

COVID-19 Hospitalizations and Deaths by Vaccination Status in Washington State

Washington State Department of Health

March 17, 2023



Washington State Department of
HEALTH

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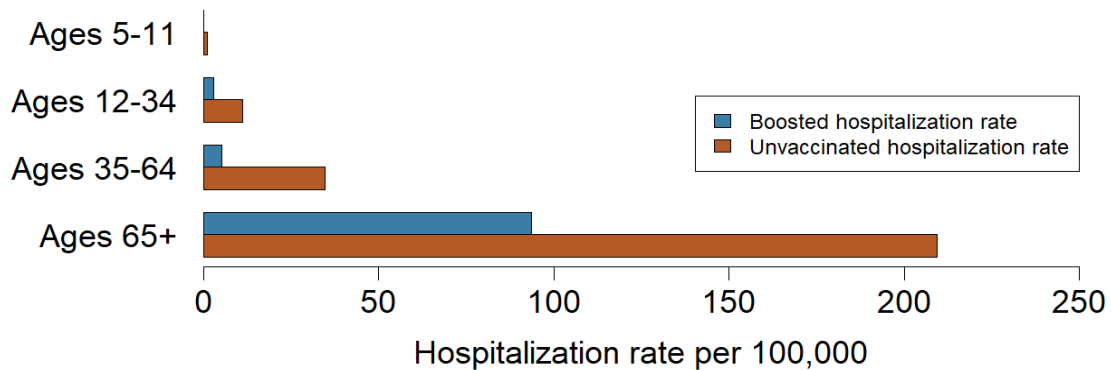
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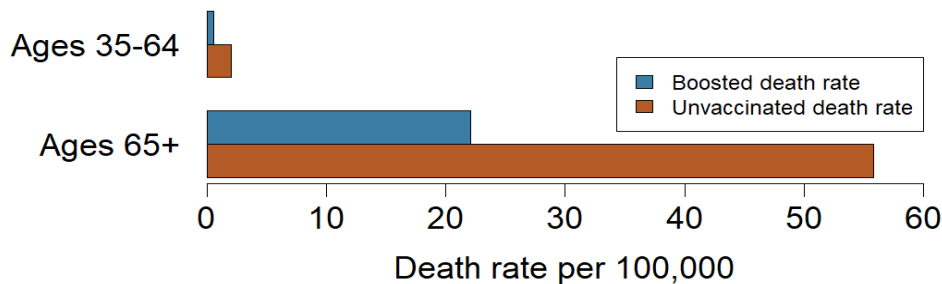
March 18, 2023

Summary

From February 07 to March 06, 2023, unvaccinated individuals were between 2.2 and 6.6 times more likely to be *hospitalized* with COVID-19 compared to those who received at least one booster dose*



From January 16 to February 12, 2023, unvaccinated individuals were between 2.5 and 3.7 times more likely to *die* from COVID-19 compared to those who received at least one booster dose*,**



*Booster here includes additional doses or monovalent booster doses (excluding bivalent booster doses authorized on September 1, 2022)

**Due to a small number of COVID-19 deaths, death rates in certain age groups may be unstable. Resulting rate ratios should be interpreted with caution.

Background

Vaccination is an important tool for controlling the COVID-19 pandemic. COVID-19 vaccines are safe and effective at reducing the risk of severe infections, being hospitalized, and dying from COVID-19.

Approximately 70% of the Washington population ages 6 months and older has completed the primary COVID-19 vaccine series and over half of the population has received at least one booster dose (shot). Unvaccinated Washingtonians are at risk of serious outcomes such as being hospitalized and dying due to COVID-19. Because vaccination rates vary across the state between different age and demographic groups, some populations may be more vulnerable to these serious outcomes.

Although COVID-19 vaccines work well to protect against severe infections, being hospitalized, and dying from COVID-19, some people who are vaccinated with the primary series or who have received a booster dose will still get COVID-19 if they are exposed to the virus. As more individuals become vaccinated it is natural to see more vaccinated individuals get COVID-19, and even be hospitalized or die from COVID-19. However, because people who have completed the primary series and received at least one booster dose are much less likely to be hospitalized or die compared to those who are unvaccinated, increasing vaccination rates remains important to protect Washingtonians from severe COVID-19 infections and save lives.

