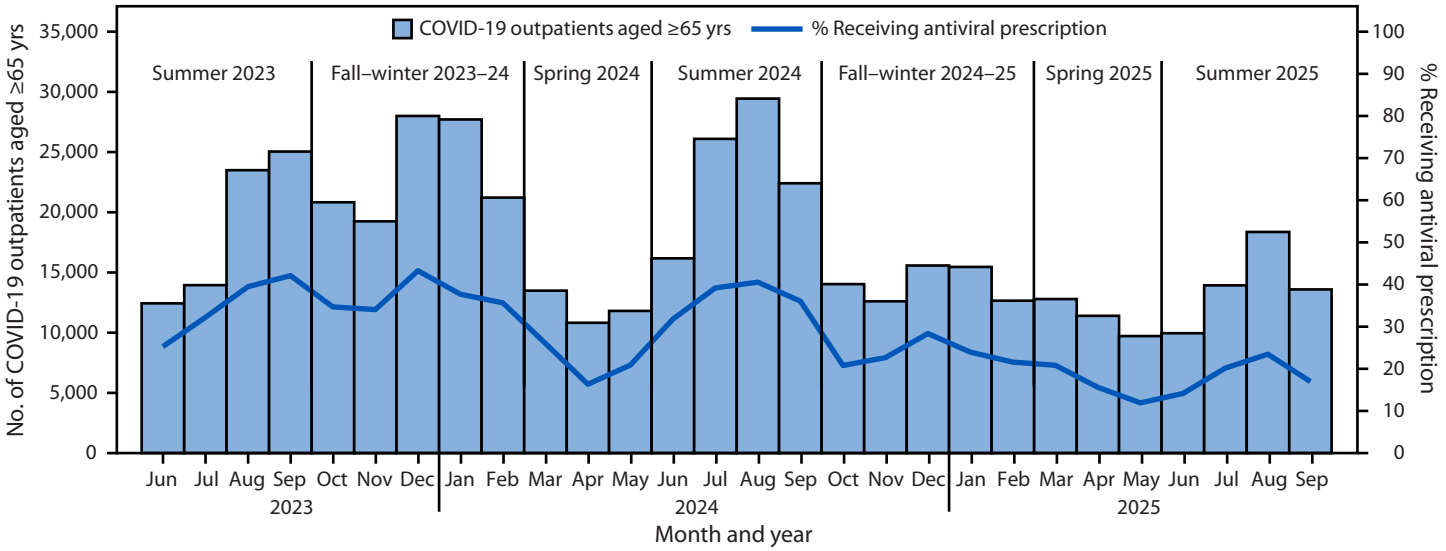
* Summer 2023 = June 1–September 30, 2023; fall–winter 2023–2024 = October 1, 2023–February 29, 2024; spring 2024 = March 1–May 31, 2024; summer 2024 = June 1–September 30, 2024; fall–winter 2024–2025 = October 1, 2024–February 28, 2025; spring 2025 = March 1–May 31, 2025; summer 2025 = June 1–September 30, 2025.

† For chronic medical conditions (nonexclusive categories), each condition was compared in a 2x2 table using total number of patients with this comorbidity and total number of patients without this comorbidity by treatment status.

§ Rural/urban classification is defined by residential address based on Federal Office of Rural Health Policy Data files from 2024, which contain all zip codes classified as rural areas.

¶ HHS regional offices: 1 = Boston, Massachusetts; 2 = New York, New York; 3 = Philadelphia, Pennsylvania; 4 = Atlanta, Georgia; 5 = Chicago, Illinois; 6 = Dallas, Texas; 7 = Kansas City, Missouri; 8 = Denver, Colorado; 9 = San Francisco, California; and 10 = Seattle, Washington.

FIGURE. Percentage of patients aged ≥65 years with COVID-19* who received a COVID-19 antiviral prescription in an outpatient setting, by analysis period† — Truveta database,§ United States, June 1, 2023–September 30, 2025



* Receipt of a positive SARS-CoV-2 molecular or antigen test result or a health care encounter with an *International Classification of Diseases, Tenth Revision, Clinical Modification* COVID-19 diagnosis code.
† Summer 2023 = June 1–September 30, 2023; fall–winter 2023–24 = October 1, 2023–February 29, 2024; spring 2024 = March 1–May 31, 2024; summer 2024 = June 1–September 30, 2024; fall–winter 2024–25 = October 1, 2024–February 28, 2025; spring 2025 = March 1–May 31, 2025; summer 2025 = June 1–September 30, 2025.
§ EHR data and analytics | Truveta

Summary

What is already known about this topic?

COVID-19 antiviral use is low among outpatients aged ≥65 years, a population at high risk for severe disease.

What is added by this report?

During June 1, 2023–September 30, 2025, 16%–23% of outpatients aged ≥65 years with COVID-19 received an antiviral prescription during periods of low COVID-19 incidence compared with 37%–38% during higher incidence periods. Adults aged 75–84 years and ≥85 years were more likely to receive an antiviral prescription than were those aged 65–74 years.

What are the implications for public heath practice?

COVID-19 vaccination and treatment can prevent severe COVID-19 among older adults. Efforts to improve health care provider and patient knowledge regarding the benefits of COVID-19 vaccination and antivirals, especially for older adults, are needed to reduce the risk for severe illness and death.

Increased receipt of an antiviral prescription with increasing age suggests an improvement in health care provider recommendations for antivirals among older adults with COVID-19, particularly because the risk for severe disease increases with increasing age (*1*). In this analysis, persons with comorbidities were less likely to receive a COVID-19 antiviral prescription than were those without comorbidities. This might reflect complicated medication profiles of older adults as well as health care provider concerns about the potential for drug interactions. However, because persons with comorbidities are at increased risk for severe disease, considering treatment for these persons can help prevent morbidity and mortality. Increased receipt of COVID-19 antiviral prescriptions among persons who had received the COVID-19 vaccine suggests that persons who engage in preventive care might be more likely to seek treatment when they are ill. COVID-19 vaccination rates are lower now than in previous years (*6*). Therefore, recommending primary prevention strategies to protect against severe COVID-19 to older adults, including COVID-19 vaccination, can reduce hospitalizations and deaths. For additional protection, consideration of early outpatient treatment for older adults who develop mild to moderate COVID-19 can help prevent disease progression.

The receipt of an antiviral prescription varied across periods and seemed to correspond with intensity of SARS-CoV-2 circulation, suggesting that perception of risk related to SARS-CoV-2 activity rather than individual risk might be a factor in clinical decision-making about treatment (*7*). Health care providers and patients should be educated about the benefits and risks of COVID-19 antiviral treatment. Accurate assessment of risk for severe disease and options for treatment are important for early initiation to prevent severe outcomes. Barriers to COVID-19 treatment, particularly nirmatrelvir/ritonavir, include concerns about drug interactions (*8*). However, studies suggest these interactions can be safely

TABLE 2. Factors associated with receipt of antiviral prescriptions among adults aged ≥65 with COVID-19* in outpatient care settings — Truveta database, United States, June 2023–September 2025

Characteristic	Adjusted odds ratio (95% CI)†
Age group, yrs	
65–74	Referent
75–84	1.09 (1.07–1.10)
≥85	1.11 (1.09–1.14)
Sex	
Female	Referent
Male	0.95 (0.94–0.96)
Race and ethnicity	
White, non-Hispanic	Referent
American Indian/Alaska Native	0.85 (0.62–1.18)
Asian	1.42 (1.37–1.47)
Black or African American, non-Hispanic	0.97 (0.95–1.00)
Hispanic or Latino	1.24 (1.20–1.28)
Native Hawaiian or Pacific Islander	1.12 (0.93–1.35)
Other	1.21 (1.15–1.28)
Unknown	1.03 (1.01–1.05)
No. of comorbidities	
0	Referent
1	0.76 (0.74–0.78)
≥2	0.75 (0.74–0.77)
No. of COVID-19 vaccine doses in last 6 months	
0	Referent
1 or 2	1.73 (1.70–1.77)
Rural/Urban classification§	
Urban	Referent
Rural	0.81 (0.79–0.84)
Analysis period¶	
Summer 2023	Referent
Fall–winter 2023–24	0.98 (0.96–1.00)
Spring 2024	0.45 (0.44–0.46)
Summer 2024	1.05 (1.03–1.07)
Fall–winter 2024–25	0.51 (0.49–0.52)
Spring 2025	0.34 (0.33–0.35)
Summer 2025	0.41 (0.40–0.43)

* Receipt of a positive SARS-CoV-2 molecular or antigen test result or a health care encounter with an *International Classification of Diseases, Tenth Revision, Clinical Modification* COVID-19 diagnosis code.

† The logistic regression models were estimated using a generalized linear model with a binomial family and a logit link. All models included the variables reported as main effects. For all categorical covariates, the level treated as the referent category is listed in the table. Adjusted odds ratios are interpreted relative to this referent.

§ Rural/urban classification is defined by residential address based on Federal Office of Rural Health Policy Data files from 2024, which contain all zip codes classified as rural areas.

