

# Methodology for Public Health Immunization Measures Dashboard

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This document explains how we estimate immunization coverage in the Public Health Immunization Measures Dashboard. The version of this dashboard using these methods was first published in 2024. A more detailed summary of information may be requested by contacting [WAISDataRequests@doh.wa.gov](mailto:WAISDataRequests@doh.wa.gov).

The methods used in this dashboard differ from those in previous versions. Therefore the estimates may differ from previously published data. Comparisons between the two should not be made.

In the past, we updated the dashboard by adding new estimates to previous ones, without changing the older estimates. For example, estimates for 2018 were made in 2018 and for 2020 in 2020. Over time, this approach became increasingly difficult to maintain. New measures could not be calculated retrospectively. Old coverage estimates could not be revised if needed, such as due to changes to how the immunization registry functions.

Now the dashboard calculates estimates retrospectively. This allows us to add and revise measures as needed. But this method requires us to make some additional assumptions, which can introduce errors.

This document summarizes our methods for calculating coverage and highlights these additional sources of error.

## Washington State Immunization Information System (WAIS)

The dashboard uses data from the Washington State Immunization Information System (WAIS). The WAIS is a secure web-based tool, managed by the Washington State Department of Health. It is a lifetime immunization registry for residents of all ages. The information it contains is reported by licensed health care providers. Health care providers that voluntarily report immunizations for their patients to the WAIS include:

- hospitals
- primary care providers
- pharmacists
- childcare centers
- schools
- WIC clinics
- STD/HIV clinics
- Tribal and Indian Health Services clinics
- family planning clinics

WAIS data are considered medically verified.

## Inclusion/Exclusion Criteria

### Denominator

The denominator (total population) is based on the people with data entered in the WAIS. Some people are not represented in the WAIS and not all immunizations are entered into the WAIS.

Records which meet the following criteria are included in the denominator:

- WAIS records of patients who are living and fall within the milestone age ranges on the “as of the date” (AOD) of the coverage estimate.
- WAIS records where the most current address available in the system on the AOD is “WA”.

We exclude WAIS records that are entered into the system after the AOD. This approximates the population of available records in the system as of the AOD.

### Numerator

The numerator is a subset of the denominator. It includes individuals who have one or more valid vaccinations associated with the vaccine series of interest, or documented evidence of immunity recorded in the registry by a health care provider on the AOD. Vaccine series coverage is whether an individual has completed all vaccines in a series. Those who are missing even one immunization in the total series are not considered complete for the series.

Numerator counts greater than 0 and less than 10 are suppressed, as are rates derived from suppressed counts.

### Timing of Estimation

Estimates are based on data as of December 31 each year and are updated annually with the most current information. We also recalculate estimates with the currently available data each time we update the dashboard. Because the WAIS is constantly being updated, estimates will vary slightly on a year-to-year basis and should not be compared to previous years' data.

## Sources of Error

### Denominator Inflation

The WAIS suffers from denominator inflation, meaning that it contains an excess number of records. The 2022 WAIS Annual Report noted that the WAIS captured information for 127% of children 0-18 years old in the state based on Census estimates. Several factors contribute to denominator inflation.

### Fragmented or duplicate records

New records with missing or erroneous information cannot be merged to existing records, so, they are left in the system. These duplicates cannot be readily removed and accrue over time.

### Unreported residency changes

Providers don't always report when an individual moves out of Washington.

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We do not currently have a way to resolve the issue of denominator inflation. There is no clearcut way to tell which records are inactive because they are duplicates and which ones are inactive because the individuals have not had recent vaccination data reported. Because these erroneous records don't represent real people or they represent people who have left and are no longer reporting vaccinations to WAIS, they will contribute to the denominator of a coverage rate, but not the numerator. This results in coverage estimates from WAIS always being lower than estimates from other data sources.

## Retrospective Estimates

Many pieces of information in the WAIS are only designed to reflect the current state of a record. Not all pieces of information are available and dated in every record history. These become a source of error for retrospective estimates.

## Historical Address

We use the most recent address to determine resident inclusion in coverage calculations. We also have a history of reported addresses to pull from for retrospective estimates. However, the address history table may be incomplete. Incomplete history tables can cause increased variation the further back the estimate goes.

## Deceased Status

The WAIS categorizes patients as deceased based on vital statistics death record and provider report. For some records, the patient is marked as deceased, but there is no date of death or date the death was reported. In these cases, the patients are excluded from all estimates.

## Estimate "Drift"

Older estimates will "drift" over time. Routine updates and quality control measures will slowly remove or merge records. The number of records which "disappear" this way is relatively small, but changes accumulate over time. This means that rates calculated in different years will differ, even if using the same AOD. We will document and evaluate this as time passes and we have more retrospective estimates with known AOD and vintage dates.



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