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

Forest Plots: Vaccine Effectiveness against Omicron Variant 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 Omicron variant across the globe, the plots in this document are restricted to studies conducted during a period when the Omicron variant was the dominant circulating variant. The previous version of the plots (posted regularly between November 18, 2021 and June 2, 2022) also showed results for the Delta variant, and an earlier version (prior to November 18, 2021) showed results from all studies, regardless of dominant variant at the time. These earlier versions 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
- 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 apples 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 '+' following the reference number located in the label on the y-axis; these estimates appear at the bottom of each disease outcome panel for all plots.

ABBREVIATIONS

asymp = asymptomatic

HCW = healthcare workers

HHC = household contacts

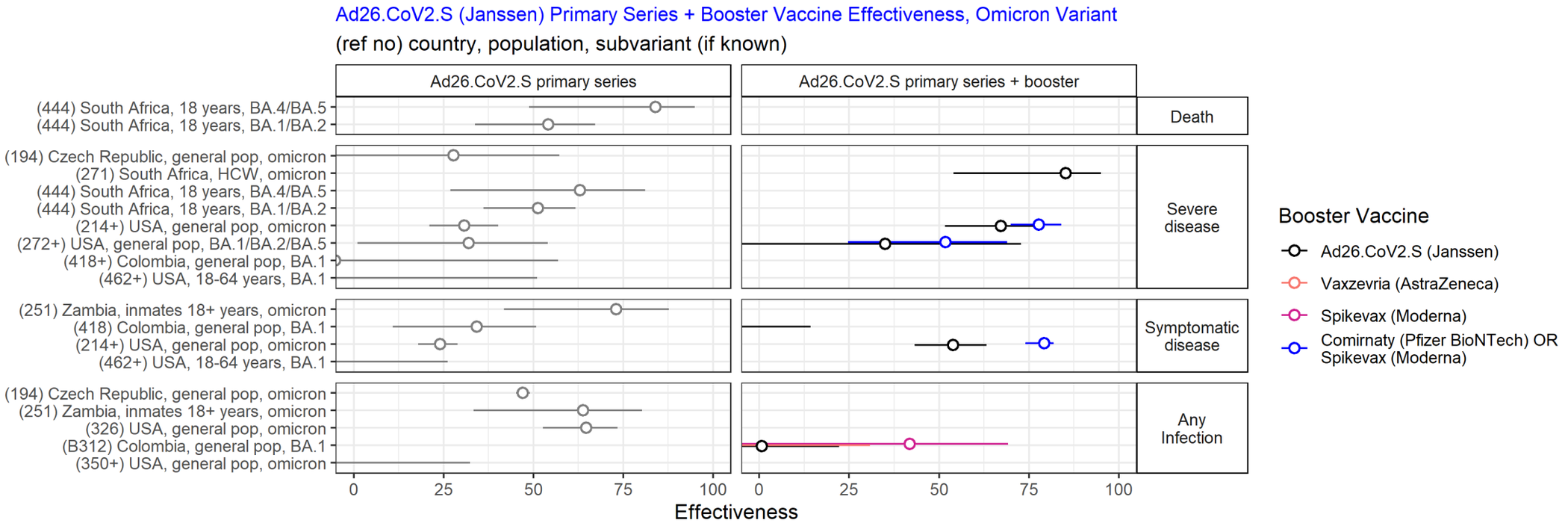
LTCF = long-term care facility

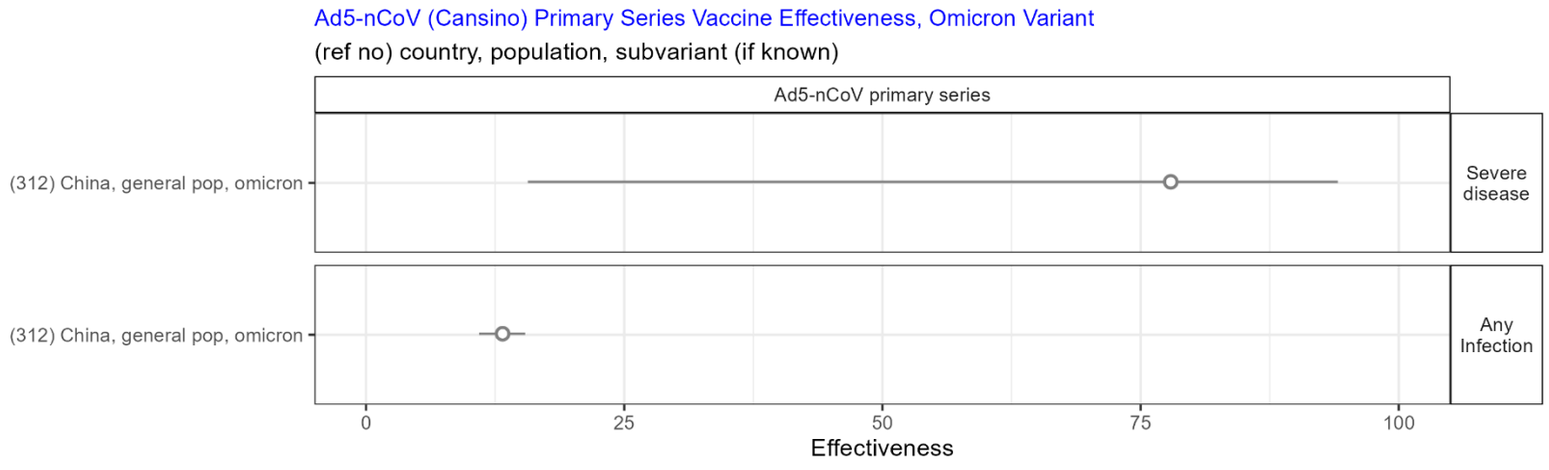
pop = population

