Results of COVID-19 Vaccine Effectiveness Studies: An Ongoing Systematic Review

Forest Plots: Vaccine Effectiveness against Delta and Omicron Variants of Concern

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METHODS FOR INCLUSION IN FOREST PLOTS

Vaccine Effectiveness (VE) estimates included in these plots are from an ongoing systematic review of COVID-19 vaccine effectiveness studies. Due to the predominance of the Delta variant across the globe, the plots in this document are restricted to studies conducted during a period when the Delta variant was the dominant circulating variant. Previous versions of the plots (prior to November 18, 2021) showed results from all studies, regardless of dominant variant, and the latest version of those plots (November 11, 2021) are available on the VIEW-hub resources page (https://view-hub.org/resources). Complete details on the method of the systematic review as well as a summary table of results can also be found on the VIEW-hub Resources Page:

- “COVID-19 Vaccine Effectiveness and Impact Studies Review Methods”
- “COVID-19 Vaccine Effectiveness Results Summary Table”

The VE estimates included in the plots are a subset of the estimates abstracted from the systematic literature review. A single study can include many VE estimates. In an effort to not overrepresent the amount of evidence that exists for each vaccine, the following criteria are used to determine which VE estimates are displayed in the forest plots located on the VIEW-hub resources page (https://view-hub.org/resources). There are some instances when more than one estimate from a study will be displayed in the same plot (e.g. a study includes VE estimates from two distinct populations). Reference numbers are included for each VE estimate displayed so users can identify when a study is represented more than once within a plot. More information on each reference can be found in the weekly literature review summary table located on VIEW-HUB (https://view-hub.org/resources).

- Complete vaccination is defined as ≥7 days post final dose; partial vaccination is defined as ≥14 days post first dose of a 2-dose vaccine.
- If a study reports results for the same outcome for both combined and individual vaccines, only individual vaccine VE estimates are displayed. This criterion only applies to studies evaluating VE of BNT162b2 (Pfizer) and mRNA-1273 (Moderna) vaccines.
- If a study reports results from 2 different evaluation designs (e.g. test-negative design and cohort design) on the same population, VE estimates from the primary analysis only are displayed.
- If a study reports VE estimates for the same disease outcome for different populations, the general population VE estimate is displayed when available. If a general population estimate is not available, the VE from each population is displayed (exception is when there are estimates for similar age groups in which case the more stable VE estimate will be displayed).
- If a study reports VE estimates on more than one ‘severe’ disease outcome (e.g. ‘severe disease’, ‘hospitalization’, and ‘ICU admission’), the more inclusive disease outcome including a larger population is displayed. These different types of severe outcomes are labeled as ‘severe disease’ in the plots, however it is important to keep in mind that the definition of severe disease varies and may explain some differences in VE estimates for severe disease outcomes.
- If a study reports VE estimates for different time intervals from the final dose, those from the earlier time intervals are plotted in an effort to remove the effect of possible waning of immunity. Studies that report only VE estimates that include a follow-up time that extends beyond 4 months post final dose are indicated with a ‘+’. Studies that report only VE estimates that are restricted to time intervals beyond 4 months are indicated with a ‘*’.
ABBREVIATIONS

asymp = asymptomatic
HCW = healthcare workers
HHC = household contacts
LTCF = long-term care facility
pop = population
SNF = skilled nursing facility
DELTA VARIANT OF CONCERN

BY VACCINE

Ad26 CoV2.S (Janssen) Primary Series Vaccine Effectiveness, Delta Variant
(ref no) country, population

Ad5-nCoV (Cansino) Primary Series Vaccine Effectiveness, Delta Variant
(ref no) country, population
Vaxzevria (AstraZeneca) Primary Series + Booster Dose Vaccine Effectiveness, Delta Variant

(ref no) country, population

Vaxzevria primary series

(117+) Scotland, general pop
(95) UK - England, general pop

Vaxzevria primary series + booster

(49) Canada, general pop
(114) Canada (BC), general pop
(194+) Czech Republic, general pop

