



Impact of COVID-19 vaccination on IIS-based denominators in Vermont

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Vermont Immunization Registry

- Per state law, all immunizations administered in the state of Vermont must be reported to the [Vermont Immunization Registry \(IMR\)](#)
- IMR is co-located in a database with Vermont Electronic Birth and Death systems.
 - Vital Birth records and Vital Deaths since 1909 have been loaded into system.
 - New births appear in IMR when birth certificate is created.
 - Deaths (in VT) are archived upon death certificate initiation.
- 95.8% of enrolled immunizing sites report to IMR.
- Data in IMR routinely used to assess vaccination coverage statewide by age ranges, demographic groups.
- Healthcare providers also assess coverage within their own practices.

Background

IIS-based denominators or census-based denominators

3.3. Selecting the Denominator

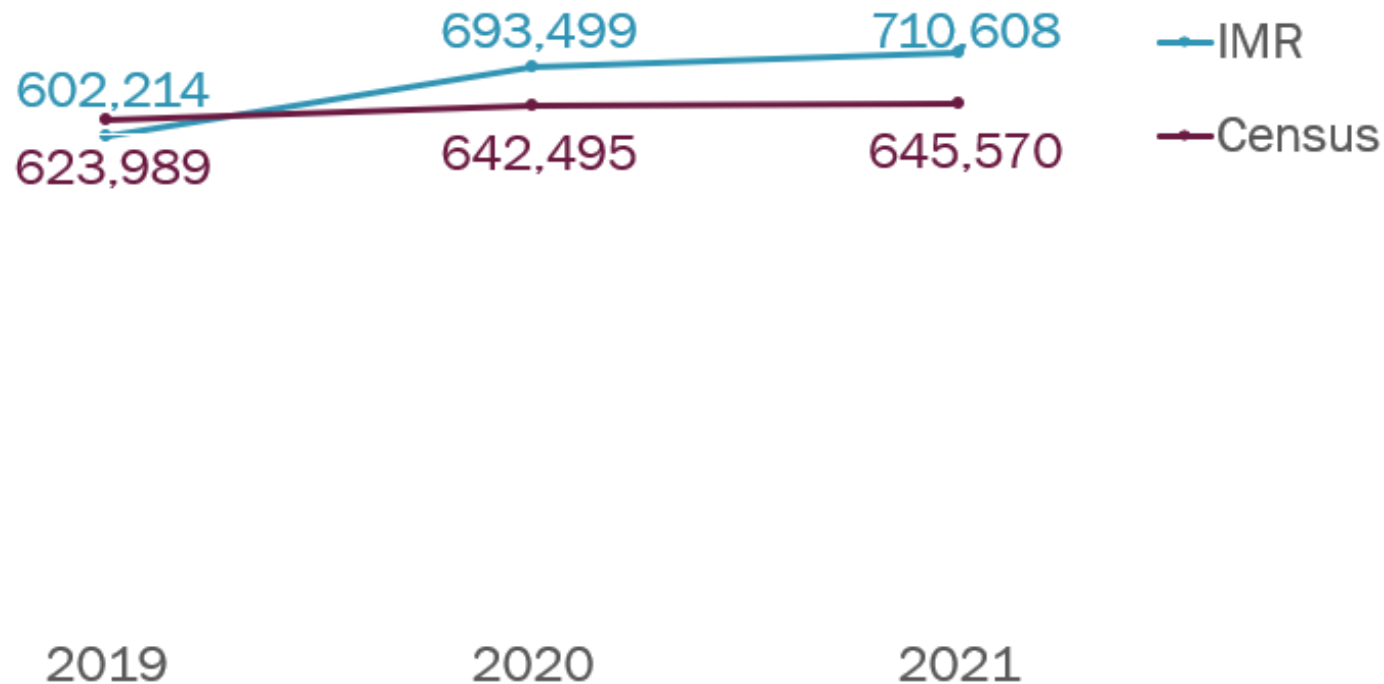
The two main sources of denominator data for IIS-based coverage assessments are the IIS itself and the United States Census. You also can pull your denominator from birth statistics, school census data, and possibly other population-based data sources. Your choice of denominator depends on a variety of factors. In general, your denominator source should match the population selection parameters for your numerator. You should be able to describe why the denominator you choose is the best one for the purpose of the assessment. In this section, we discuss the pros and cons of several denominator sources including:

- IIS-based denominators
- Non-IIS-based denominators
- Other denominator options

[Analytic Guide for Assessing Vaccination Coverage Using an IIS](#)

Background

More than 100,000 Vermonters were added to Vermont's Immunization Registry (IMR) from 2019 to 2021.