SNF= skilled nursing facility

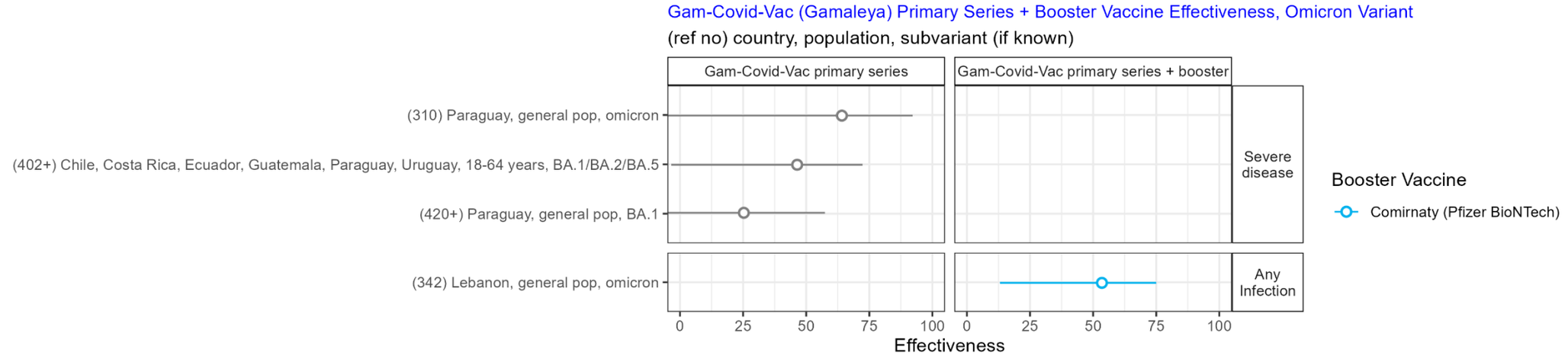
PRIMARY SERIES AND FIRST BOOSTER DOSE EFFECTIVENESS AGAINST OMICRON

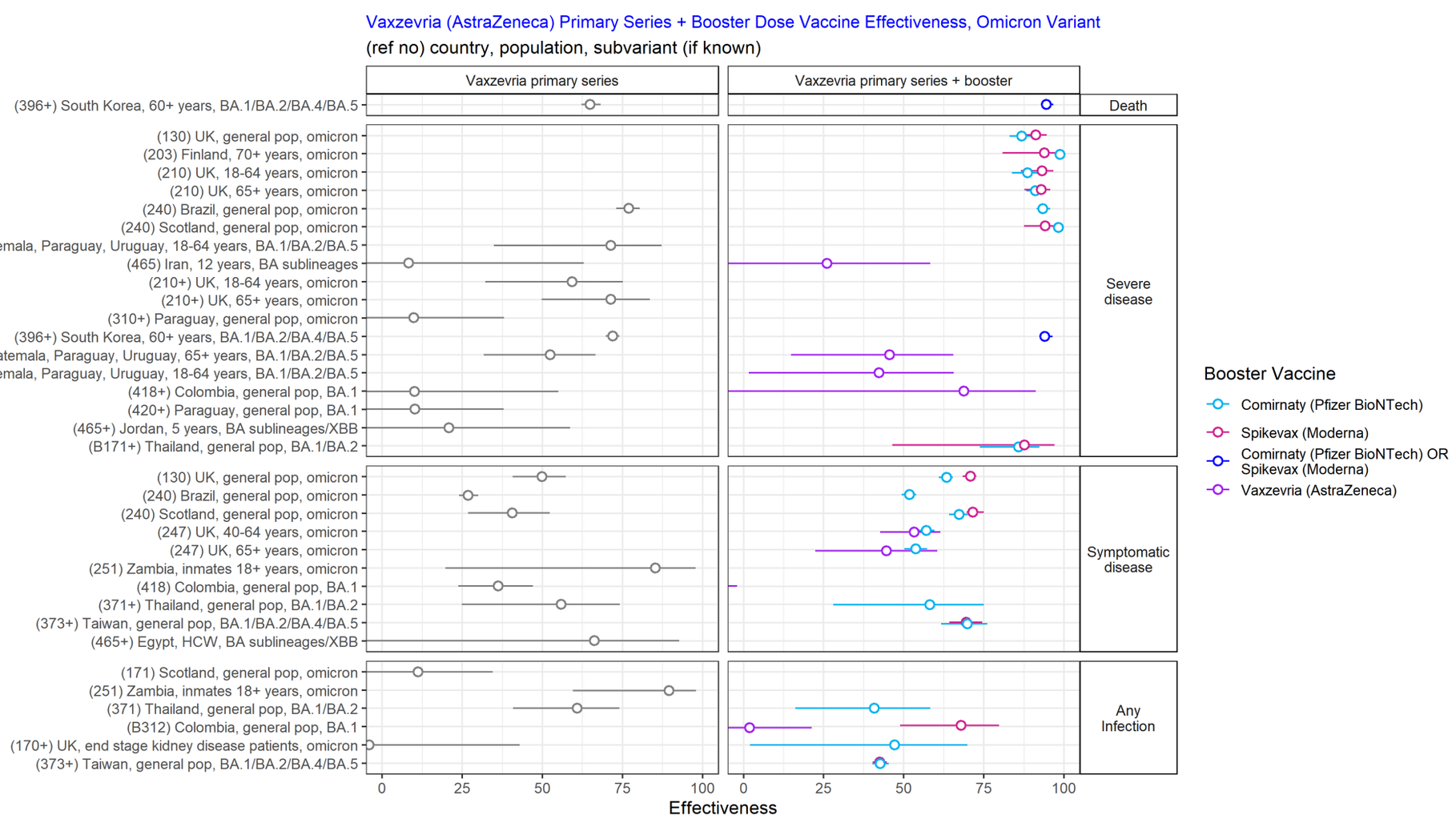
BY VACCINE



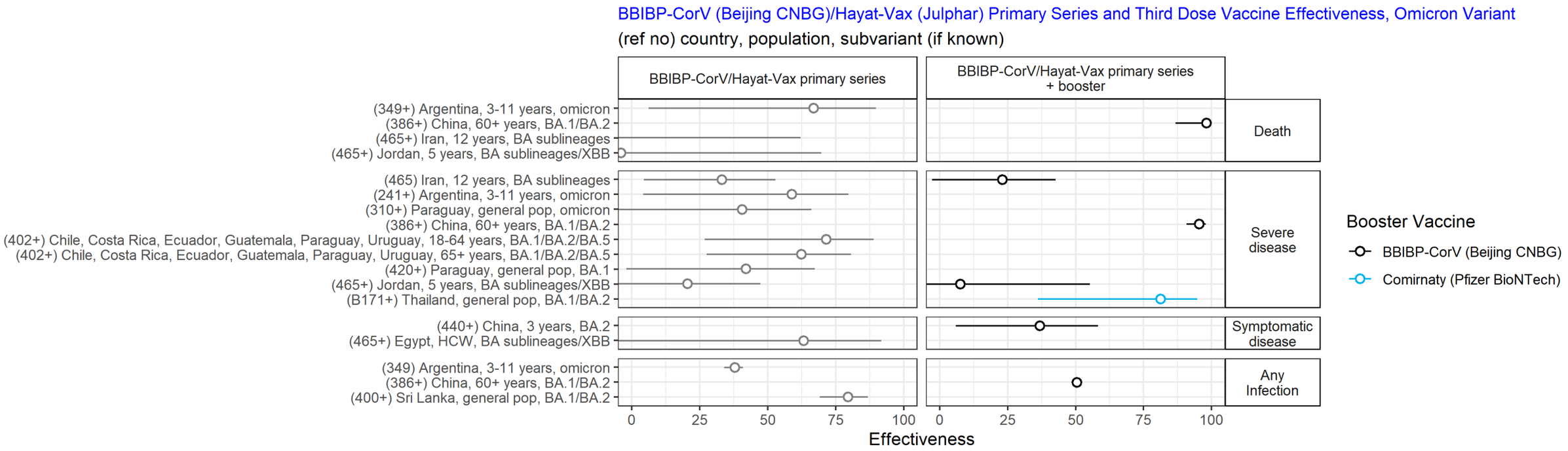


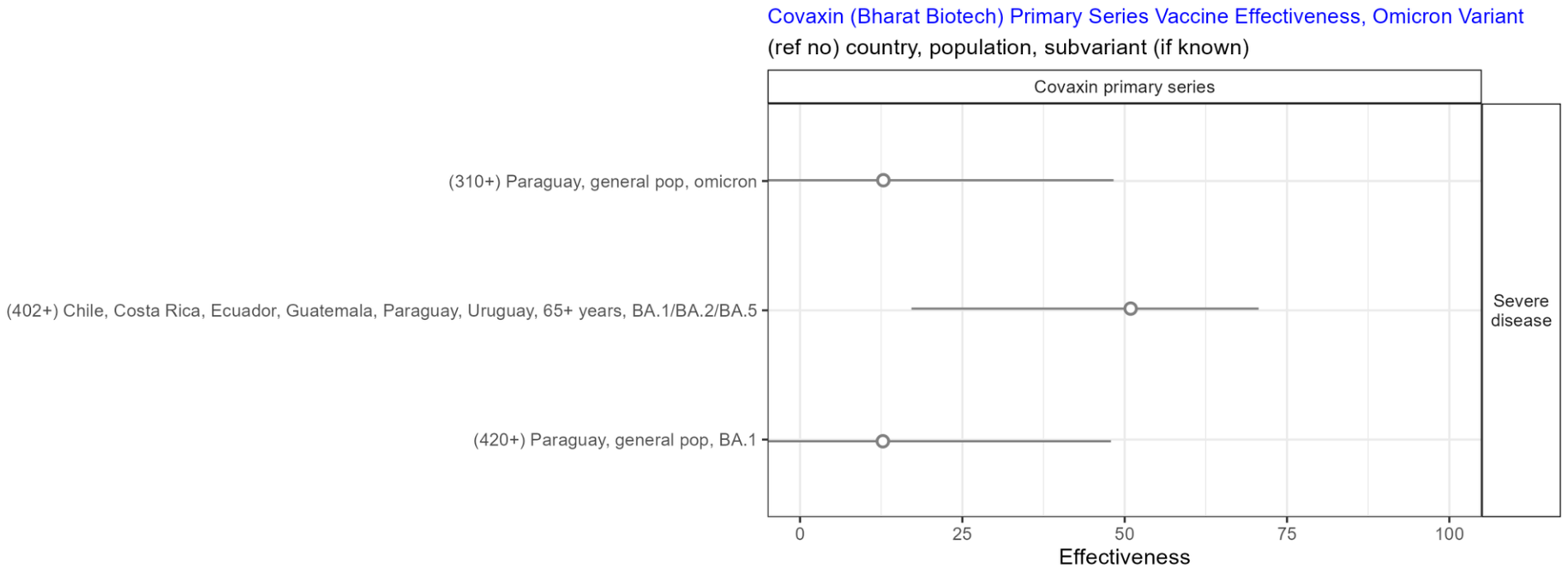
+ Indicates estimates that that include a follow-up time extending beyond 4 months post final dose.