¶ Summer 2023 = June 1–September 30, 2023; fall–winter 2023–2024 = October 1, 2023–February 29, 2024; spring 2024 = March 1–May 31, 2024; summer 2024 = June 1–September 30, 2024; fall–winter 2024–2025 = October 1, 2024–February 28, 2025; spring 2025 = March 1–May 31, 2025; summer 2025 = June 1–September 30, 2025.

managed (*9*). Improved awareness of COVID-19 antiviral patient access programs could improve availability.

Limitations

The findings in this report are subject to at least five limitations. First, these data are not representative of the general U.S. population because they reflect only the health care–seeking population. Second, selection bias might have resulted from exclusion of persons who did not have electronic health record documentation of a positive SARS-CoV-2 test result or COVID-19 diagnosis and likely resulted in underascertainment of COVID-19 cases. Third, lack of symptom data affected the accurate assessment of eligibility for treatment. Fourth, data are limited to those that were documented by the clinician, likely resulting in incomplete data on some variables such as vaccination status. Finally, contraindications to treatment, which might have biased the estimate of eligibility for treatment, could not be examined.

Implications for Public Health Practice

This study suggests that COVID-19 antivirals are likely underprescribed to outpatients aged ≥65 years with COVID-19 and that their use varies with disease transmission intensity. Increased perception of individual risk for severe COVID-19, which is largely driven by age, might increase antiviral prescribing and prevent significant morbidity and mortality among older adults (*10*). COVID-19 vaccination and treatment remain essential interventions for preventing severe COVID-19 among older adults throughout the year, because individual risk for progression to severe disease remains even when SARS-CoV-2 circulation is low. Public health efforts to improve health care provider and patient knowledge of the benefits of COVID-19 vaccination and antivirals, especially for outpatients aged ≥65 years with COVID-19, are needed to prevent severe outcomes.

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Respiratory Virus Activity — United States, July 1, 2024–June 30, 2025

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Abstract

Respiratory viruses are common causes of upper and lower respiratory tract illness and can also result in hospitalization and death. CDC conducts national surveillance using multiple systems to monitor ongoing and seasonal changes in the activity of selected respiratory viruses. This report summarizes U.S. trends in endemic respiratory virus activity during July 2024–June 2025. For SARS-CoV-2 and respiratory syncytial virus (RSV), national and regional trends; population-based hospitalization rates; vital records death counts; and preliminary estimates of associated illnesses, outpatient visits, hospitalizations, and deaths are described, as well as genetic characterization of circulating SARS-CoV-2 viruses. Some viruses, including SARS-CoV-2, showed bimodal peaks in positive laboratory test results, whereas others, including RSV and influenza viruses, were characterized by a single peak. The highest COVID-19–associated hospitalization rates were reported among adults aged ≥75 years (932.6 per 100,000 persons), infants aged <6 months (285.6), and adults aged 65–74 years (274.4). RSV-associated hospitalization rates were highest among infants aged <12 months (1,116.7 per 100,000; 95% CI = 1,078.4–1,157.9), children aged 12–23 months (770.6; 95% CI = 743.1–800.3), and adults aged ≥75 years (426.9; 95% CI = 366.6–510.8). COVID-19 was associated with an estimated 290,000–450,000 hospitalizations and 34,000–53,000 deaths; RSV was associated with 190,000–350,000 hospitalizations and 10,000–23,000 deaths. All circulating SARS-CoV-2 lineages were Omicron JN.1 descendants. Staying up to date with recommended COVID-19, RSV, and influenza vaccinations remains important to reducing the risk for severe disease caused by these viruses.

Introduction

The circulation of many respiratory viruses, which are common causes of upper and lower respiratory tract illnesses, varies seasonally. Although respiratory viral infections usually cause mild or moderate illnesses, such as the common cold, lower respiratory tract infections can result in hospitalization and death. CDC uses multiple surveillance systems to systematically monitor selected respiratory virus activity in the United States, including SARS-CoV-2 (the virus that causes COVID-19), influenza viruses, respiratory syncytial virus (RSV), human metapneumovirus (hMPV), rhinoviruses and enteroviruses (RV/EV), parainfluenza viruses (PIV) types 1–4, common human coronaviruses (229E, NL63, OC43, and HKU1), and respiratory adenoviruses. This report summarizes U.S. trends in endemic respiratory virus activity during July 2024–June 2025; hospitalization rates, vital records death counts, and estimates of illnesses, outpatient visits, hospitalizations, and deaths for COVID-19 and RSV; and genomic surveillance data for SARS-CoV-2. CDC publishes a separate summary of influenza activity, morbidity, and mortality each season. Ongoing national respiratory virus surveillance is critical for characterizing seasonality, providing information to guide health system preparedness and the timing of prevention product use for certain respiratory viruses, and identifying threats caused by new strains or novel viruses.

Methods

Data Sources

Data from six national surveillance systems (Box) were analyzed for this report. Data on COVID-19 and RSV vaccinations status and COVID-19 antiviral treatment are not systematically collected by some systems and were not analyzed for this report. All findings were limited to data reported during July 1, 2024–June 30, 2025, unless otherwise specified. This activity was reviewed by CDC, deemed not research, and was conducted consistent with applicable federal law and CDC policy.*

Data Analysis

Respiratory virus activity. The National Respiratory and Enteric Virus Surveillance System (NREVSS) includes results from clinical testing of persons seeking medical care reported by clinical, reference, and public health laboratories throughout the United States. For this report, influenza data were limited to submissions from clinical laboratories and influenza-collaborating laboratories to monitor the timing and intensity of influenza activity. Data from NREVSS were analyzed to provide virus-specific information on percentages of laboratory tests that were positive (percent positive).

Hospitalizations and deaths associated with COVID-19 and RSV. Rates of laboratory-confirmed hospitalization associated with COVID-19 and RSV are monitored

*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.

BOX. Surveillance systems used in analyses — United States, July 2024–June 2025

1. National Respiratory and Enteric Virus Surveillance System (NREVSS)

- **Data source**: specimen testing results from children and adults, all ages
- **Settings:** participating clinical laboratories, commercial reference laboratories, and public health laboratories (influenza data are limited to clinical laboratory testing data)
- **Inclusion dates:** June 30, 2024–June 28, 2025
- **Type of surveillance:** passive (voluntary) reporting of laboratory test results as weekly aggregate counts. Reporting sources included: approximately 345 participating laboratories representing all 50 states and the District of Columbia. Data were included from laboratories consistently reporting SARS-CoV-2 tests (n = 298 laboratories), respiratory syncytial virus (RSV) tests (273), rhinoviruses/enteroviruses tests (156), respiratory adenovirus tests (149), parainfluenza virus tests (222), common human coronaviruses tests (125) and human metapneumovirus tests (190). Current participating laboratories are shown here: Participating Labs | NREVSS | CDC
- **RSV season onset and offset:** onset and offset were identified, respectively, as the week ending date corresponding to the first and last of 2 consecutive weeks when the percentage of weekly tests positive for RSV reached or exceeded 3%

2. COVID-19–Associated Hospitalization Surveillance Network (COVID-NET)

- **Population:** all ages (children and adults) hospitalized with laboratory-confirmed SARS-CoV-2 infection identified through provider-driven testing
- **Settings:** inpatient
- **Inclusion dates:** July 1, 2024–June 30, 2025
- **Type of surveillance:** active, population-based sentinel surveillance network catchment area included: residents receiving care in approximately 300 participating hospitals in select counties in California, Colorado, Connecticut, Georgia, Maryland, Michigan, Minnesota, New Mexico, New York, North Carolina, Oregon, Tennessee, and Utah
- **Unadjusted rate calculation:** COVID-19–associated hospitalizations are defined as those among persons who have received a positive SARS-CoV-2 reverse transcription–polymerase chain reaction (RT-PCR) or rapid antigen detection test result during hospitalization or ≤14 days before admission. Unadjusted COVID-NET hospitalization rates (number of hospitalizations per 100,000 population) were estimated by dividing total catchment-area COVID-19 hospitalizations by U.S. Census Bureau vintage unbridged-race postcensal population estimates for the counties or county equivalents in the surveillance catchment area. COVID-NET conducts population-based surveillance in which every hospitalization meeting the case definition is ascertained. Because hospitalization rates reflect actual measured rates in the catchment area population, 95% CIs are not calculated

3. New Vaccine Surveillance Network (NVSN)

- **Population:** children and adolescents <18 years
- **Settings:** outpatient (outpatient clinics, urgent care clinics, and emergency departments); inpatient
- **Inclusion dates:** July 1, 2024–June 30, 2025
- **Type of surveillance:** active, prospective, population-based sentinel surveillance network for acute respiratory illness (ARI)
- **Medical centers included:** Vanderbilt University Medical Center (Tennessee), University of Rochester Medical Center (New York), Cincinnati Children's Hospital Medical Center (Ohio), Texas Children's Hospital (Texas), Seattle Children's Hospital (Washington), Children's Mercy Hospital (Missouri), and University of Pittsburgh Medical Center Children's Hospital of Pittsburgh (Pennsylvania)
- **Adjusted rate calculation:** All children hospitalized with ARI (based on a standard case definition) have respiratory samples collected (or residual clinical samples retained) and tested for respiratory viruses by RT-PCR. NVSN population-based numerators are adjusted using multipliers for the observed number of enrolled hospitalizations to account for weeks with <7 days of surveillance, the percentage of eligible children not enrolled, sensitivity of RSV RT-PCR testing (87.6%) for RSV rates only, and the market share of each enrollment hospital site for the estimated proportion of ARI hospitalizations ascertained in the catchment area. Adjusted rates were estimated per 100,000 children, and 95% CIs were determined to account for multiplier uncertainty by percentiles based on 1,000 bootstrap samples for each rate