Could this increase have anything to do with COVID-19 vaccinations?



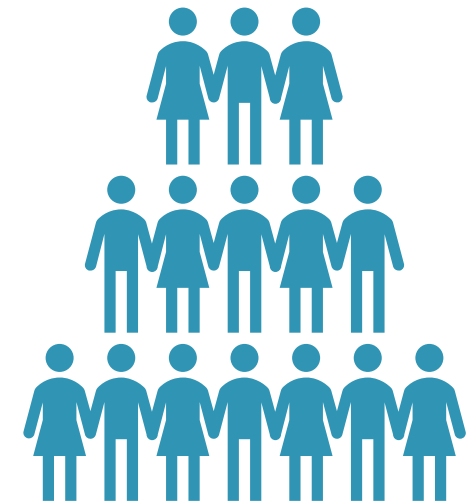
Questions



- How many people in IMR during 2011-2021 **only** have records for COVID-19 vaccination?
- How many people **only** have records for COVID-19 primary series in 2021?

Use of IIS-based denominators is sometimes preferable to use of census-based denominators

- Practice-level reports with patient population as denominator.
- Up-to-date population estimates (lag time with receiving/calculating census-based estimates).
- Can use custom age ranges (e.g., assessing influenza vaccination coverage from 6 months to 17 years of age).



How we calculate IIS-based denominators



Limit to Vermont
mailing addresses



Exclude individuals
marked as out-of-state



Exclude deceased
individuals



Exclude those who
haven't received a dose
in past 10 years

IIS-based denominators may under or overestimate population numbers

- Non-residents may be listed in IMR with a Vermont address.
- Those not vaccinated are underrepresented.
- Race/ethnicity information is not validated by IMR and is not a required field.
- Some Vermonters (particularly those living on the New Hampshire border) receive vaccinations out-of-state.



COVID-19 vaccines may alter IIS-based denominators

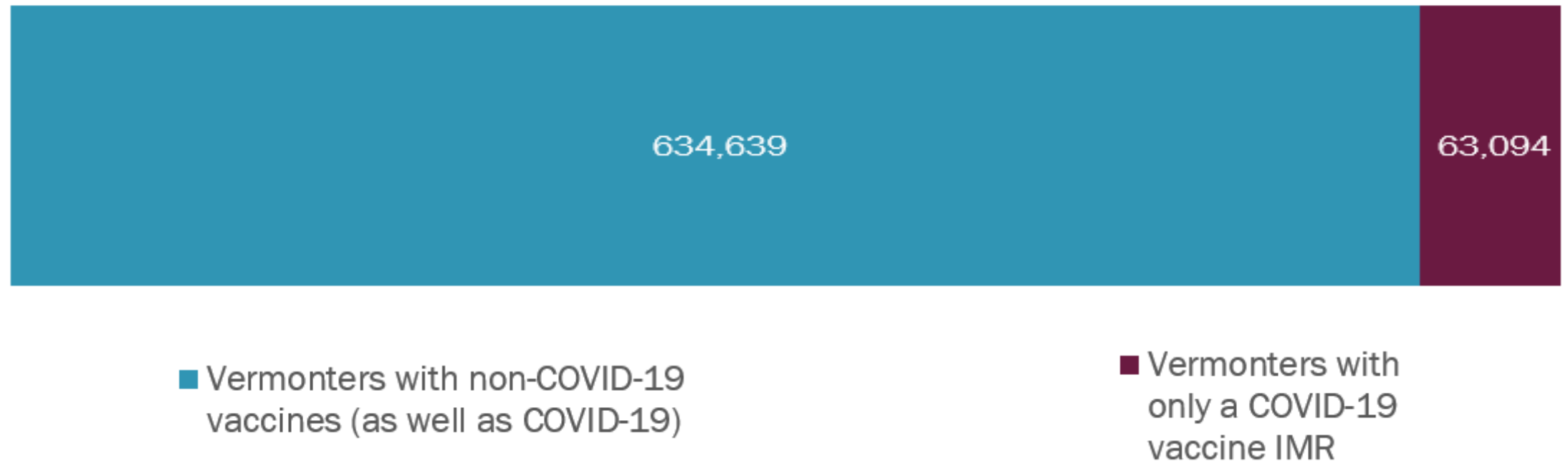
- Many people temporarily relocated during the pandemic
 - Compared to other states, [a large proportion of Vermont residences are second homes/vacation homes](#).
 - May have used address of second home, vacation rentals, family or friends' homes to register for COVID-19 vaccination in Vermont.
- Traveling nurses, out of state students, etc.
 - Likely would not be counted in census.
 - May not otherwise be receiving a vaccine in Vermont.
- Many people seeking first/second doses of COVID-19 vaccine unable to find appointments in their own state.