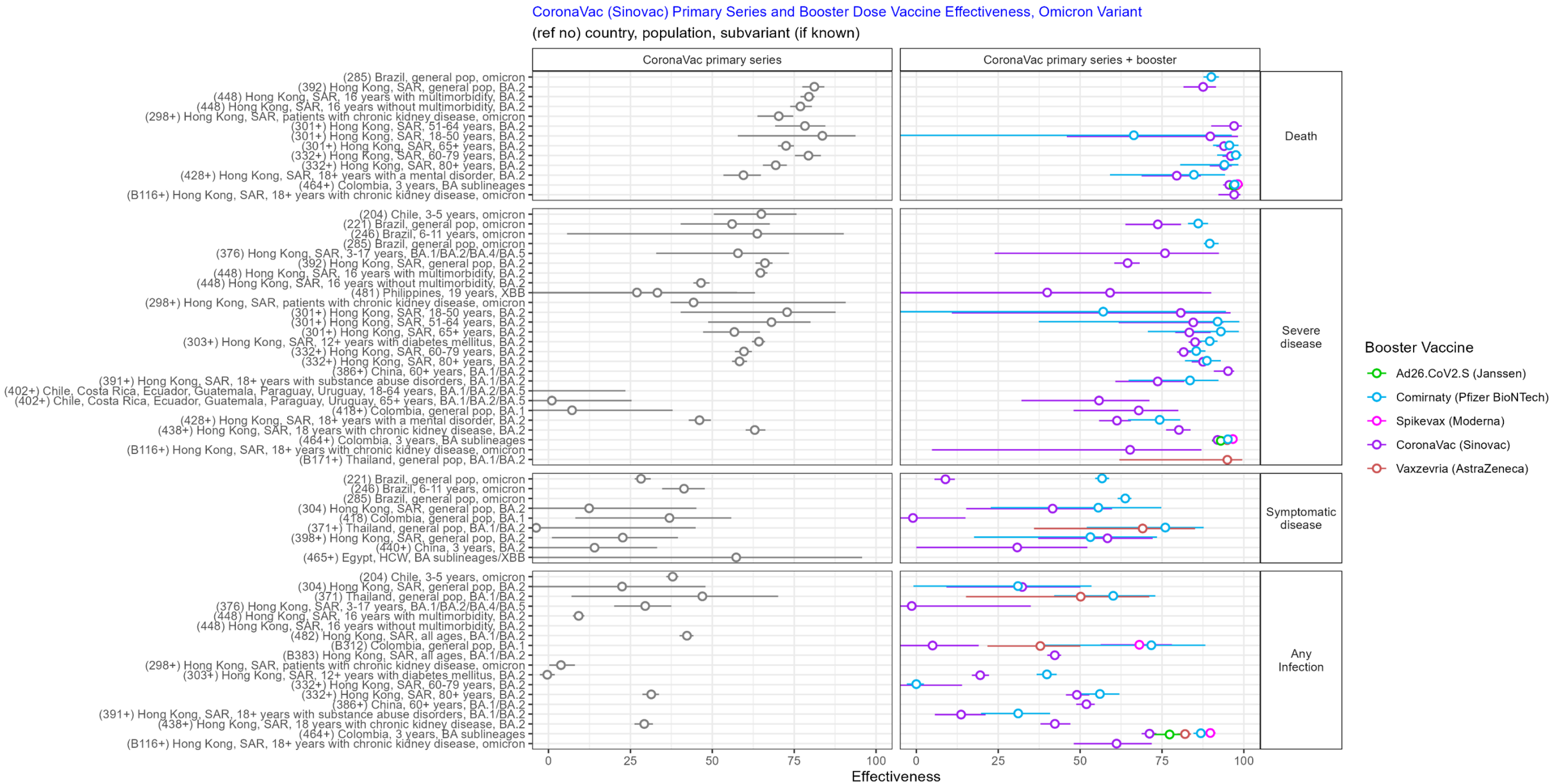


+ Indicates estimates that that include a follow-up time extending beyond 4 months post final dose.