This report shows the impact of vaccination on COVID-19 in Washington by describing rates of COVID-19 hospitalizations and deaths among people with different vaccination statuses. This report breaks vaccination status into three categories:

- **Unvaccinated:** those who have not received any dose of an authorized COVID-19 vaccine.
- **Completed primary series:** those who have reached two weeks after receiving the final recommended dose of the primary series of an authorized COVID-19 vaccine.
- **Boosted:** those who have reached two weeks after receiving at least one booster dose or additional dose of a monovalent COVID-19 vaccine. Individuals are not considered to have full protection from the monovalent booster dose until two weeks have passed since receiving the dose because of the time required for the body to build protection. COVID-19 vaccines categorized as “monovalent” are the initial COVID-19 vaccines that were approved by the Food and Drug Administration (FDA). Doses used for the primary series are monovalent vaccines. These are different from the new booster doses authorized by the FDA for use beginning September 1, 2022, which are referred to as “bivalent” vaccines. Data about doses of bivalent boosters are not included in this report.

PLEASE NOTE:

- Information about bivalent boosters is not included in this report in order to avoid confusing the impact of the bivalent boosters with the impact of the monovalent boosters. Individuals who received a bivalent booster after August 31, 2022 are removed from the analyses presented here. Information about the impact of bivalent boosters will be included in future iterations of this report once a sufficient percentage of the Washington population has received the booster.
- Immunocompromised individuals are eligible for an additional dose following the primary series before being eligible for a booster dose. Because DOH has very limited data about whether someone is immunocompromised, all doses received after the primary series is completed are categorized as “booster doses”.

Impact of vaccination on COVID-19 hospitalization and death rates

The following graphs show the 28-day COVID-19 hospitalization and death rates by age group for people with different vaccination statuses. There are several important things to know when looking at the data. First, individuals who have received at least one booster dose (represented by the blue line in the following graphs) are less likely to be hospitalized or die of COVID-19 compared to those who are unvaccinated (red line) as well as those who completed the primary series (yellow line). However, because even very effective vaccines cannot prevent all infections, some individuals who have received at least one booster dose may still get sick, be hospitalized with, or die from COVID-19. There may also be other reasons these individuals experience serious outcomes even after receiving at least one booster dose, including:

- Decreasing protection from the vaccine as more time passes from when individuals received their most recent dose
- The spread of variants that are more contagious and that current vaccines are not as protective against
- Individuals and society changing behaviors such as masking, social distancing, and seeking testing

Interpreting the data is challenging because of several factors that are hard to measure in the population, including:

- The number of unvaccinated individuals with some protection from COVID-19 because of a previous infection
- The use of at-home tests and information about people who test positive not being reported to the Washington State Department of Health
- Individuals with underlying health conditions potentially being more likely to both get vaccinated and boosted, and also experience severe outcomes from COVID-19
- The potential for people who are vaccinated and boosted to be more likely to be tested

These limitations have a larger impact on case data compared to hospitalization and death data and have also become more relevant in recent months. Therefore, case data are no longer included in this report.

Trends in COVID-19 hospitalization and death rates by vaccination status and age group

The following graphs show the 28-day COVID-19 hospitalization and death rates by age group for people who are unvaccinated, people who have completed the primary series, and people who have received at least one booster dose. The difference between rates in the unvaccinated population compared to the population of those who have received at least one booster dose during the grayed out 28-day time period is shown in text on each graph.

PLEASE NOTE: the Y-axes of the following graphs differ between age groups.