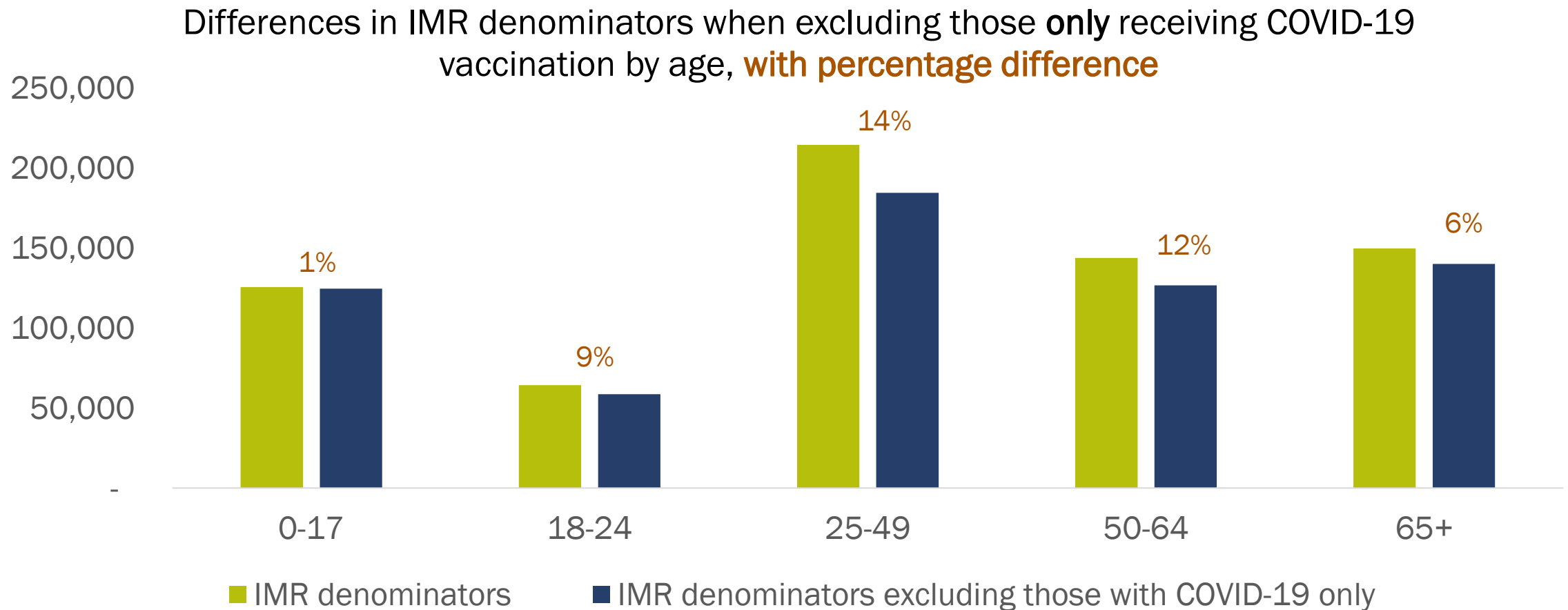
Methodology

- Pulled all doses in IMR from the past 10 years (July 2011-June 2021).
 - Excluded deceased individuals
 - Removed "out-of-state individuals"
 - Removed individuals with "inactive permanent" flag
- Repeated this excluding those who **only** received a COVID-19 vaccine in IMR.
- Also assessed number of individuals who **only** received COVID-19 primary series doses in 2021 with July 2012-June 2022.
- For those who only had a COVID-19 dose, also analyzed their doses through 2022 to understand if they received anything else later.

