

SARS-CoV-2 Vaccine Breakthrough Surveillance and Case Information Resource

Washington State Department of Health

January 11, 2023



Washington State Department of
Health

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Data Notes:

- On April 20, 2022, DOH updated COVID-19 vaccinated language, changing the terms “initiating vaccination” to “initiated primary series” and “fully vaccinated” to “completed primary series.” This change in language allows for better differentiation between original vaccine series and boosters.
 - On June 28, 2022, DOH standardized the definition of what it means to have completed a primary series of the COVID-19 vaccine. The standardized definition also assures that an age-appropriate vaccine was administered to each person. The *SARS-CoV-2 Vaccine Breakthrough Surveillance and Case Information Resource* and *COVID-19 Cases, Hospitalizations, and Deaths by Vaccination Status* reports are now aligned on this definition and will be reporting on the same cases.
 - As of June 28, 2022, this Breakthrough Surveillance report will include only those cases that are identified by matching Washington Immunization Information Systems (IIS) data with new positive COVID-19 tests.
 - On July 12, 2022, the method used to link COVID-19 case data to COVID-19 vaccination data was updated to include more robust linking methods. As a result of this updated method, more COVID-19 cases who completed the primary series were identified.
 - Beginning August 9, 2022, this report will be updated monthly instead of biweekly.
 - DOH is no longer contacting individual cases of COVID-19, so symptom data will be removed from this Breakthrough Surveillance report starting on December 7, 2022.
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At a Glance (data from January 17, 2021 - December 31, 2022)

- 769,036 SARS-CoV-2 vaccine breakthrough cases have been identified in Washington State. Of these breakthrough cases:
 - 3% were hospitalized
 - 0.5% died of COVID-related illness

Introduction

COVID-19 vaccines are effective and critical tools to aid in the control of this pandemic. Large-scale clinical studies found that COVID-19 vaccines prevented most people from getting COVID-19 illness, but like most other vaccines, they are not 100% effective. This means some people who completed the primary series of the vaccines will still get infected with SARS-CoV-2. These individuals may or may not develop COVID-19 symptoms.

Vaccine breakthrough occurs when someone gets infected with an organism they are fully vaccinated against. For the COVID-19 vaccine, this means someone tests positive for SARS-CoV-2 two weeks or more after receiving the primary series of an authorized COVID-19 vaccine. Since millions of people in the United States are getting vaccinated, we expect to see some breakthrough disease. Fortunately, there is evidence from research studies that the COVID-19 vaccine reduces the risk of people developing severe symptoms and needing to go to the hospital or dying from COVID-19.

The Washington State Department of Health (DOH) is closely monitoring and investigating vaccine breakthrough cases in Washington to identify possible patterns of infection and disease in our population. The data in this report may change as we get additional information.

Criteria for SARS-CoV-2 vaccine breakthrough cases

The criteria for identifying vaccine breakthrough cases include a positive lab test (either a PCR test or an antigen test) at least 14 days after a person received their last recommended dose of an authorized, age-appropriate COVID-19 vaccine.

At least 14 days are required to have passed after vaccination to be considered a breakthrough case as some people could get COVID-19 soon after vaccination when their body hasn't had enough time yet to build full protection. Infections that occur less than 14 days after vaccination are not considered vaccine breakthrough cases because a person could have been exposed to the virus before they were vaccinated. It typically takes approximately two weeks after the final dose of vaccine for the body to build a high level of protection against the disease.

The first COVID-19 vaccines were administered in Washington in mid-December 2020. DOH started surveillance for people who meet these case criteria on January 17, 2021.

For information on updates to this report's methodology, please see the "A review of the methodologies used for this report" section below.