4. RSV-Associated Hospitalization Surveillance Network (RSV-NET)

- **Population:** all ages (children and adults) hospitalized with laboratory-confirmed RSV infection identified through provider-driven testing

BOX. (*Continued*) Surveillance systems used in analyses — United States, July 2024–June 2025

- **Settings:** inpatient
- **Inclusion dates:** July 1, 2024–June 30, 2025
- **Type of surveillance:** active, population-based sentinel surveillance network
- **Catchment area included:** residents receiving care in approximately 300 participating hospitals in select counties in California, Colorado, Connecticut, Georgia, Maryland, Michigan, Minnesota, New Mexico, New York, North Carolina, Oregon, Tennessee, and Utah
- **Adjusted rate calculation:** RSV-associated hospitalizations are defined as those among persons who have received a positive RT-PCR or rapid antigen detection test result during hospitalization or ≤14 days before admission. Unadjusted RSV-NET hospitalization rates (number of hospitalizations per 100,000 population) were estimated by dividing total catchment-area RSV-associated hospitalizations by U.S. Census Bureau vintage unbridged-race postcensal population estimates for the counties or county equivalents in the surveillance catchment area. RSV-NET rates are adjusted with multipliers to account for underdetection due to diagnostic test sensitivity and testing practices. Adjusted rates are presented with 95% CIs to account for multiplier uncertainty

5. National Vital Statistics System (NVSS)

- **Data source:** provisional mortality data on the CDC Wonder Online Database
- **Population:** all ages (children and adults)
- **Settings:** any setting within the United States
- **Inclusion dates:** July 1, 2024–June 30, 2025
- **Type of surveillance:** passive, population-based reporting of death certificate data
- **Catchment area:** compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program
- **Mortality ascertainment**: includes all deaths among U.S. residents occurring within the United States for which COVID-19 or RSV was listed on the death certificate as the underlying (primary) or contributing cause of death in the chain of events leading to death. COVID-19–associated deaths were identified with an *International Classification of Diseases, Tenth Revision* (ICD-10) code of U07.1 (COVID-19) assigned as a cause of death. RSV-associated deaths were identified with ICD-10 code J12.1 (respiratory syncytial virus pneumonia), J20.5 (acute bronchitis due to respiratory syncytial virus), or J21.0 (acute bronchiolitis due to respiratory syncytial virus)

6. SARS-CoV-2 National Genomic Surveillance and RSV Subtyping

- **Data source:** specimens and sequencing or subtyping results from children and adults, all ages
- **Settings:** For SARS-CoV-2: National SARS-CoV-2 Strain Surveillance (NS3) program, public sequence data repositories, and before June 2025, CDC-contracted commercial laboratories. Sequences from public repositories are limited to those meeting baseline surveillance criteria, which ensures that they are representative. For RSV: surveillance specimens received from NVSN and state and local public health laboratories
- **Inclusion dates:** June 8, 2024–July 5, 2025
- **Type of surveillance:** passive, laboratory-based reporting
- **Jurisdictions included:** 56 U.S. jurisdictions for SARS-CoV-2 (50 U.S. states, District of Columbia, American Samoa, Guam, Northern Mariana Islands, Puerto Rico, and U.S. Virgin Islands) and 15 U.S. jurisdictions for RSV (Arkansas, California, Louisiana, Missouri, Nevada, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, Washington, Wisconsin, and Wyoming)

by three population-based surveillance systems: 1) the COVID-19–Associated Hospitalization Surveillance Network (COVID-NET), 2) the RSV-Associated Hospitalization Surveillance Network (RSV-NET), and 3) the New Vaccine Surveillance Network (NVSN). COVID-NET and RSV-NET conduct surveillance among residents of all ages in predefined catchment areas to calculate hospitalization rates overall and by age. NVSN conducts surveillance among children and adolescents aged <18 years, with systematic testing of patients with acute respiratory illness at seven U.S. medical centers. Counts of deaths associated with COVID-19 and RSV are described using provisional death certificate data compiled by the National Vital Statistics System (NVSS) based on codes for specific underlying or contributing causes of death.

Modeling estimates. Mathematical models using previously described methods were used to estimate COVID-19 and RSV illnesses, outpatient visits, hospitalizations, and deaths (*1*). These estimates characterize the impact of these infections on the U.S. population.

SARS-CoV-2 genomic surveillance and RSV subtyping. CDC tracks the genomic evolution of SARS-CoV-2 and estimates variant proportions by integrating sequence data from the National SARS-CoV-2 Strain Surveillance program, public sequence data repositories and, before June 2025, CDC-contracted commercial laboratories. CDC identifies RSV subtype from surveillance specimens received from NVSN and state and local public health laboratories. Data were analyzed using SAS (version 9.4; SAS Institute).

Results

Respiratory Virus Activity

During June 30, 2024–June 28, 2025, bimodal peaks occurred in the percentage of specimens that tested positive for SARS-CoV-2, RV/EV, and PIV 1–4 at laboratories participating in NREVSS (Figure 1). In contrast, single peaks occurred in the percentage of positive laboratory results for RSV, influenza viruses, hMPV, and common coronaviruses.[†]

SARS-CoV-2

During the reporting period, 297 laboratories reported 3,961,594 SARS-CoV-2 polymerase chain reaction test results, 260,883 (6.6%) of which were positive. Nationally, the highest percentage of positive SARS-CoV-2 test results (i.e., the peak) (17.9%) occurred during the week ending August 10, 2024 (week 32), and the lowest percentage of positive tests (the trough) (4.0%) occurred during the week ending November 16, 2024 (week 46). A second peak (6.7%) occurred during the week ending January 4, 2025 (week 1) followed by a trough (2.7%) during the week ending May 24, 2025 (week 21). By U.S. Department of Health and Human Services (HHS) region, the peaks within the first elevated period ranged from weeks 29 (HHS Region 9) to 35 (HHS Regions 3 and 5) and within the second elevated period from weeks 48 (HHS Region 6) to 11 (HHS Region 4) (Supplementary Table 1).

Rhinovirus/Enterovirus and Parainfluenza

The two peaks in the percentage of positive RV/EV test results occurred in the fall (30.4%) during the week ending September 21, 2024 (week 38) and the spring (22.3%) during the week ending May 10, 2025 (week 19) (Figure 1). The weekly percentage of positive RV/EV test results ranged from 10.1% to 30.4%. The two peaks in the percentage of positive PIV 1–4 test results occurred in the winter (5.6%) during the week ending November 23, 2024 (week 47) and spring (9.4%) during the week ending May 31, 2025 (week 22).

[†] NVSN test positivity data for children and adolescents aged <18 years are also available online. Pediatric Acute Respiratory Illness (ARI) Interactive Dashboard | NVSN | CDC

Respiratory Syncytial Virus

A total of 3,767,034 RSV specimen tests were reported; among these, 178,911 (4.8%) results were positive. The percentage of positive test results peaked at 11.0% during the week ending December 21, 2024 (week 51). Nationally, RSV epidemic onset[§] occurred during the week ending November 9, 2024 (week 45), and epidemic offset occurred during the week ending March 29, 2025 (week 13). Within the continental United States, the earliest RSV epidemic onset occurred in Florida (week 39, ending September 28, 2024), followed by the South (HHS Region 6, week ending October 5, 2024 [week 40]) and the Southeast (HHS Region 4, week ending October 19, 2024 [week 42]); the peak percentage of positive RSV test results also varied by region(Supplementary Table 2).[¶]

Influenza, Human Metapneumovirus, and Common Coronavirus

The percentage of positive influenza virus test results from clinical laboratories peaked (31.6%) during the week ending February 1, 2025 (week 5) (Figure 1). The peak in percentage of positive hMPV test results (7.4%) occurred during the week ending April 19, 2025 (week 16). The peak in percentage of positive common coronavirus (types 229E, NL63, OC43, and HKU1) test results (8.3%) occurred during the week ending February 22, 2025 (week 8). A pattern of elevated respiratory adenovirus activity was not observed in the 2024–25 season.