63,094 Vermonters in IMR only have a COVID-19 vaccine from July 1, 2011, to June 30, 2021.

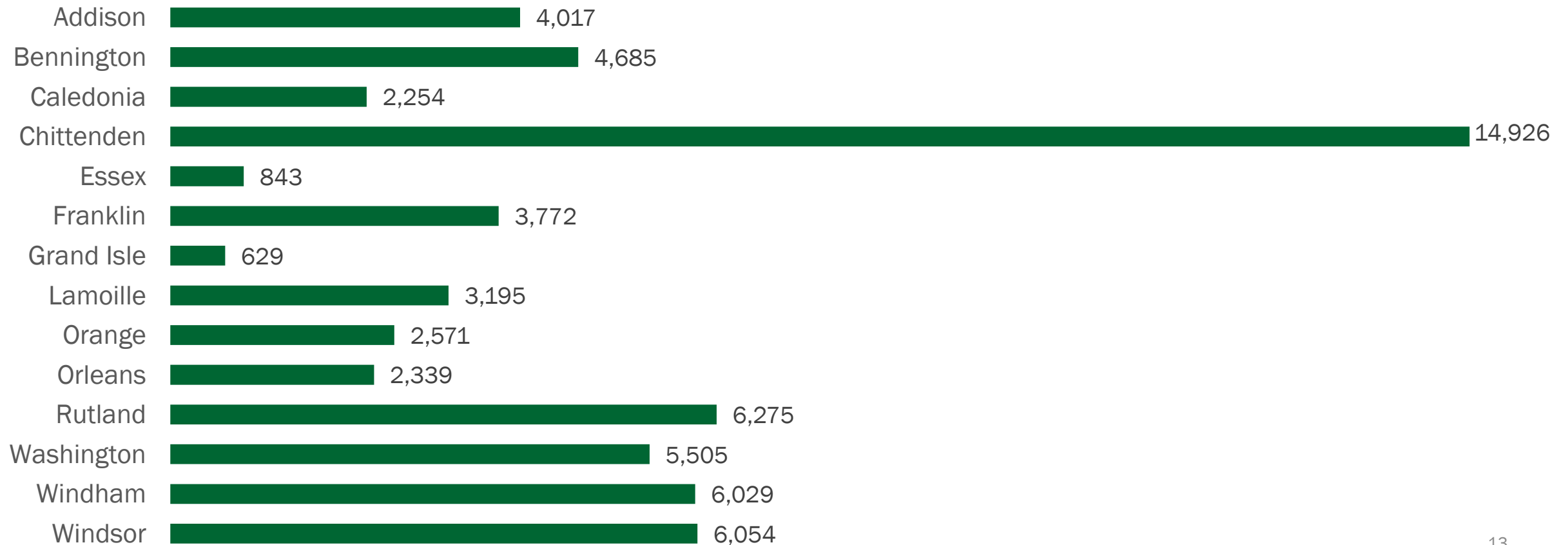


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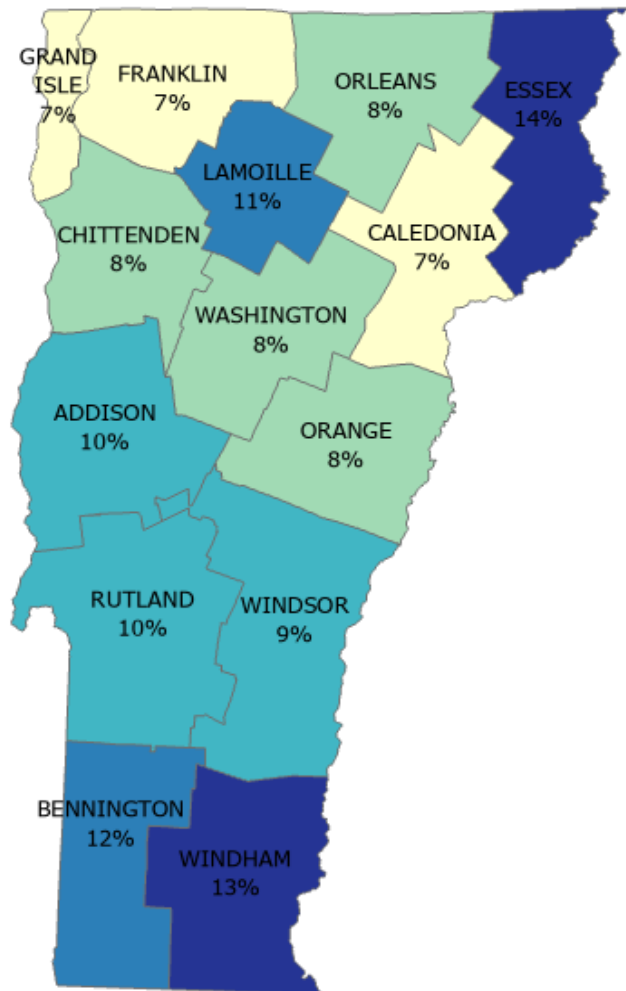