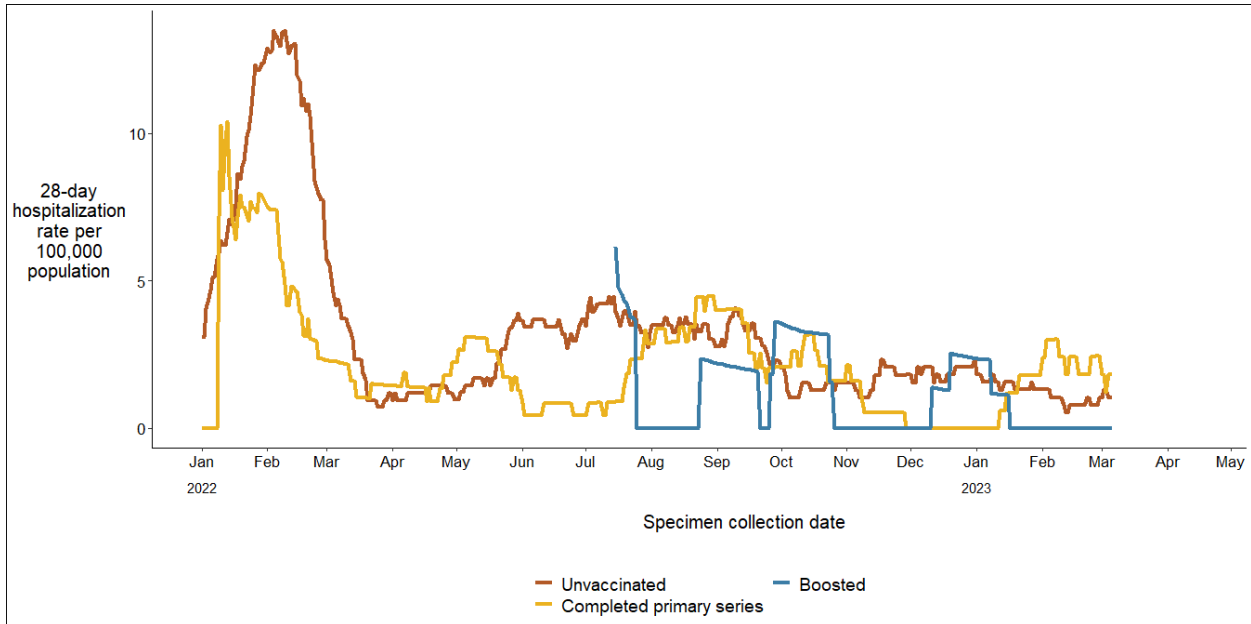
COVID-19 Hospitalizations

COVID-19 hospitalization rates per 100,000 population by age and vaccination status, February 07 to March 06, 2023

Age group	Age-specific rate per 100,000 among unvaccinated individuals	Age-specific rate per 100,000 among those who received at least one booster dose	Likelihood of unvaccinated individuals being hospitalized with COVID-19 compared to those who received at least one booster dose
5 - 11	Not calculated*	Not calculated*	Not calculated*
12 - 34	11.3	3.1	3.6
35 - 64	34.8	5.2	6.6
65+	209.5	93.6	2.2

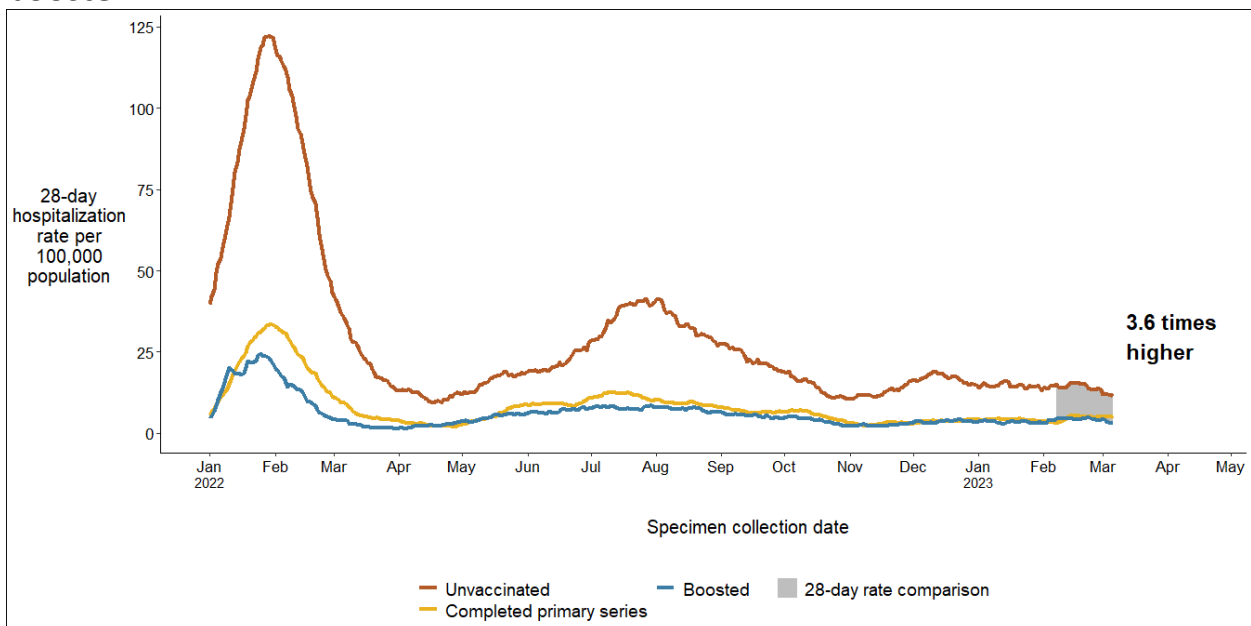
**Rates are not calculated when there are five or fewer hospitalizations in either the unvaccinated or boosted group. The underlying number of hospitalizations is too small to analyze and draw meaningful conclusions about the impact of booster doses on hospitalizations.*