Hospitalizations and Deaths

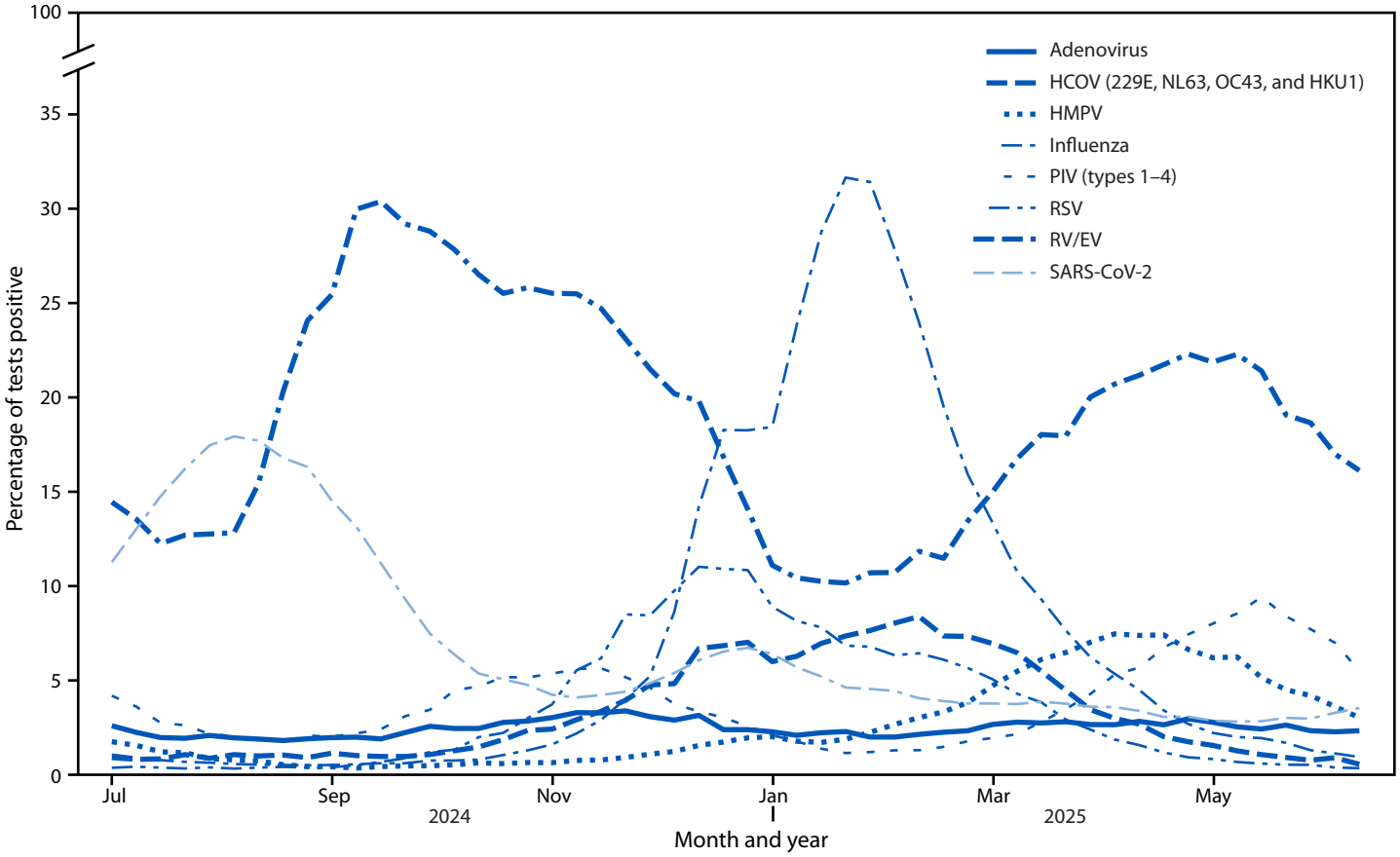
COVID-19. Based on analysis of COVID-NET data, adults aged ≥75 years experienced the highest rate of COVID-19–associated hospitalization (number of hospitalizations per 100,000 persons) (932.6), followed by infants aged <6 months (285.6), adults aged 65–74 years (274.4) and 50–64 years (104.7), and children aged 6–23 months (104.1) (Figure 2). Pediatric COVID-19–associated hospitalization rates estimated by NVSN were highest among infants aged <6 months (243.0; 95% CI = 174.1–315.2), followed by children aged 6–23 months (92.5; 95% CI = 68.6–120.6).

A total of 34,981 COVID-19–associated deaths were recorded by NVSS, including 187 (0.5%) among children and adolescents aged <18 years, 3,781 (10.8%) among persons aged 18–64 years, and 30,923 (88.4%) among adults aged ≥65 years. During October 1, 2024–July 5, 2025, COVID-19 was associated with an estimated 10.4–16.7 million illnesses,

[§] RSV season onset and offset were identified, respectively, as the week ending date corresponding to the first and last of 2 consecutive weeks when the percentage of weekly tests positive for RSV was ≥3%.

[¶] For assessment of RSV, HHS Region 4 excludes Florida, HHS Region 9 excludes Hawaii, and HHS Region 10 excludes Alaska to account for notable variations in seasonal activity patterns in these states.

FIGURE 1. Weekly percentage of laboratory test results positive for respiratory viruses* — National Respiratory and Enteric Virus Surveillance System, United States, June 30, 2024–June 28, 2025†



Abbreviations: HCOV = human coronavirus; HMPV = human metapneumovirus; PIV = parainfluenza viruses; RSV = respiratory syncytial virus; RV/EV = rhinovirus/enterovirus.
* Influenza data are limited to clinical laboratory testing data.
† As of December 5, 2025.

2.5–4 million outpatient visits, 290,000–450,000 hospitalizations, and 34,000–53,000 deaths.

RSV. RSV-associated hospitalization rates estimated by RSV-NET were highest among infants aged 0–11 months (1,116.7; 95% CI = 1,078.4–1,157.9), followed by children aged 12–23 months (770.6; 95% CI = 743.1–800.3) and adults aged ≥75 years (426.9; 95% CI = 366.6–510.8). Pediatric RSV-associated hospitalization rates estimated by NVSN were highest among infants aged 0–11 months (1,053.9; 95% CI = 949.0–1,159.0), followed by children aged 12–23 months (647.5; 95% CI = 576.7–720.8).

Among 672 RSV-associated deaths recorded by NVSS, 31 (4.6%) occurred among children and adolescents aged <18 years, 89 (13.2%) among adults aged 18–64 years, and 552 (82.1%) among adults aged ≥65 years. During October 1, 2024–May 3, 2025, RSV was associated with an estimated 3.6–6.5 million outpatient visits, 190,000–350,000 hospitalizations, and 10,000–23,000 deaths.