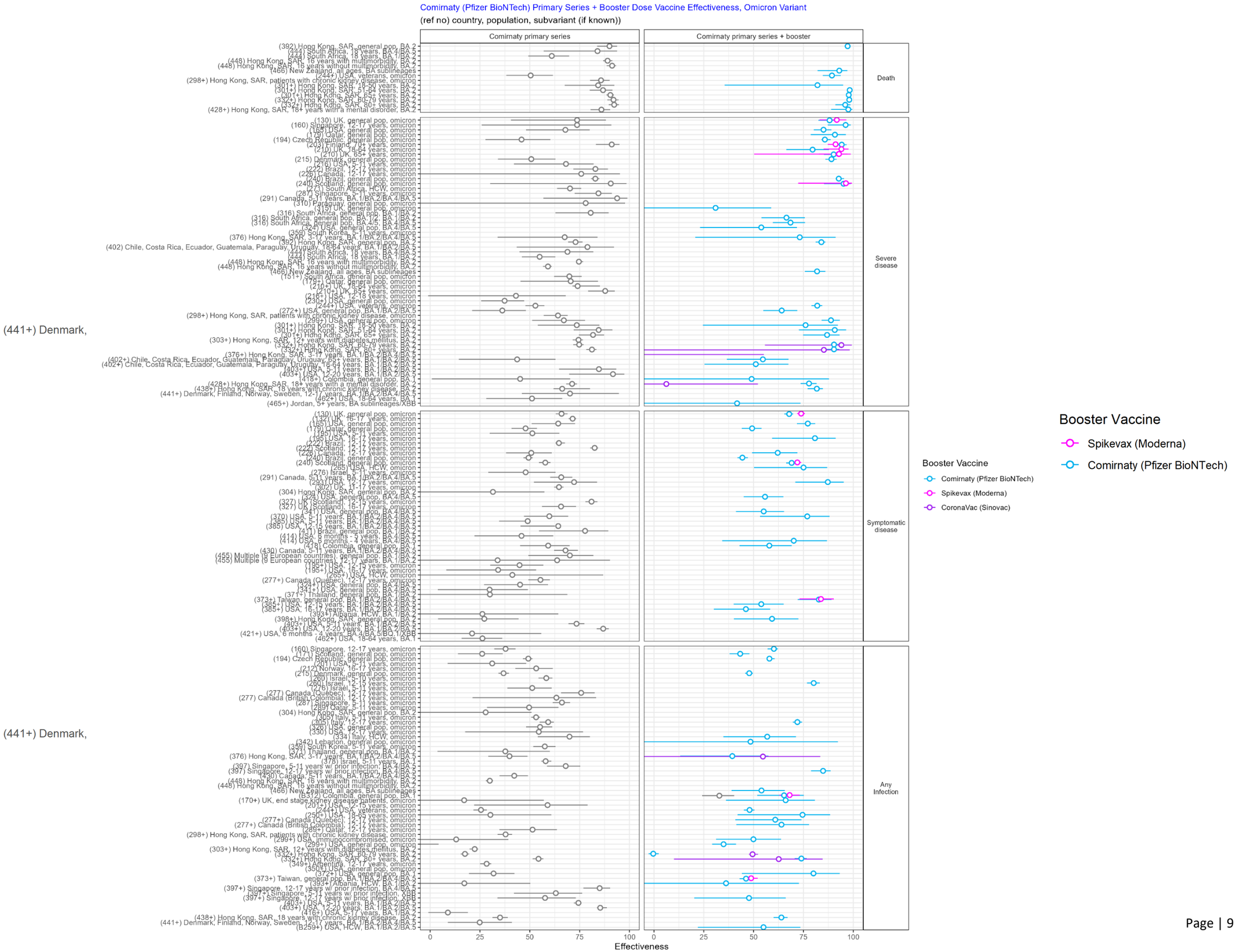




+ Indicates estimates that that include a follow-up time extending beyond 4 months post final dose.



+ Indicates estimates that that include a follow-up time extending beyond 4 months post final dose.