COVID-19 hospitalization rates among 5 - 11 year-olds were low across all vaccination statuses*

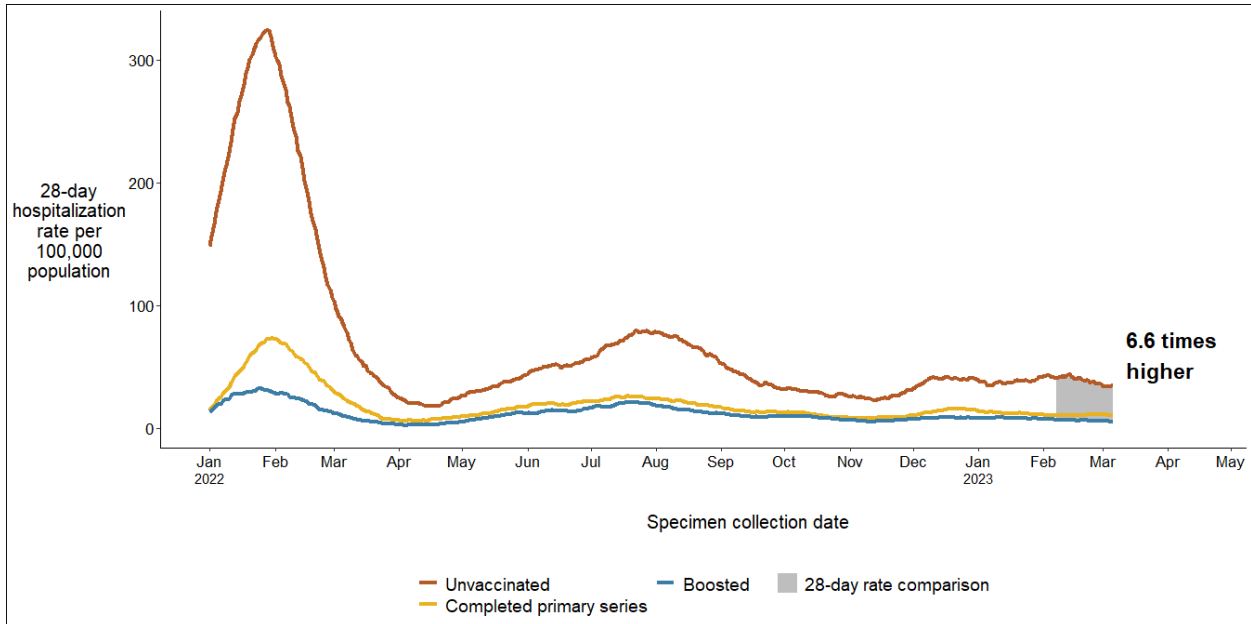


**The rate ratio is not included on this graph because the underlying number of hospitalizations is too small to analyze and draw meaningful conclusions about the impact of booster doses on hospitalizations in this age group.*