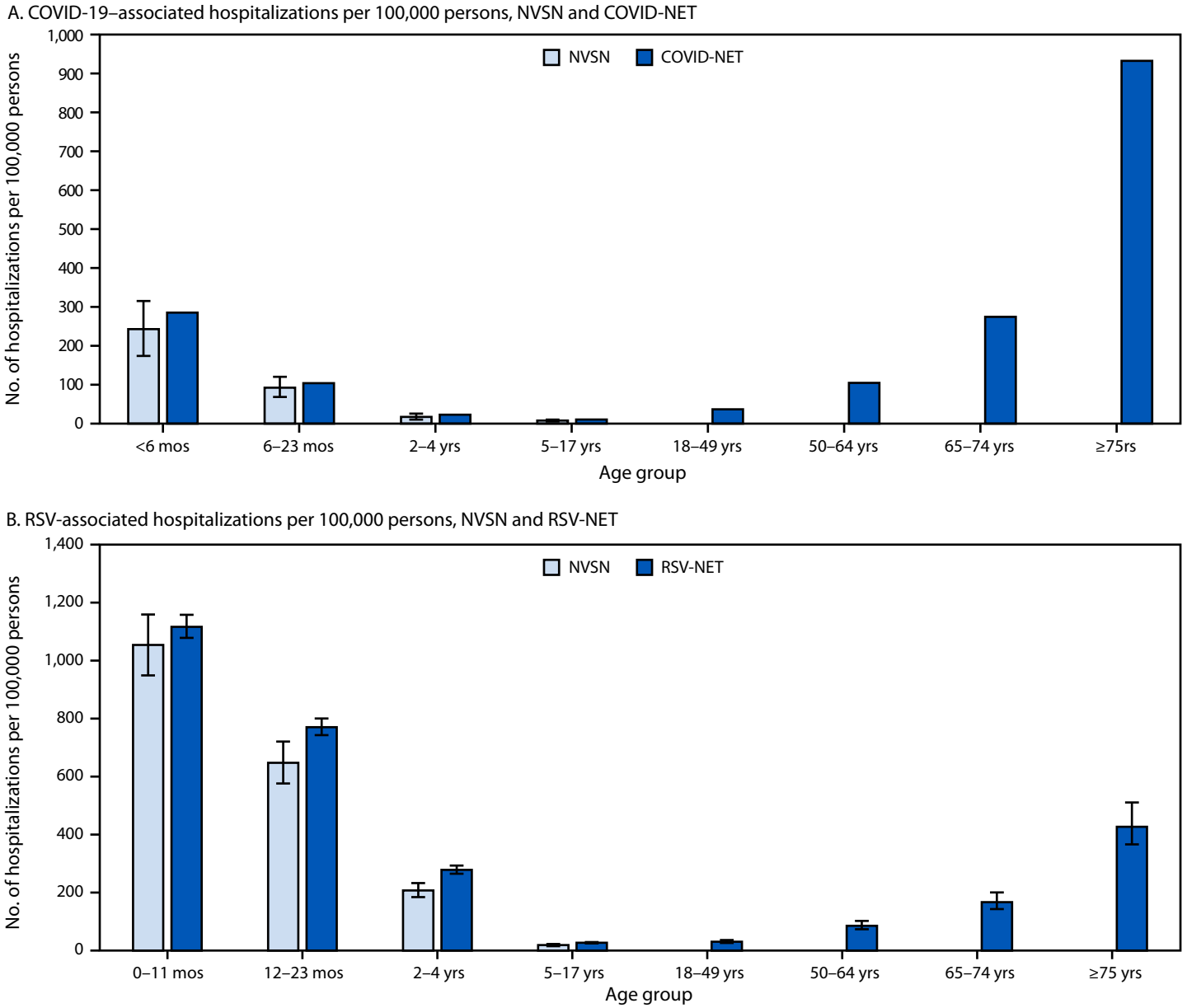
SARS-CoV-2 Lineages and RSV Subtypes

A total of 92,703 SARS-CoV-2 sequences from 56 U.S. jurisdictions were analyzed. Among these, 2% were from the National SARS-CoV-2 Strain Surveillance program, 22% were from commercial laboratories, and 76% were tagged baseline sequences from public repositories. All SARS-CoV-2 lineages circulating at ≥1% prevalence during this period were Omicron JN.1 descendant lineages. During at least one 4-week period, KP.3.1.1-like and LP.8.1 lineages accounted for >50% of sequenced viruses, and KP.2-like, KP.3, LB.1-like, XEC, and XFG lineages accounted for >20% of sequenced viruses (Supplementary Figure). Among 630 RSV specimens from 16 U.S. jurisdictions that had subtyping results, 408 (64.8%) were RSV-A, 204 (32.4%) were RSV-B, and 18 (2.9%) were both RSV-A and RSV-B positive.

Discussion

Since expiration of the COVID-19 pandemic public health emergency declaration in May 2023 (*2*), CDC has continued

FIGURE 2. Hospitalization rates* associated with COVID-19†,§ (A) and respiratory syncytial virus¶ (B), by age group — United States, July 1, 2024–June 30, 2025,††**



Abbreviations: COVID-NET = COVID-19 Hospitalization Surveillance Network; NVSN = New Vaccine Surveillance Network; RSV = respiratory syncytial virus; RSV-NET = Respiratory Syncytial Virus Hospitalization Surveillance Network.

* With 95% CIs indicated by error bars.

† COVID-NET conducts population-based surveillance in which every hospitalization meeting the case definition is ascertained. Because hospitalization rates reflect actual measured rates in the catchment area population, 95% CIs are not calculated.

§ NVSN surveillance is pediatric only. Population-based numerators are adjusted using multipliers for the observed number of enrolled hospitalizations to account for weeks with <7 days of surveillance, the percentage of eligible children not enrolled, sensitivity of RSV reverse transcription–polymerase chain reaction testing (87.6%) for RSV rates only, and the market share of each enrollment hospital site for the estimated proportion of acute respiratory illness hospitalizations ascertained in the catchment area. Adjusted rates were estimated per 100,000 children, and 95% CIs were determined to account for multiplier uncertainty by percentiles based on 1,000 bootstrap samples for each rate.

¶ RSV-NET rates are adjusted with multipliers to account for underdetection due to diagnostic test sensitivity and testing practices. Adjusted rates are presented with 95% CIs to account for multiplier uncertainty.

** Age groups for hospitalized children aged <2 years are <6 months and 6–23 months for COVID-19 and 0–11 months and 12–23 months for RSV.

†† As of December 19, 2025.

Summary

What is already known about this topic?

CDC monitors the activity and severity of respiratory viruses using data from complementary surveillance systems. Weekly data are published online.

What is added by this report?

Severe outcomes from COVID-19 and respiratory syncytial virus (RSV) continue to occur, especially among young children and older adults. COVID-19 was associated with an estimated 290,000–450,000 hospitalizations and 34,000–53,000 deaths; RSV was associated with 190,000–350,000 hospitalizations and 10,000–23,000 deaths. All sequenced circulating U.S. SARS-CoV-2 viruses remained descendants of the JN.1 variant, representing the first season without a SARS-CoV-2 strain replacement since the beginning of the COVID-19 pandemic.

What are the implications for public health practice?

Respiratory virus surveillance remains critical for preparedness and prevention monitoring. Staying up to date with recommended respiratory virus vaccinations can protect against severe COVID-19, RSV, and influenza.

efforts to optimize and integrate reporting and communication of national surveillance data for respiratory viruses. This report analyzed data from six complementary national surveillance systems to summarize the 2024–25 season for most respiratory viruses of public health significance.

The bimodal periodicity of positive SARS-CoV-2 test results observed in past years (*3*) continued during the 2024–25 season, including a larger July peak followed by a smaller January peak. Consistent with recent years preceding the 2024–25 respiratory virus season, COVID-19 hospitalization rates were highest among adults aged ≥75 years, followed by infants aged <6 months who are not eligible for COVID-19 vaccination, and adults aged 65–74 years. Maternal COVID-19 vaccination is the only available immunization strategy to protect infants aged <6 months from severe COVID-19. During 2024–2025, no major SARS-CoV-2 strain replacement occurred; all sequenced SARS-CoV-2 viruses circulating in the United States remained descendants of JN.1. The 2025–26 COVID-19 vaccines are expected to provide protection against severe disease (*4*–*6*), including from the XFG variant that approached predominance in late June 2025.**

During 2024–2025, RSV activity followed typical seasonal patterns observed before the COVID-19 pandemic (i.e., increased activity during October–April) that aligned with the timing of RSV vaccination guidance for adults and children for most of the United States. An interim evaluation based on 2024–2025 NVSN and RSV-NET data found that after the introduction of pediatric RSV prevention products, RSV-associated hospitalization rates in infants aged 0–7 months were reduced 28%–43%, compared with seasons preceding the introduction of those products (*7*). However, during 2024–2025, infants aged 0–11 months still experienced the highest RSV-associated hospitalization rates among all age groups, followed by children aged 12–23 months and adults aged ≥75 years. Three options for protecting infants in their first RSV season against severe RSV disease are available: a maternal RSV vaccine given during pregnancy at 32–36 weeks' gestation and one of two long-acting monoclonal antibodies (nirsevimab or clesrovimab) administered to infants aged <8 months who are born during or entering their first RSV season (*8*). A single dose of RSV vaccine is recommended for all adults aged ≥75 years and for adults aged 50–74 years at increased risk for severe RSV disease (*9*).

Limitations

The findings in this report are subject to at least four limitations. First, NREVSS is a passive and voluntary surveillance system; therefore, data from participating laboratories vary by season and might not be representative of all geographic areas or age groups. Second, because hospitalization rate estimates from NVSN and RSV-NET are generated using different methods and surveillance catchment areas, variations in point estimates, as noted for COVID-19 and RSV hospitalization estimates, are expected. Third, continuing declines in submitted SARS-CoV-2 specimens and resources available for sequencing over time affect the precision of genomic surveillance estimates. Finally, death certificate data likely do not include all deaths from COVID-19 and RSV because not all persons who die after COVID-19 or RSV are tested for these viruses, and some deaths might be attributed to associated complications, such as myocardial infarction or pneumonia. Therefore, deaths from NVSS should be considered minimum counts, whereas CDC estimates of COVID-19 and RSV mortality, which use continuously updated surveillance data, data from the latest scientific reports, and mathematical modeling, account for incomplete data. Because death certificates contain limited information on missed opportunities for intervention and potential risk factors for death, standardized national surveillance and reporting for pediatric laboratory-confirmed COVID-19 and RSV-associated deaths is being implemented in 2026.

Implications for Public Health Practice

Core prevention strategies to reduce the risk for respiratory virus infections include staying up to date with vaccinations, washing hands regularly and cleaning commonly touched surfaces, optimizing ventilation in places where persons live

** 2025–2026 COVID-19 vaccines in the United States are JN.1 lineage-based with a preference for an LP.8.1-like antigen.

and work, and staying home and away from others when sick. Available antiviral treatments for COVID-19 and influenza are underused (*10*), despite evidence that they decrease risk for hospitalization and death; early treatment might help decrease the risk for severe illness. CDC continues to monitor respiratory virus activity in the United States and provide weekly updates online.

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Regional Increases in Incidence of Coccidioidomycosis (Valley Fever) — Arizona, 2005–2022

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Abstract

Incidence of coccidioidomycosis (Valley fever), a fungal infection caused by inhalation of *Coccidioides* species spores, has increased substantially across the southwestern United States in association with increasing aridity, warming temperatures, and precipitation volatility. Arizona and California report >95% of U.S. coccidioidomycosis cases, and incidence in Arizona has increased statewide. Patterns within Arizona's distinct climatological regions have not been characterized, especially in regions outside the known zone of persistently high levels of disease occurrence (hyperendemicity) in the southwest Sonoran Desert region. In this study, surveillance data reported to the Arizona Department of Health Services since 2005 were used to calculate coccidioidomycosis incidence within six ecological regions. During 2005–2022, annual incidence approximately doubled in Arizona, with >95% of cases reported from the Sonoran Desert region. Although the Plateaus and Mojave Desert regions (in the northern parts of the state) reported <1.5% of Arizona cases during this period, these regions experienced the highest relative increases in incidence from the 2005–2007 period to the 2020–2022 period. During 2020–2022, coccidioidomycosis incidence in the Plateaus region was 6.61 times the incidence during 2005–2007 (95% CI = 4.22–10.30), and in the Mojave Desert region, incidence was 4.50 times that during 2005–2007 (95% CI = 3.45–5.89). The Plateau and Mojave regions also reported the highest relative increases in incidence from the 2014–2016 period to the 2020–2022 period. Large relative incidence increases in northern regions, including cooler and wetter regions generally considered less suitable for *Coccidioides* species establishment and transmission, necessitate targeted public health messaging in these areas and support ongoing investigation into the causes of these increases.