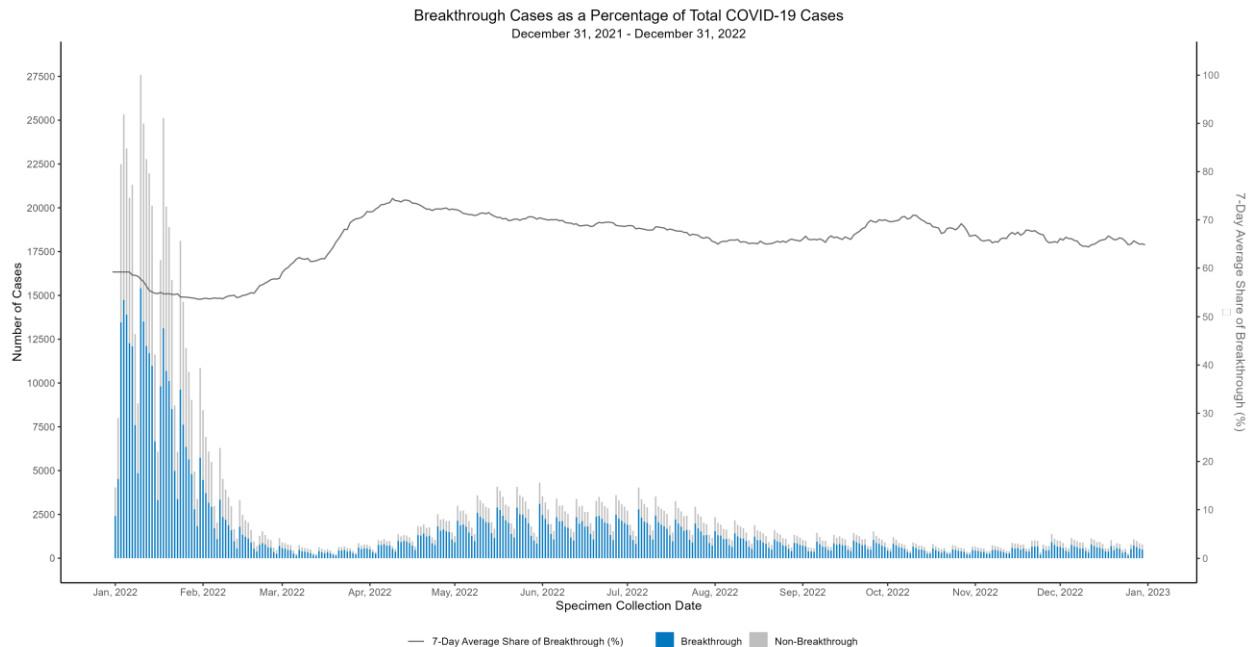
Washington State SARS-CoV-2 breakthrough and non-breakthrough cases by month

The epidemiologic curve below shows non-breakthrough COVID-19 cases (confirmed and probable) in grey and the number of breakthrough cases in blue by specimen collection date. The graph also shows the 7-day average of breakthrough as a percentage of overall COVID-19 cases.

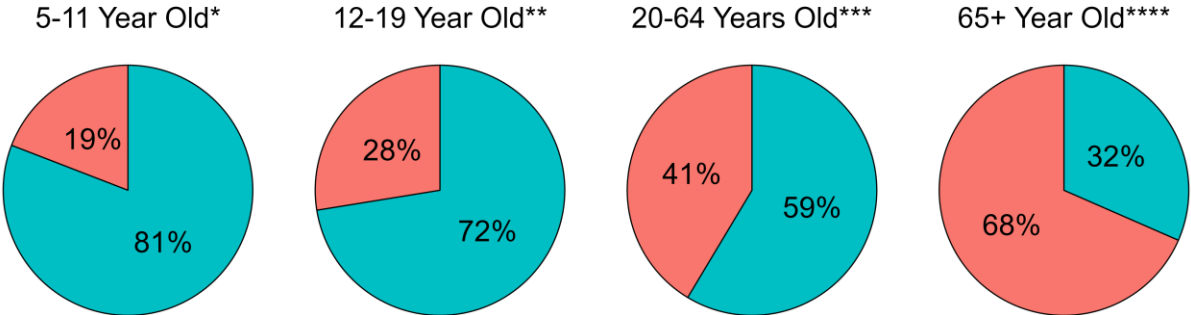
Some factors that may have contributed to the increase in breakthrough cases include:

- increased numbers of vaccinated persons,
- different SARS-CoV-2 variants circulating at a given time,
- possible waning immunity, and
- changes in mitigation recommendations for the community.

Additional analyses are needed to fully understand breakthrough as a percentage of overall COVID-19 cases.



Washington State SARS-CoV-2 breakthrough cases by vaccination status



* 05/31/2022 – 12/31/2022

** 01/17/2022 – 12/31/2022

*** 12/03/2021 – 12/31/2022

**** 11/03/2021 - 12/31/2022

■ Completed primary series with an additional dose ■ Completed primary series without an additional dose