(119) Finland, HCW
(203) Finland, 70 years
(203+) Finland, 70 years
(235) Hungary, 18-64 years
(235) Hungary, 65-100 years
(148) Scotland, general pop
(130) UK, general pop
(43) UK, hospital patients

(95) UK - England, general pop

(49) Canada, general pop
(145) EU, 30-59 years
(112) Sweden, general pop
(115) Sweden, general pop
(130) UK, general pop
(62) UK, general pop

(95) UK - England, general pop

(114) Canada (BC), general pop
(194+) Czech Republic, general pop

(119) Finland, HCW
(235) Hungary, 18-64 years
(235) Hungary, 65-100 years
(124) India, general pop
(171) Scotland, general pop
(42) Scotland, general pop
(103+) Spain, Contacts of index cases
(176) Thailand, general pop
(102+) UK, Contacts of index cases
(78+) UK, general pop

booster_vaccine

Comirnaty (Pfizer BioNTech)
Spikevax (Moderna)
BBIBP-CorV (Beijing CNBG)
+ Indicates estimates that include a follow-up time extending beyond 4 months post final dose.
Comirnaty (Pfizer BioNTech) Vaccine Effectiveness, Delta Variant

(ref no) country, population

Comirnaty primary series
Comirnaty primary series + booster

Death
Severe disease
Symptomatic disease
Any infection
Asymptomatic

booster_vaccine
Comirnaty (Pfizer BioNTech)
Spikavax (Moderna)
Ad26.ZO2.V2.S (Janssen)
BBIBP-CorV (Beijing CNBG)
* Indicates estimates that include a follow-up time extending beyond 4 months post final dose.
Heterologous AZD1222 (AstraZeneca) 1st dose plus mRNA-1273 (Moderna) 2nd dose Vaccine Effectiveness
(ref no) country, population

(115) Sweden, general pop

(114) Canada (BC), general pop
(119) Finland, HCW
(112) Sweden, general pop
(114) Canada (BC), general pop
(119) Finland, HCW

Severe disease
Symptomatic disease
Any infection

Heterologous AZD1222 (AstraZeneca) 1st dose plus BNT162b2 (Pfizer) 2nd dose Vaccine Effectiveness
(ref no) country, population

(115) Sweden, general pop

(103+) Spain, Contacts of index cases

Any Infection

Heterologous AZD1222 (AstraZeneca) 2nd dose Vaccine Effectiveness
(ref no) country, population

(176) Thailand, general pop

Any Infection

Heterologous mRNA Vaccine Effectiveness
(ref no) country, population

(114) Canada (BC), general pop
(114) Canada (BC), general pop

Severe disease
Any infection

+ Indicates estimates that include a follow-up time extending beyond 4 months post final dose.
BY STUDY POPULATION OF SPECIAL INTEREST

Primary Series Vaccine Effectiveness Among Older Adults/Skilled Nursing Facility Residents, Delta
(ref no) country, population

Primary Series Vaccine Effectiveness Among Healthcare Workers, Delta
(ref no) country, population

Primary Series Vaccine Effectiveness Among Children, Delta
(ref no) country, population

Primary Series Vaccine Effectiveness Among Immunocompromised Persons, Delta
(ref no) country, population
Duration of vaccine effectiveness against Delta

- **Primary Series VE**
  - 14 days to <3 months
  - 3 to <6 months
  - 6+ months

- **Booster Dose VE**
  - 14 days to <3 months
  - 3 to <6 months

**Vaccine Effectiveness**

**Primary Series Vaccine**
- AstraZeneca-Vaxzevria
- Moderna-Spikevax
- Janssen-Ad26.COV2.S
- Pfizer BioNTech-Corminut
- SinoVac-CoronVac
- Beijing CNBG-BBB-CorV