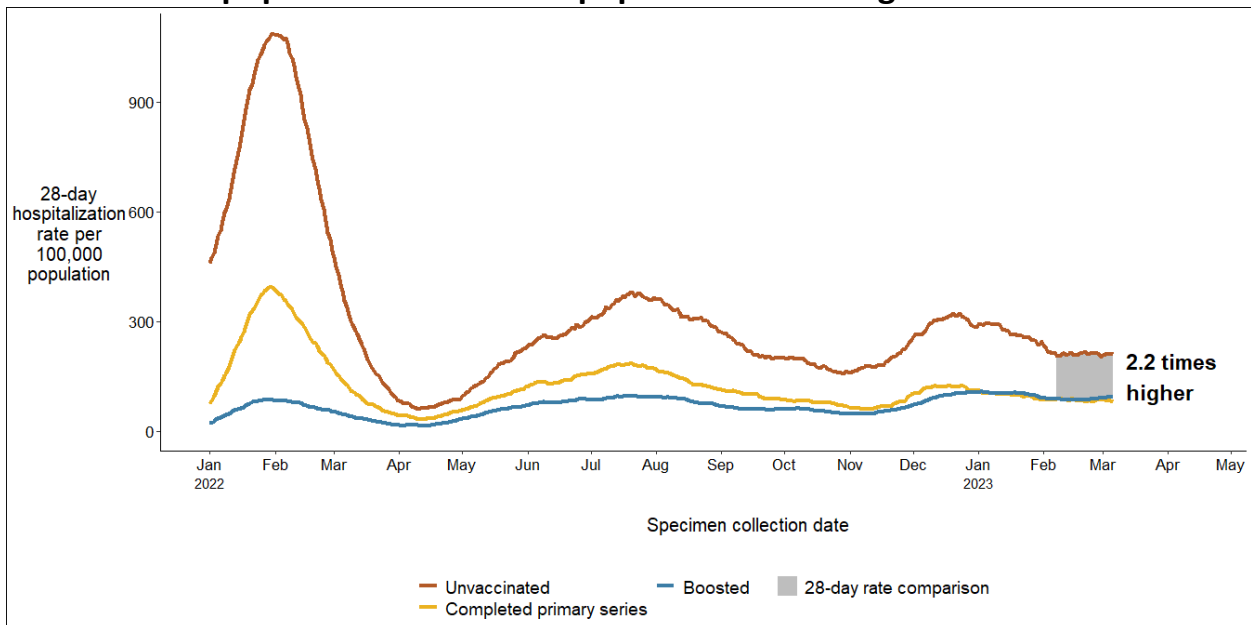
COVID-19 hospitalization rates among 12 - 34 year-olds are 3.6 times higher in the unvaccinated population than in the population receiving at least one booster



COVID-19 hospitalization rates among 35 - 64 year-olds are 6.6 times higher in the unvaccinated population than in the population receiving at least one booster



COVID-19 hospitalization rates among 65+ year-olds are 2.2 times higher in the unvaccinated population than in the population receiving at least one booster



COVID-19 Deaths

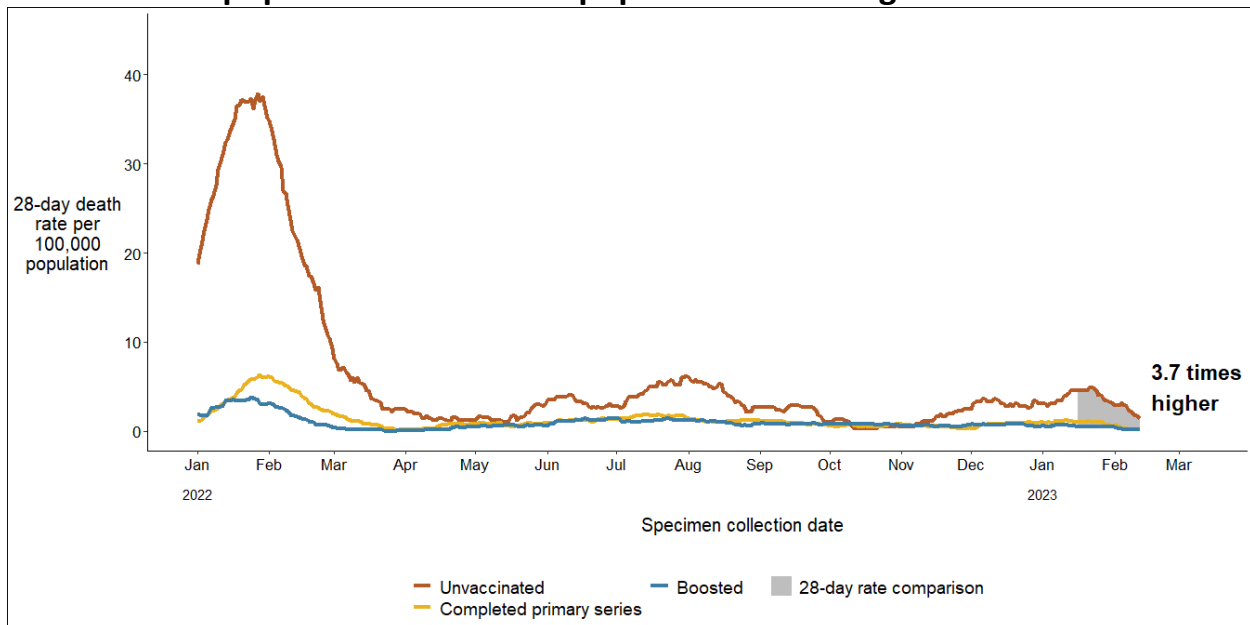
Deaths are only shown for Washingtonians ages 35 years and older due to the relatively small number of deaths in other age groups and associated instability in rates when assessing by vaccination status.