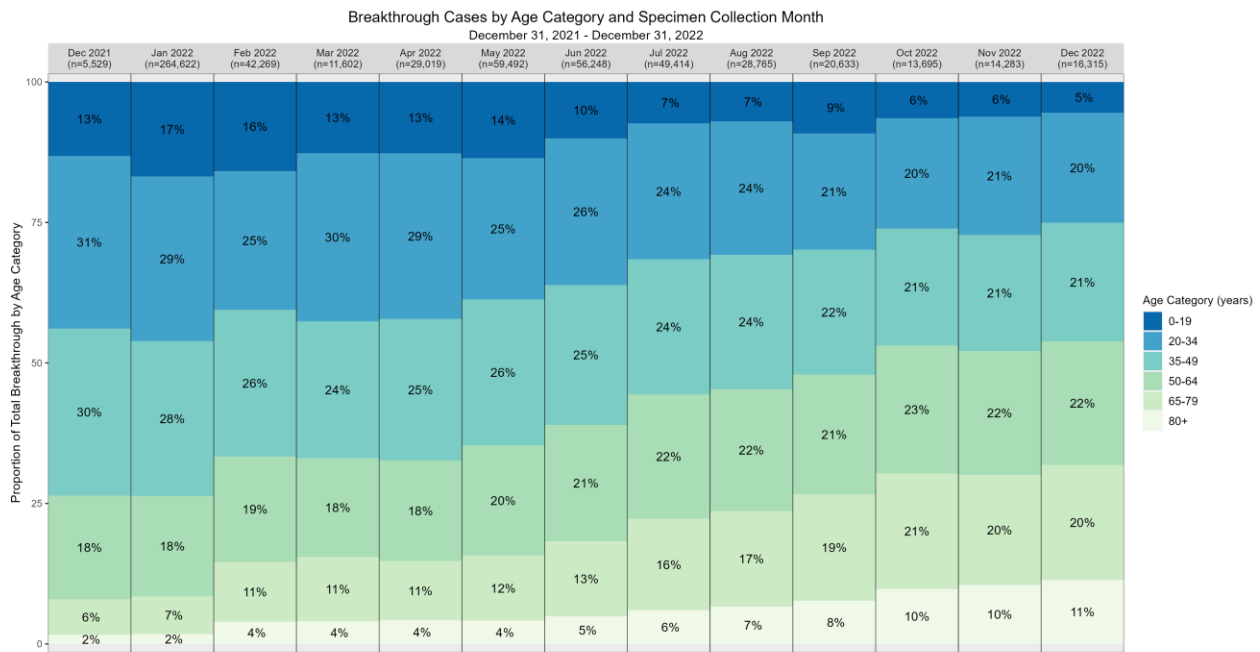
- After the completion of a primary series, additional doses were made available to different age groups on different dates. The figures above only include breakthrough cases that tested positive for SARS-CoV-2 14 or more days after their age group was eligible to receive an additional dose. Please refer to the [COVID-19 Vaccine Timeline](#) for details regarding vaccine eligibility and requirements in WA State.

Washington State SARS-CoV-2 breakthrough cases by age group

January 17, 2021 - December 31, 2022

	Primary Series only	Primary Series with Additional Dose	Total breakthrough
Age group (years)	Number of cases (%)	Number of cases (%)	Number of cases
0-19	82,495 (87%)	12,058 (13%)	94,553
20-34	145,644 (70%)	61,024 (30%)	206,668
35-49	127,055 (63%)	74,193 (37%)	201,248
50-64	85,987 (57%)	65,814 (43%)	151,801
65-79	35,424 (42%)	49,465 (58%)	84,889
80+	12,141 (41%)	17,736 (59%)	29,877
Total	488,746 (64%)	280,290 (36%)	769,036

- Age distribution of breakthrough cases has changed over time as more age groups became eligible for vaccine as shown below. Please refer to the [COVID-19 Vaccine Timeline](#) for details regarding vaccine eligibility and requirements in WA State.



Washington State SARS-CoV-2 breakthrough cases by sex

January 17, 2021 - December 31, 2022

	Primary Series only	Primary Series with Additional Dose	Total breakthrough
Sex	Number of cases (%)	Number of cases (%)	Number of cases
Female	258,703 (62%)	155,656 (38%)	414,359
Male	219,401 (65%)	119,845 (35%)	339,246
Unknown	10,642 (69%)	4,789 (31%)	15,431
Total	488,746 (64%)	280,290 (36%)	769,036

- In Washington, recorded vaccinations indicate a higher percentage of uptake among women compared to men. Among 769,036 total COVID-19 breakthrough cases, 54% of cases identified as female, 44% of cases identified as male, 2% of cases are unknown.

Washington State SARS-CoV-2 breakthrough cases by race and ethnicity

For all race and ethnicity reporting, all those who indicated Hispanic ethnicity are grouped in the Hispanic ethnicity, regardless of race. Racial groups are identified only for those who indicated non-Hispanic ethnicity. Based on this classification, our report includes the following groups:

- Hispanic; and
- Non-Hispanic race categorizations for white, Black, Native Hawaiian and Pacific Islander, Asian, and American Indian/Alaska Native.

The multiracial group includes people who chose more than one category. This can include a selection of unknown and one other race category. This method of categorization allows us to assess the data by race and ethnicity. However, the reporting categories are incomplete and do not reflect the diversity of people and experiences across Washington state.