Introduction

Coccidioidomycosis, or Valley fever, is a fungal disease caused by inhalation of spores of the soil-dwelling *Coccidioides* species (*1*). Although coccidioidomycosis typically results in a self-limited pneumonia-like respiratory illness, approximately 5% of patients develop disseminated disease with chronic sequelae, and <1% experience severe pulmonary complications (*1*). Treatment of Valley fever depends on infection severity, disease presentation, and patient immune status and comorbidities, but can involve short-term (3–6 months) oral azole therapy (most often fluconazole or itraconazole) with disseminated or chronic infections often requiring longer treatment (≥1 year to lifelong) (*1*). Coccidioidomycosis is endemic to the southwestern United States, with Arizona and California reporting >95% of U.S. cases (*2*). Since 2000, coccidioidomycosis incidence has increased substantially across the southwestern United States in association with increasing aridity, warming temperatures, and precipitation volatility (i.e., sudden, large, or frequent shifts between extremely wet and dry conditions) (*3–6*). Arizona temperatures typically peak in July, and precipitation peaks both during the monsoon season (July–September) and winter months (December–March). Coccidioidomycosis incidence is seasonal; the peak in Arizona typically occurs during October–January, which overlaps the second annual rainy season. The increasing incidence in Arizona is predominantly in the hot and arid Sonoran Desert region that includes the counties of Maricopa, Pima, and Pinal, where the disease is hyperendemic (*4*,*7*). However, changes in incidence patterns within Arizona's various climatological and ecological regions, especially those outside the Sonoran Desert, have not been investigated. This report describes regional trends in coccidioidomycosis incidence in Arizona during 2005–2022, as well as the climatological profiles of regions with the largest relative increases in incidence.

Methods

Data Source

Arizona health jurisdictions are required to report coccidioidomycosis cases to the Arizona Department of Health Services (ADHS) using the laboratory component of the Council of State and Territorial Epidemiologists' case definition. Information on all laboratory-confirmed coccidioidomycosis cases reported to ADHS during 2005–2022, including week of diagnosis* and U.S. Census Bureau tract of patient residence, was obtained. Cases were assigned to one of six modified Environmental Protection Agency level III ecoregions

* Based on the earliest date among the following: symptom onset, specimen collected for laboratory testing, laboratory test results finalized for a specimen, diagnosis, case reported to the county, entered into the Medical Electronic Disease Surveillance Intelligence System (MEDSIS), reported to ADHS, or submitted to the state. Event date definitions are outlined in Arizona Department of Health Services' User Training Guide | MEDSIS.

(regions)[†] by tract. Cases in persons without residence information (including in persons from tribal lands) were excluded from the analysis.

Estimates of Population, Temperature, and Precipitation

Annual populations for each region were estimated by summing annual population estimates for U.S. Census Bureau tracts whose geometric centers were contained in the region.[§] Monthly mean temperature and total precipitation within approximately 6.2 miles^2 (16 km^2) grid cells were obtained from the PRISM Climate Group. These values were then averaged within the boundaries of each region.

Analysis of Change in Incidence

Statewide and regional incidences (number of cases per 100,000 population) were calculated. To calculate changes in incidence over time and by region, a single Poisson model was fit to regional annual incident cases with an offset on the log of the annual regional population and fixed effects on region, a six-level categorical measure of 3-year periods to increase stability of the calculated incidences (2005–2007, 2008–2010, 2011–2013, 2014–2016, 2017–2019, and 2020–2022), and the interaction between the 3-year period and region.[¶] The offset term in the model accounts for differences in population size by region and over time and allows the model to estimate and compare incidences (number of cases per population unit), rather than raw case counts.

In 2009, one of Arizona's major commercial laboratories changed its coccidioidomycosis diagnostic and reporting practices and began to report all positive enzyme immunoassay (EIA) results as cases, regardless of results from more specific tests (e.g., immunodiffusion). Because of the increased potential for false-positive results, this practice change is believed to have led, in part, to increases in cases reported from 2009 to 2012. Changes to this laboratory's EIA testing platform in late 2012 align with a decrease in cases through 2013. Whereas the fitted model was used to calculate incidence rate ratios (IRRs) comparing region-specific incidences in all 3-year periods with incidence during 2020–2022, these reporting changes might have affected the reliability and comparability of incidence estimates during the 2008–2010 and 2011–2013 periods. Therefore, this report highlights comparisons of the incidence in the beginning (2005–2007) and midpoint (2014–2016[**]) of the study period with the incidence at the end of the study period (2020–2022); the periods 2005–2007 and 2014–2016 were both unaffected by diagnostic and reporting changes.

Analyses were performed using R statistical software (version 4.2.3; R Core Team 2023). Because this study constitutes a public health surveillance activity, the work described did not constitute human research and did not require institutional review board review or exemption according to the Common Rule. This study received ADHS approval to conduct research using case surveillance data collected by ADHS.

Results

Arizona Regional Coccidioidomycosis Incidence, 2005–2022

During January 1, 2005–December 31, 2022, a total of 152,446 coccidioidomycosis cases were reported in Arizona; among these, 126,982 (83.3%) cases with geographic residence information were included in this study (Table). Median annual incidence was highest (112.13 per 100,000) in the most populous region studied (the southwestern Sonoran Desert region), which reported >95% of cases, and was lowest (19.91 per 100,000) in the northern Plateaus region, which reported <0.5% of cases (Supplementary Figure 1). During this period, statewide annual coccidioidomycosis incidence in Arizona approximately doubled; the average annual 2020–2022 rate (145.02 per 100,000) was 2.27 times that during 2005–2007 (63.73 per 100,000) and 1.76 times that during 2014–2016 (82.28 per 100,000) (Figure 1) (Table). Statewide, the incidence was lowest in 2005 (58.59 cases per 100,000 population) and increased approximately 200% to 188.33 cases per 100,000 in 2011 (Figure 1). After 2011, the incidence decreased through 2014 (62.61 cases per 100,000) and followed a generally increasing trend thereafter, reaching 123.76 cases per 100,000 population in 2022. On average, across the study period, the percentage of reported annual coccidioidomycosis cases peaked in November (Figure 2).

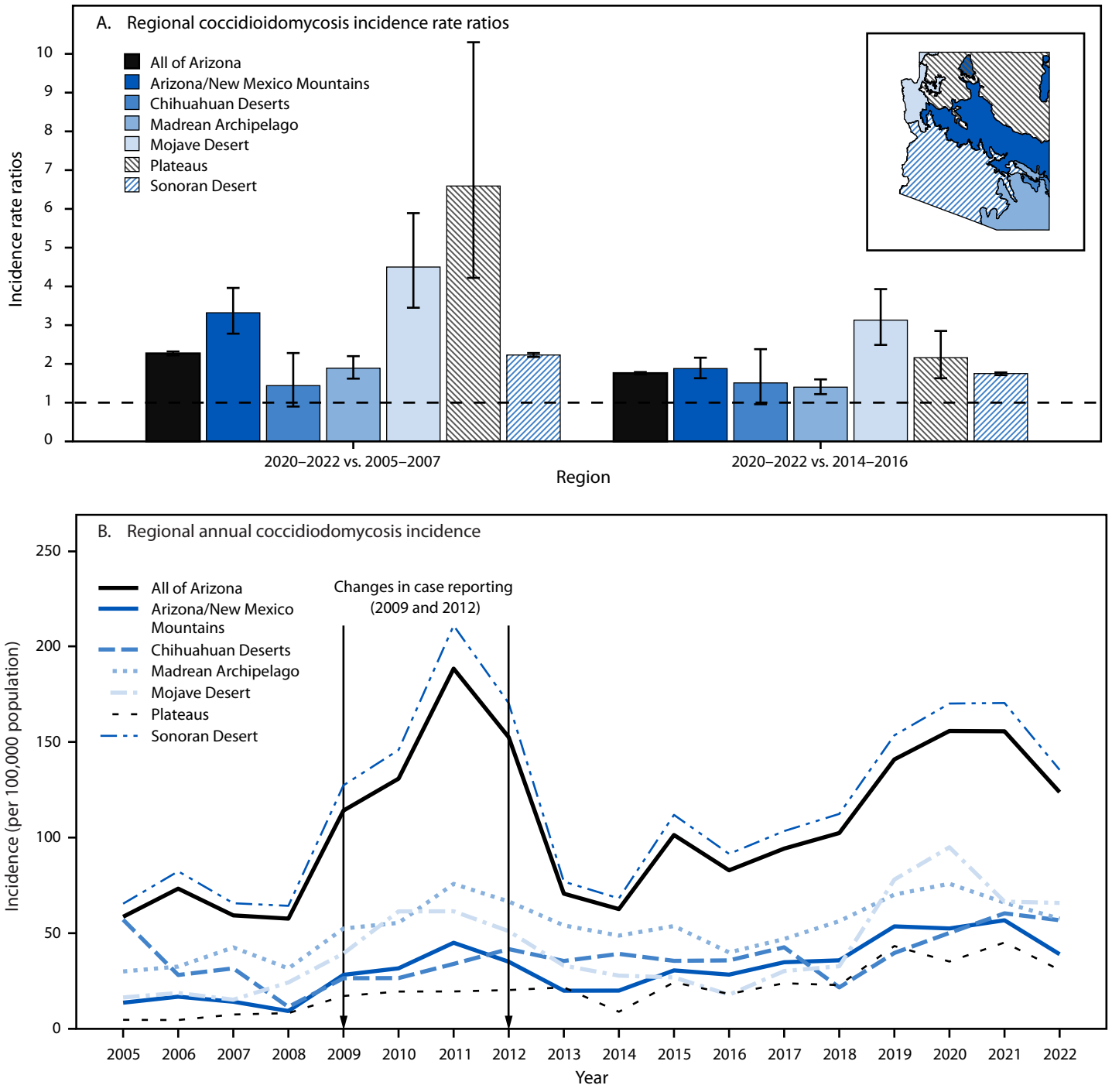
[†] The EPA level III ecoregions in Arizona include the Arizona/New Mexico Mountains, Arizona/New Mexico Plateau, Chihuahuan Deserts, Colorado Plateaus, Madrean Archipelago, Mojave Basin and Range (Mojave Desert), and the Sonoran Basin and Range (Sonoran Desert). For this analysis, Arizona/New Mexico Plateau and Colorado Plateaus were grouped into a single Plateaus region given ecological similarity and spatial proximity. Shapefiles for these regions were joined in QGIS, a spatial visualization and decision-making tool, to summarize incidence and climate variables for the aggregated region.