COVID-19 death rates per 100,000 population by age and vaccination status, January 16 to February 12, 2023**

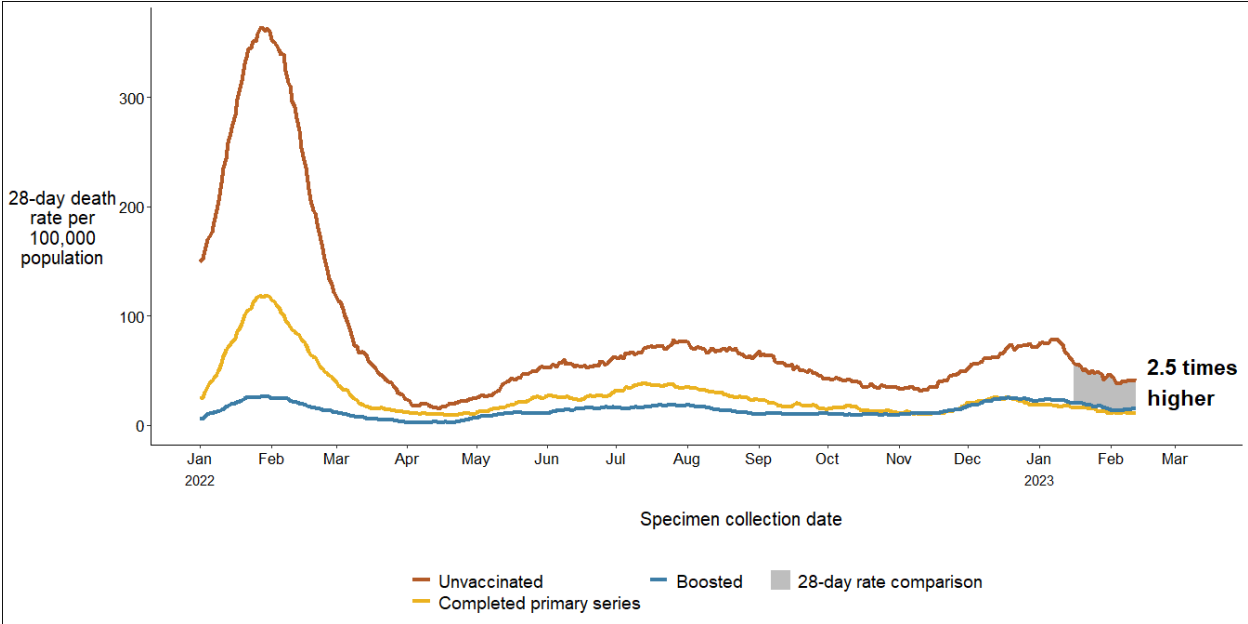
Age group	Age-specific rate per 100,000 among unvaccinated individuals	Age-specific rate per 100,000 among those who received at least one booster dose	Likelihood of unvaccinated individuals dying from COVID-19 compared to those who received at least one booster dose
35 - 64	2.0	0.5	3.7
65+	55.8	22.1	2.5

**Due to a small number of COVID-19 deaths, death rates in certain age groups may be unstable. Resulting rate ratios should be interpreted with caution.