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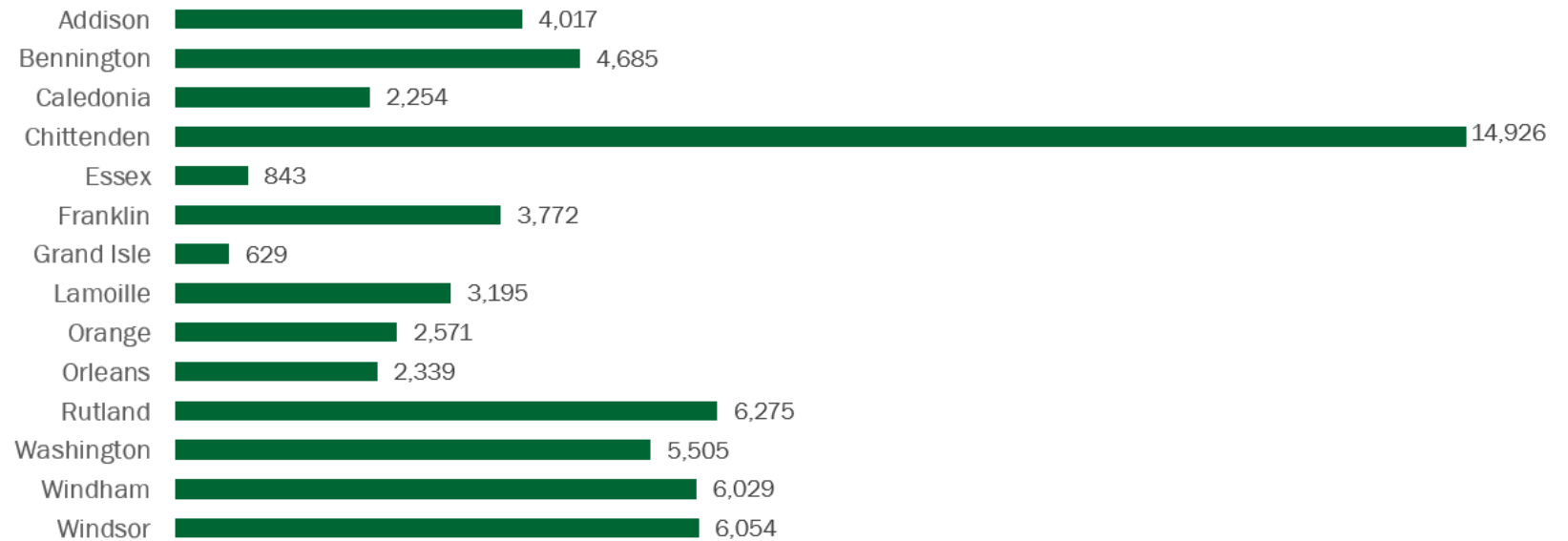
Differences in IMR denominators when excluding those **only** receiving COVID-19 vaccination by county