[§] Annual population per U.S. Census Bureau tract were calculated using tract-level data from the Decennial U.S. Census Demographic and Housing Characteristics File and county-level data from the Arizona Office of Economic Opportunity. The proportion of 2020 U.S. Census Bureau tract populations to county population proportions were calculated and multiplied by annual county population estimates for each year in the study period to obtain tract estimates for all years.

[¶] A six-level categorical variable that describes the 3-year period (e.g., 2005–2007) to which each year belongs was included in the model. The model automatically treated one of these 3-year periods as the reference and estimates coefficients on the remaining five of the six 3-year periods. In this way, five fixed effects on the 3-year periods were included in the model.

[**] The 2014–2016 period included the true midpoint (2014) for the 2005–2022 study period. The 2011–2013 period was excluded as a main period of comparison because case counts in all years during this period were unreliable owing to changes in diagnostic and reporting practices.

FIGURE 1. Regional coccidioidomycosis incidence rate ratios* for 2020–2022 versus 2005–2007 and 2014–2016 (A) and annual coccidioidomycosis incidence, by year and region (B) — Arizona, 2005–2022†



*With 95% CIs indicated by error bars.

† One study suggests the number of cases reported during 2009–2012 should be decreased by one half to adjust for increases attributed to testing changes: Comrie A. No consistent link between dust storms and Valley fever (coccidioidomycosis). GeoHealth. 2021;5:e2021GH000504. https://doi.org/10.1029/2021GH000504

State and Regional Climate Profiles

During the study period, the Sonoran Desert region experienced the highest temperatures (average annual daily temperature range = 69.71°F –72.43°F [20.95°C –22.46°C]) (Supplementary Table). The more northern Mojave Desert was the driest region (total annual precipitation = 3.84–11.39 in

TABLE. Number and median annual incidence of coccidioidomycosis cases* and comparison of 2020–2022 with previous 3-year periods, by region (N = 126,982) — Arizona, 2005–2022

			Average annual incidence† of 3-year periods and IRR (95% CI)§ comparing incidence with 2020–2022											
	2005–2022		2005–2007		2008–2010		2011–2013		2014–2016		2017–2019		2020–2022	
Region¶	No. (column %) of cases	Median annual incidence	No. of cases	IRR (95% CI)	No. of cases	IRR (95% CI)	No. of cases	IRR (95% CI)	No. of cases	IRR (95% CI)	No. of cases	IRR (95% CI)	No. of cases	IRR
Arizona	126,982 (100.00)	101.86	63.73	2.27 (2.22–2.32)	100.84	1.44 (1.41–1.46)	137.16	1.06 (1.04–1.08)	82.28	1.76 (1.73–1.79)	112.49	1.29 (1.26–1.31)	145.02	1 (Ref)
Arizona/ New Mexico Mountains	2,074 (1.63)	31.09	14.88	3.32 (2.78–3.96)	23.05	2.14 (1.84–2.49)	33.34	1.48 (1.30–1.69)	26.29	1.88 (1.63–2.16)	41.40	1.19 (1.05–1.35)	49.42	1 (Ref)
Chihuahuan Deserts	183 (0.14)	35.66	38.95	1.44 (0.90–2.28)	21.48	2.59 (1.49–4.52)	37.04	1.51 (0.95–2.38)	36.84	1.51 (0.96–2.38)	34.65	1.61 (1.01–2.55)	55.77	1 (Ref)
Madrean Archipelago	2,364 (1.86)	53.91	35.04	1.90 (1.62–2.20)	46.47	1.43 (1.25–1.64)	65.48	1.01 (0.90–1.15)	47.48	1.40 (1.22–1.60)	57.81	1.15 (1.01–1.31)	66.46	1 (Ref)
Mojave Desert	1,039 (0.82)	32.89	16.80	4.50 (3.45–5.89)	41.68	1.81 (1.50–2.19)	48.53	1.56 (1.31–1.86)	24.18	3.13 (2.49–3.93)	46.99	1.60 (1.34–1.91)	75.76	1 (Ref)
Plateaus	520 (0.41)	19.91	5.60	6.61 (4.22–10.30)	14.96	2.48 (1.84–3.33)	20.50	1.81 (1.38–2.36)	17.15	2.16 (1.63–2.85)	29.99	1.23 (0.98–1.56)	37.04	1 (Ref)
Sonoran Desert	120,802 (95.13)	112.13	71.15	2.23 (2.18–2.28)	112.48	1.41 (1.38–1.43)	152.69	1.04 (1.02–1.06)	90.53	1.75 (1.71–1.78)	123.07	1.28 (1.26–1.31)	158.63	1 (Ref)

Abbreviations: IRR = incidence rate ratio; Ref = referent.

* Total cases exclude cases in tribal lands and others that could not be linked to a residence.

† Number of cases per 100,000 population.

§ *Arizona/New Mexico Mountains:* parts of Apache, Coconino, Gila, Greenlee, Mohave, Navajo, and Pinal counties; *Plateaus:* Apache, Coconino, and Navajo counties and parts of Mohave and Yavapai counties; *Chihuahuan Deserts:* parts of Greenlee and Graham counties; *Madrean Archipelago:* Cochise and Santa Cruz counties and parts of Graham, Pima, and Pinal counties; *Mojave Desert:* parts of Mohave county; and *Sonoran Desert:* Gila, La Paz, Maricopa, Yavapai, and Yuma counties and parts of Mohave, Pima, and Pinal counties.

¶ IRRs and 95% CIs were calculated using a Poisson model fit to annual regional case data and compared incidence rates during 2020–2022 with incidence rates in each previous 3-year period.