COVID-19 death rates among 35 - 64 year-olds are 3.7 times higher in the unvaccinated population than in the population receiving at least one booster



COVID-19 death rates among 65+ year-olds are 2.5 times higher in the unvaccinated population than in the population receiving at least one booster



Methods

Data sources

There are three data sources for these metrics:

- Washington Disease Reporting System (WDRS)
- Washington Immunization Information System (WAIS)
- Washington Health and Life Events System (WHALES)

WDRS receives case, hospitalization, and death information for all COVID-19 cases in Washington residents reported to the Washington State Department of Health. WAIS collects COVID-19 vaccination data from healthcare providers for people vaccinated in Washington, as well as Washington residents vaccinated outside of the state. Not all federal correction facilities and federal healthcare organizations (e.g., Department of Defense and Veterans Administration facilities) submit data to WAIS. WAIS may not include vaccination data from all tribal health facilities.

All rates presented in this report are calculated using the Washington state population distribution based on the Office of Financial Management's (OFM) April 1, 2020 population estimates. To better reflect the true rates of COVID-19 hospitalizations and deaths in this report, calculations include only the 5 years and older population because they were eligible to receive booster doses during the assessment period.

Definitions

All case, hospitalization, and death data reported are based on positive molecular or antigen test results. A person classified as a COVID-19 case who received at least one booster dose is defined as a person with a positive molecular or antigen test result and a specimen collection date two or more weeks after their first booster dose of a monovalent COVID-19 vaccine is administered. An individual is considered to have received a booster dose two weeks after an age-appropriate booster dose is administered.

A COVID-19 hospitalization is a hospitalization of a Washington resident with COVID-19 who has been identified using case investigation data in WDRS or links with Rapid Health Information Network (RHINO) records as hospitalized with confirmed or probable COVID-19.

Deaths are reported to the state by health care providers, medical examiners or coroners, local health departments, or others to the official vital records database, WHALES. COVID-19 deaths included in this report are identified in WHALES where the cause of death was confirmed or suspected to have been COVID-19, and require a known positive test result.

Timeframes

It takes up to 10 days from specimen collection date for DOH to receive information about 90% of reported cases, 10 days for DOH to identify hospitalizations, and 32 days to identify deaths. For this reason, we report time periods differently for hospitalizations and deaths to ensure we are reporting the most complete data.

Linking methods

All information on COVID-19 cases, hospitalizations, and deaths in this report use WDRS data linked to WAIS COVID-19 vaccination data. The method to link data was updated in July 2022 to include more robust linking methods. The links are based on a comparison of the following demographic information present in both WDRS and WAIS:

- first name
- last name
- middle initial
- date of birth
- sex at birth
- phone number
- zip code

The new methodology identifies matches even when there are slight variations in the spelling of names or small errors in other demographic information between the two data sources. This method is a more robust method of linking data than the previous method, which required exact matches of first name, last name, and date of birth for records to be considered a match. COVID-19 cases with vaccines not reported to WAIS as described above are considered unvaccinated in this report.

28-day rate calculations

Rates are calculated as the total number of hospitalizations or deaths within the specified vaccination and age groups with a specimen collection date during the 28-day period divided by the population that falls in the same age group with the same vaccination status at the beginning of the 28-day period.

For example,

28-day COVID-19 hospitalization rates per 100,000 population among 12 - 34 year-old individuals who received at least one booster dose =

$$\frac{\text{Number of hospitalizations in 12 - 34-year-old individuals who received at least one booster dose with a specimen collection date August 1 – August 28}}{\text{Number of 12 - 34-year-old individuals in Washington who received at least one booster dose as of August 1}} \times 100,000$$

To compare rates in the population of individuals who received at least one booster dose to the unvaccinated population, the rates for the most recent four-week (i.e., 28-day) period is calculated. The 28-day rate in the unvaccinated population is divided by the 28-day rate in the population of individuals who received at least one booster dose to calculate a rate ratio.

For example,

The rate ratio for the boosted and unvaccinated COVID-19 hospitalization rates per 100,000 population among 12 - 34 year-old individuals on August 28 =

28-day (August 1 – August 28) hospitalization rate for unvaccinated 12 - 34-year-old individuals

28-day (August 1 – August 28) hospitalization rate for 12 - 34-year-old individuals who received at least one booster dose