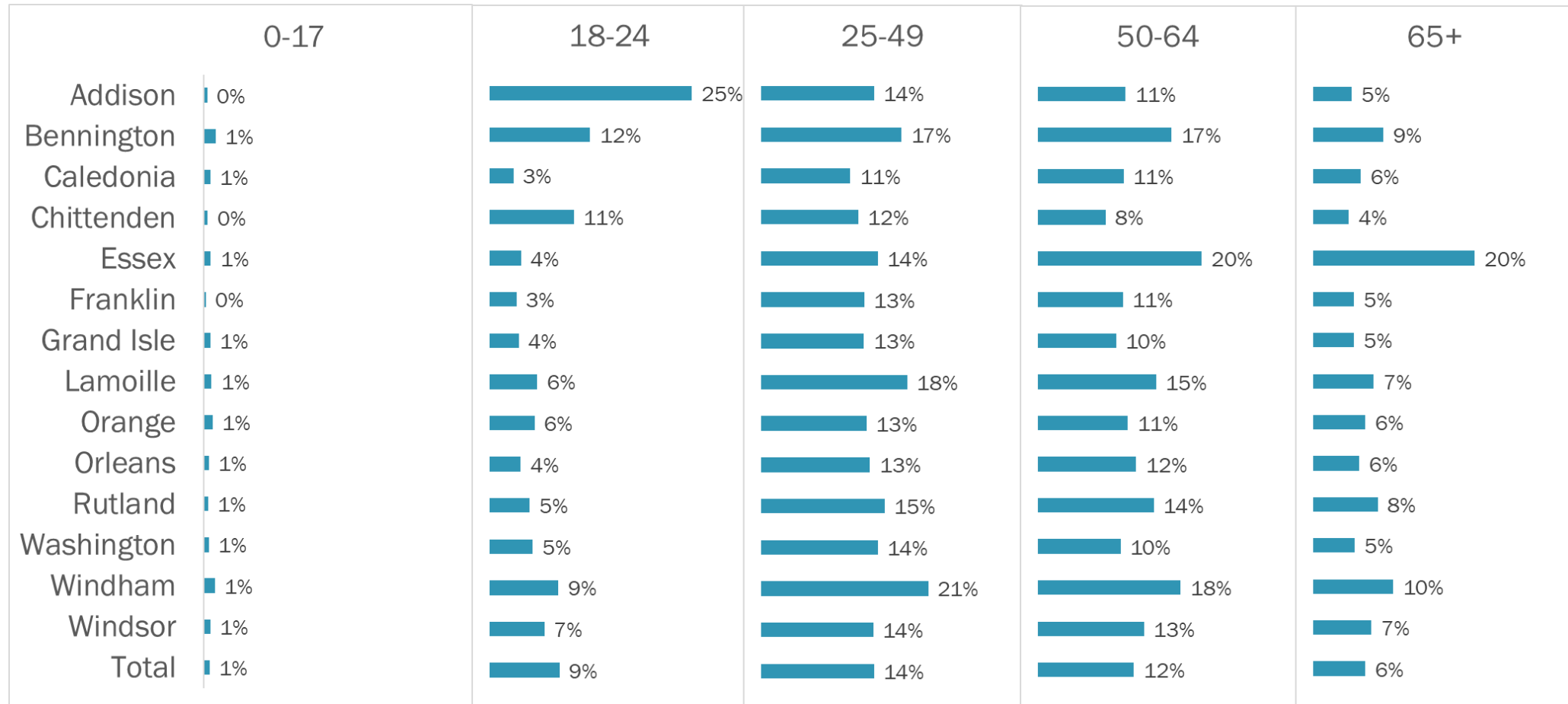
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Differences in IMR denominators when excluding those **only** receiving COVID-19 vaccination by county