January 17, 2021 - December 31, 2022

	Primary Series only	Primary Series with Additional Dose	Total breakthrough
Race and Ethnicity	Number of cases (%)	Number of cases (%)	Number of cases
American Indian or Alaska Native*	7,749 (73%)	2,900 (27%)	10,649
Asian*	36,298 (53%)	32,236 (47%)	68,534
Black*	17,469 (73%)	6,595 (27%)	24,064
Hispanic	49,319 (75%)	16,073 (25%)	65,392
Multiracial*	4,051 (75%)	1,344 (25%)	5,395
Native Hawaiian or Other Pacific Islander*	4,778 (74%)	1,680 (26%)	6,458
Other Race*	2,062 (67%)	1,002 (33%)	3,064
White*	210,842 (62%)	129,970 (38%)	340,812
Unknown	156,178 (64%)	88,490 (36%)	244,668
Total	488,746 (64%)	280,290 (36%)	769,036

* Non-Hispanic

- Among 769,036 COVID-19 breakthrough cases, no race and/or ethnicity information was available for 244,617 (32%) people.

Washington State SARS-CoV-2 breakthrough cases by hospitalization

January 17, 2021 - December 31, 2022

	Primary Series only	Primary Series with Additional Dose	Total breakthrough
Hospitalization	Number of cases (%)	Number of cases (%)	Number of cases
Yes	13,594 (58%)	9,947 (42%)	23,541
No/Unknown	475,152 (64%)	270,343 (36%)	745,495
Total	488,746 (64%)	280,290 (36%)	769,036

- Among the 769,036 COVID-19 breakthrough cases, 23,541 (3%) cases were hospitalized. Please refer to the [COVID-19 Data Dashboard](#) for details regarding hospitalization definitions.

COVID-19 deaths among SARS-CoV-2 breakthrough cases in Washington State

January 17, 2021 - December 31, 2022

Among breakthrough cases from this surveillance period **3,937** have died of COVID-related illness. Please refer to the [COVID-19 Data Dashboard](#) for details regarding death definitions.

The age range of deceased cases was 7 - 106 years (median 79 years).

Among the **3,937** deceased:

Underlying Conditions	
Yes	No/Unknown
1,650 (42%)	2,287 (58%)

Hospitalizations	
Yes	No/Unknown
2,607 (66%)	1,330 (34%)

Long-term Care Facility Association	
Yes	No/Unknown
1,279 (32%)	2,658 (68%)

Received Additional Dose After Primary Series	
Yes	No/Unknown
520 (13%)	3,417 (87%)

Washington State SARS-CoV-2 vaccine breakthrough cases - variants

Vaccine breakthrough cases were prioritized for whole genome sequencing from January 17, 2021 through September 9, 2021 to ensure that the distribution of variants detected among breakthrough cases could be continually monitored. Beginning September 10, 2021, sequencing for breakthrough cases is now part of random sampling by sentinel surveillance laboratories across the state.

Please refer to the [SARS-CoV-2 Sequencing and Variants in Washington State](#) report for more details.

Washington State SARS-CoV-2 vaccine breakthrough cases – Vaccination Rates

In order to understand the impact of vaccination on COVID-19, it is important to look at vaccine breakthrough cases in the context of overall vaccination rates in Washington State.

Please refer to the [COVID-19 Cases, Hospitalizations, and Deaths by Vaccination Status](#) report for more details.

A review of the methodologies used for this report

Early in the pandemic, breakthrough case information was only available through reports from local public health and other interviewers who had talked to people who had a positive PCR or antigen test and learned whether the interviewee had been vaccinated.

Beginning with the September 1, 2021 issue of this report, DOH included an additional method of identifying breakthrough cases by matching Washington Immunization Information Systems (IIS) data with new positive COVID tests using exact matches between first name, last name, and date of birth. The matching method automatically verified the vaccine doses and assured that at least 14 days had passed between the final vaccine administration date and the specimen collection date for an individual's positive test.

Because the initial matching methodology allowed us to report as breakthrough cases people that had only received the recommended primary COVID-19 vaccination series (2 doses of mRNA vaccines or 1 dose of J&J vaccine), on January 29, 2022 the report's methodology was updated to retrospectively include people who received doses of the COVID-19 vaccine in addition to their primary series doses.

On June 28, 2022 the methodology was updated to include standardized definitions and only breakthrough cases that can be identified by matching IIS data with new positive COVID tests.

On September 14, 2022, this report was updated to include analyses on breakthrough cases that received an additional dose after the primary series. After FDA-authorization of the bivalent booster doses, we updated the definition of an additional dose to also include bivalent booster doses, starting with the October edition of this report.

DOH continues to review and incorporate methodologies to enhance its COVID-19 related data including that for breakthrough surveillance. The goal is to ensure a more accurate account of the number of breakthrough cases in our state.

Vaccines remain a critical tool for providing protection against COVID-19, especially against severe illness and hospitalization.