**Booster Vaccine**
- No booster (Primary Series only)
- AstraZeneca-Vaxzevria
- Moderna-Spikevax
- Pfizer BioNTech-Corminut
- SinoVac-CoronVac

*Reference group is fully vaccinated with two doses.*
OMICRON VARIANT OF CONCERN

BY VACCINE

Ad26.Cov2.S (Janssen) Primary Series + Booster Vaccine Effectiveness, Omicron Variant
(ref no) country, population

Vaxzevria (AstraZeneca) Primary Series + Booster Dose Vaccine Effectiveness, Omicron Variant
(ref no) country, population
BBIBP-CorV (Beijing CNBG) Primary Series Vaccine Effectiveness, Omicron Variant

(Ref no) country, population

CoronaVac (Sinovac) Primary Series and Booster Dose Vaccine Effectiveness, Omicron

(Ref no) country, population
+ Indicates estimates that include a follow-up time extending beyond 4 months post final dose.
+ Indicates estimates that include follow-up time extending beyond 4 months post final dose.
SECOND BOOSTER DOSE VACCINE EFFECTIVENESS AGAINST OMICRON

Relative* Vaccine Effectiveness of a Second Booster dose, Omicron

*All studies evaluated VE of a 2nd booster relative to 3 doses of Comirnaty (Pfizer BioNTech)

+ Indicates estimates that include a follow-up time extending beyond 4 months post final dose.
BY STUDY POPULATION OF SPECIALInterest

Primary Series Vaccine Effectiveness Among Older Adults/Skilled Nursing Facility Residents, Omicron
(ref no) country, population

Primary Series Vaccine Effectiveness Among Healthcare Workers, Omicron
(ref no) country, population

Primary Series Vaccine Effectiveness Among Children, Omicron
(ref no) country, population

Primary Series Vaccine Effectiveness Among Immunocompromised Persons, Omicron
(ref no) country, population

Vaccine ● BGBP-CoV (Beijing BIBP)
● CoronaVac (Sinovac)
● Comirnaty (Pfizer/BioNTech)
● Vaxzevria (AstraZeneca)

+ indicates follow-up period extending beyond 6 months.
DURATION OF VACCINE EFFECTIVENESS AGAINST OMICRON

<table>
<thead>
<tr>
<th>Primary Series VE</th>
<th>Primary Series VE</th>
<th>Primary Series VE</th>
<th>Booster Dose VE</th>
<th>Booster Dose VE</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 days to &lt;3 months</td>
<td>3 to &lt;6 months</td>
<td>6+ months</td>
<td>14 days to &lt;3 months</td>
<td>3 to &lt;6 months</td>
</tr>
<tr>
<td>Brazil, general pop</td>
<td>Brazil, 12-17 years</td>
<td>[219] Denmark, general pop</td>
<td>[203] Finland, 70 years</td>
<td>[179] Qatar, general pop</td>
</tr>
<tr>
<td>[222] Brazil, 12-17 years</td>
<td>[222] Brazil, 12-17 years</td>
<td>[130] UK, general pop</td>
<td>[130] UK, 16-17 years</td>
<td>[195] USA, 12-15 years</td>
</tr>
<tr>
<td>[226] Canada, 12-17 years</td>
<td>Scotland, general pop</td>
<td>[132] UK, 16-17 years</td>
<td>[818] UK, 65 years</td>
<td>[214] USA, general pop</td>
</tr>
<tr>
<td>[222] Brazil, 12-17 years</td>
<td>[215] Denmark, general pop</td>
<td>[195] USA, 12-15 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[194] Czech Republic, general pop</td>
<td>[171] Scotland, general pop</td>
<td>[201] USA, 12-15 years</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Vaccine Effectiveness


Booster Vaccine: No booster (Primary Series only), Janssen-Ad26.COV2.S, Moderna-Spikevax, Pfizer BioNTech-Comirnaty, Sinovac-CoronaVac