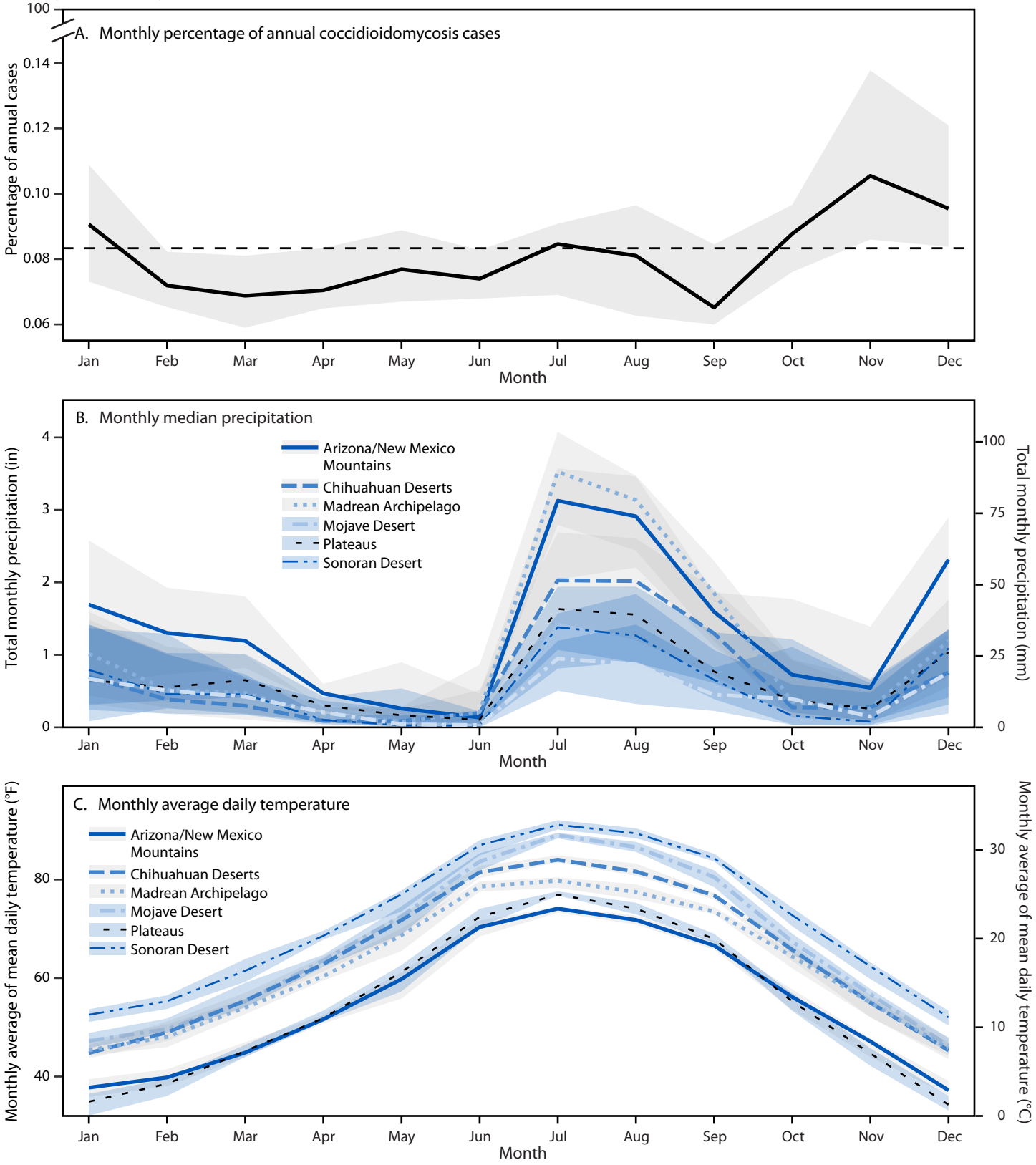
[97.65–289.32 mm]), whereas the southeastern Chihuahuan Deserts and nearby Madrean Archipelago reported more total annual precipitation on average than did the Mojave and Sonoran Desert regions (5.35–13.86 in [135.77–352.22 mm] and 8.27–18.44 in [210.13–468.48 mm]) (Figure 2). The Plateaus region of northeastern Arizona was approximately 44.6°F (7°C) cooler than all desert regions and received on average 2.95 in (75 mm) more precipitation annually than did the Sonoran and Mojave Desert regions. Although temperatures in the midland Arizona/New Mexico Mountains and the Plateaus regions were similarly cool, the midland Arizona/New Mexico Mountains region was the wettest region during the study period (maximum annual precipitation = 23.60 in [599.53 mm]).

Changes in Regional Coccidioidomycosis Incidence

Coccidioidomycosis incidence in Arizona followed a generally increasing trend across the study period (Supplementary Figure 2). When comparing regional incidences from 2005–2007 to those during 2020–2022, the highest relative increases were reported by the two northernmost regions (the Plateaus and the Mojave Desert regions). During 2020–2022, coccidioidomycosis incidence in the Plateaus region was 6.61 times the incidence during 2005–2007 (95% CI = 4.22–10.30), and in the Mojave Desert region, incidence was 4.50 times that during 2005–2007 (95% CI = 3.45–5.89), corresponding to increases in incidence of approximately 550% and 350%, respectively (Figure 1) (Table). Comparatively, the Sonoran Desert region, where coccidioidomycosis is hyperendemic, reported a 123% increase in incidence between these periods (IRR = 2.23; 95% CI = 2.18–2.28). This equates to absolute average annual increases of 31.44, 58.96, and 87.48 cases per 100,000 population from 2005–2007 to 2020–2022 for the Plateaus, Mojave Desert, and Sonoran Desert regions, respectively. The incidence in all other regions increased from 2005–2007 to 2020–2022.

The incidence also increased between 2014–2016 and 2020–2022, with all regions reporting IRRs from 1.40 to 3.13 for this period (Figure 1). The highest IRR during this more recent period was observed in the Mojave Desert region (IRR = 3.13; 95% CI = 2.49–3.93), followed by the Plateaus region (IRR = 2.16; 95% CI = 1.63–2.85). In absolute terms, average annual incidences for 2020–2022 were 19.89, 51.58, and 68.10 cases per 100,000 population higher than those during 2014–2016 for the Plateaus, Mojave Desert, and Sonoran Desert regions, respectively.

FIGURE 2. Monthly statewide percentage of annual coccidioidomycosis cases (A),* regional monthly median precipitation (B), and regional monthly average daily temperature (C) — Arizona, 2005–2022†



* Dashed line indicates the estimated percentage of cases by month if the disease were not seasonal.
† With IQRs indicated by shaded areas.

Summary

What is already known about this topic?

Approximately 95% of U.S. coccidioidomycosis (Valley fever) cases are reported from Arizona and California. Incidence of coccidioidomycosis in Arizona approximately doubled during 2005–2022, with most cases in the southwestern counties of Maricopa, Pima, and Pinal.

What is added by this report?

A regional analysis of 2005–2022 Arizona coccidioidomycosis incidence data found that although the majority (95%) of cases are reported in the southwestern Sonoran Desert region, the largest relative increases in incidence occurred in the low-incidence northern Plateaus and Mojave Desert regions. Causes of this relative increase are likely multifactorial.

What are the implications for public health practice?

Coccidioidomycosis diagnoses are increasing in historically low-incidence regions of Arizona. Directing resources and outreach campaigns to these areas, as well as to regions with historically higher incidence, might increase awareness and guide prevention strategies in low-incidence regions. Ongoing study of the causes of this changing epidemiology could guide tailored regional interventions.

Discussion

The hot, dry southwestern Sonoran Desert region where coccidioidomycosis is hyperendemic was the largest contributor to absolute increases in incidence in Arizona during 2005–2022. However, this regional analysis indicates that the northern Plateaus and Mojave Desert regions experienced the largest relative increases in incidence compared with other regions during the same period. From 2005–2007 to 2020–2022, incidence increased approximately 550% and 350% in the Plateaus and Mojave Desert regions, respectively, compared with a 123% increase for the Sonoran Desert region.

Possible determinants of the sharp increases in incidence during the study period in more northern parts of the state include 1) changes to regional population susceptibility, in part affected by increased migration to the state, which increased most among older populations during the study period. Older populations are more likely to have symptomatic infection, seek care, and receive a diagnosis; 2) increased disease awareness and reporting; and 3) increased travel (e.g., for work, recreation, leisure, or temporary relocation) from areas of lower to higher endemicity. A 2022 study found clinical *Coccidioides* isolates from patients in northern Arizona clustered with isolates from patients in Maricopa and Pima counties, suggesting that some cases in the northern regions are associated with travel to areas of higher endemicity (*8*). Geographic expansion of *Coccidioides* within historically cooler climates is also a potential cause and is in part supported by a regional analysis in California that documented disproportionate increases in coccidioidomycosis incidence within cooler, wetter regions that were outside the hyperendemic hot and dry Southern San Joaquin Valley (*9*), similar to the findings in this study. Additional research is needed to explain the relative contribution of regional climate and other environmental, socioeconomic, and behavioral contributors to the observed increases and shifts in incidence.

Limitations

The findings in this report are subject to at least four limitations. First, incidences are underestimates because of missed diagnoses, the low percentage of patients who seek care for mild illnesses, and exclusion of cases identified in tribal lands (*10*). At the same time, the changes in diagnostic testing and reporting practices that occurred in 2009 and 2012 might have led to overestimated case counts during 2009–2013. Accordingly, increases in incidence might be attributed, in part, to increased awareness of coccidioidomycosis testing and case-reporting practices, especially in regions with lower levels of endemicity. To address this possibility, the comparative analyses used in this study focus on the more reliable beginning and midpoint periods as reference periods. Second, areas with low case counts also have smaller populations, which might lead to unstable calculated incidences. This analysis attempted to minimize such instability by using 3-year periods in calculating incidence. Third, because cases are assigned to the region of residence rather than the region of exposure, this analysis was unable to differentiate locally acquired cases from travel-associated cases. Finally, because the surveillance database lacked information on patient ages, incidences were not age-adjusted; however, with minor deviations, population age distributions among adults were similar across regions.

Implications for Public Health Practice

This regional analysis of Arizona coccidioidomycosis surveillance data highlights disease trends and areas where incidence is increasing most rapidly. Although most cases continue to be reported from a single highly populated zone of hyperendemic disease, including the typically low-incidence regions of Arizona in public health messaging campaigns is important for increasing public and provider awareness about the disease. Although primary prevention of coccidioidomycosis is challenged by the lack of a vaccine and limited understanding of the geographic distribution of *Coccidioides* spp., increasing awareness of coccidioidomycosis can prompt earlier diagnosis and treatment and might motivate adoption of dust control measures (e.g., via vegetation planting, selective irrigation, or both) within towns, work sites, and residences as well as use of personal protective equipment (e.g., N-95 masks) in especially high-risk scenarios, where feasible (*2*).

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