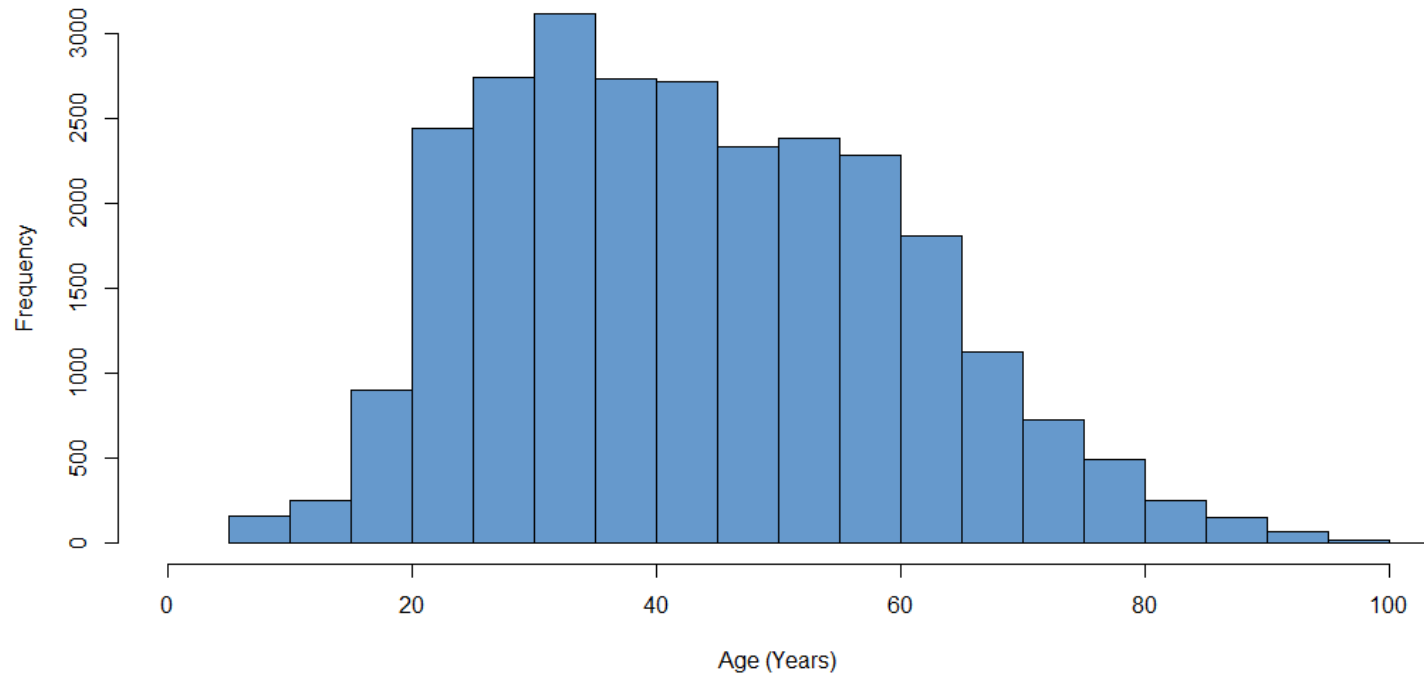


Percentage of Vermonters in IMR denominators with only a COVID-19 vaccine



27,000 individuals only have a primary series in Vermont in 2021.

Age of Vermonters who only have a COVID-19 primary series from 2021 in IMR



Among those in IMR who only received a COVID-19 primary series, the median age of individuals was 42 years.

Limitations

- People who temporarily relocated may have received other vaccinations (e.g., flu, Tdap)
- It is not clear what the data mean
 - Vermonters may have received a vaccine for the first time in the last 10 years
 - Non-Vermonters (e.g. traveling nurses) may have received vaccine
 - Newly relocated Vermonters may have received vaccines
- Some people, particularly those living on the New Hampshire border, may have received vaccines out-of-state, which may not be reported in IMR.

Potential Impacts for Data Analysis

- Vaccination coverage rates may be underestimated using larger IMR denominators (versus smaller census denominators), especially for non-COVID-19 vaccines.
- IMR denominators are likely to be more accurate for some groups than others, and may be more suitable for targeted analysis.

Key Takeaways

It is important to consider potential impacts of COVID-19 vaccinations and the COVID-19 pandemic when using IMR denominators for recent years in the context of your state's registry and circumstances surrounding the vaccination rollout.

- Administration of COVID-19 vaccinations may have artificially inflated denominators.
- Unknowns around permanent addresses can conflict with Census data.





Thank you!

Let's stay in touch.

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