(441+) Denmark,

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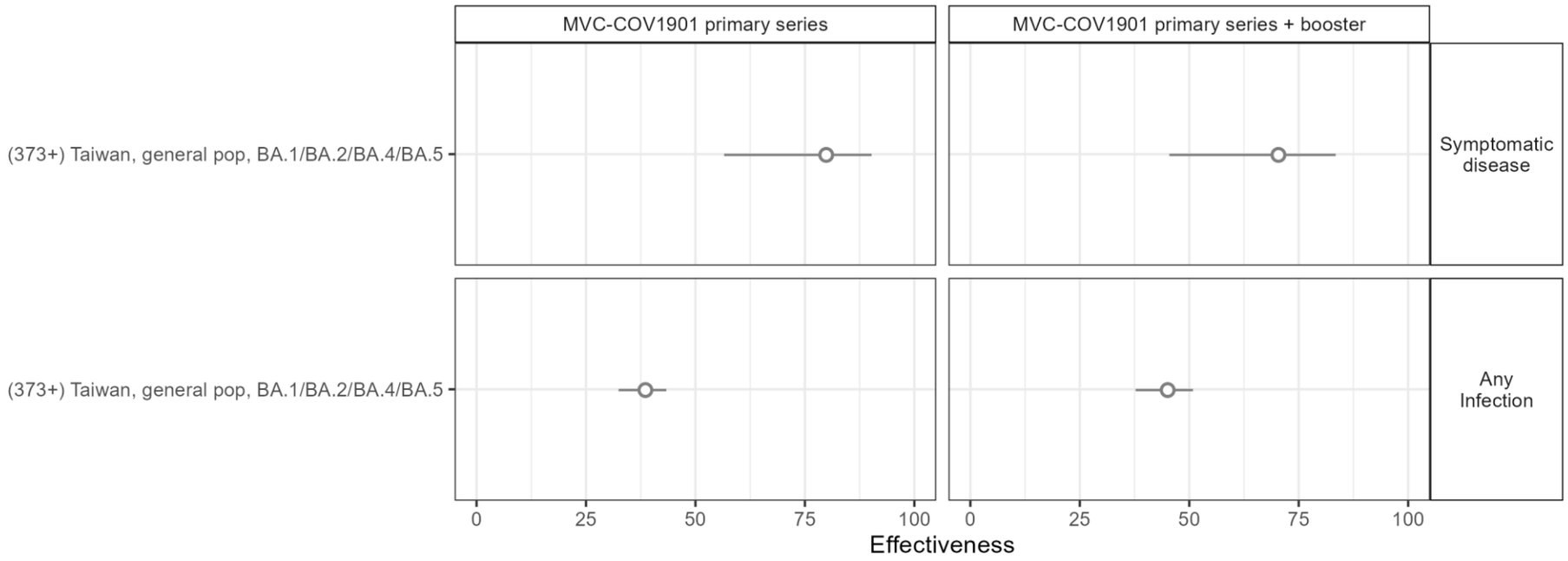
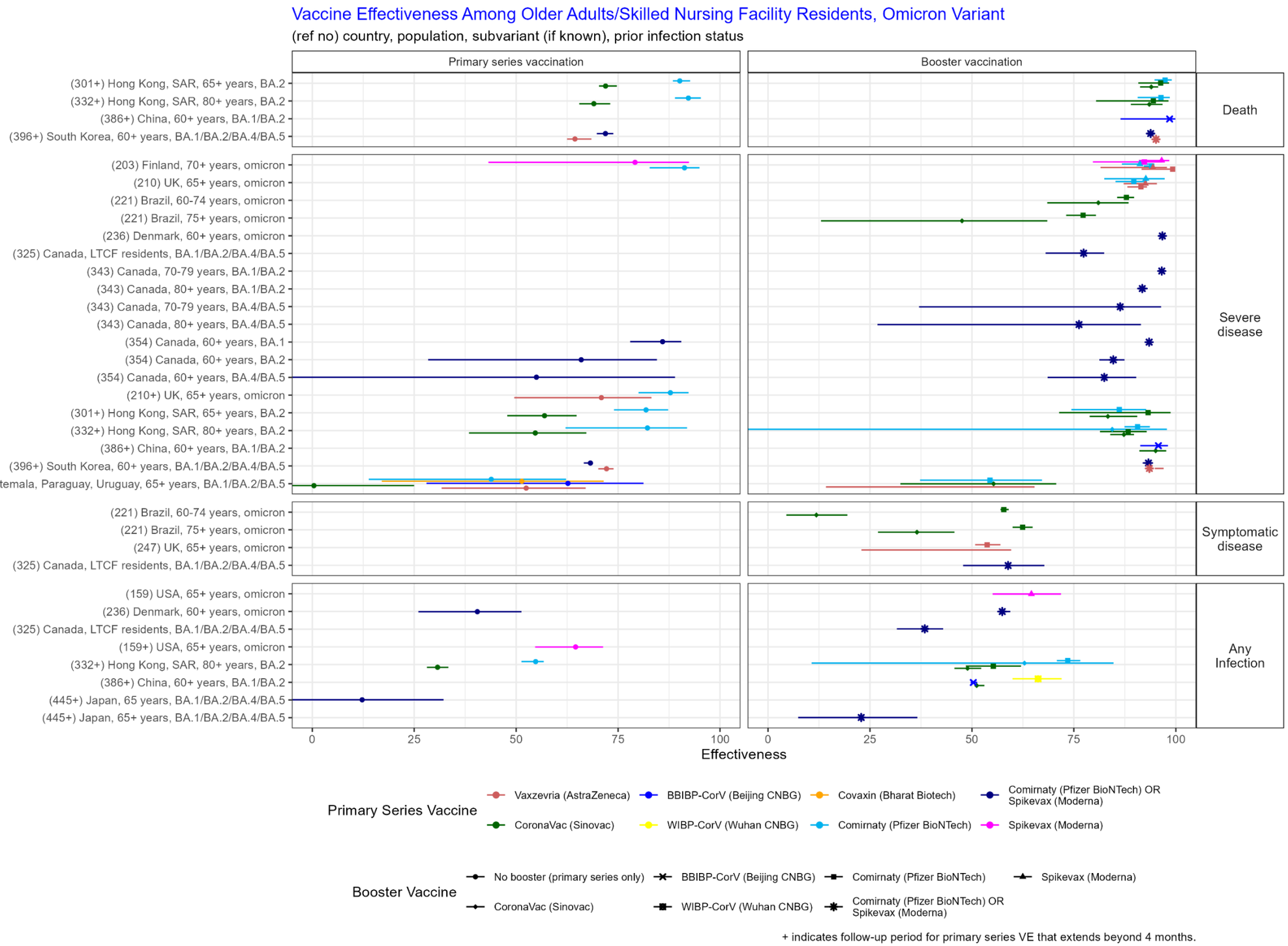
MVC-COV1901 (Medigen) Primary Series + Booster Dose Vaccine Effectiveness, Omicron Variant

(ref no) country, population, subvariant (if known)

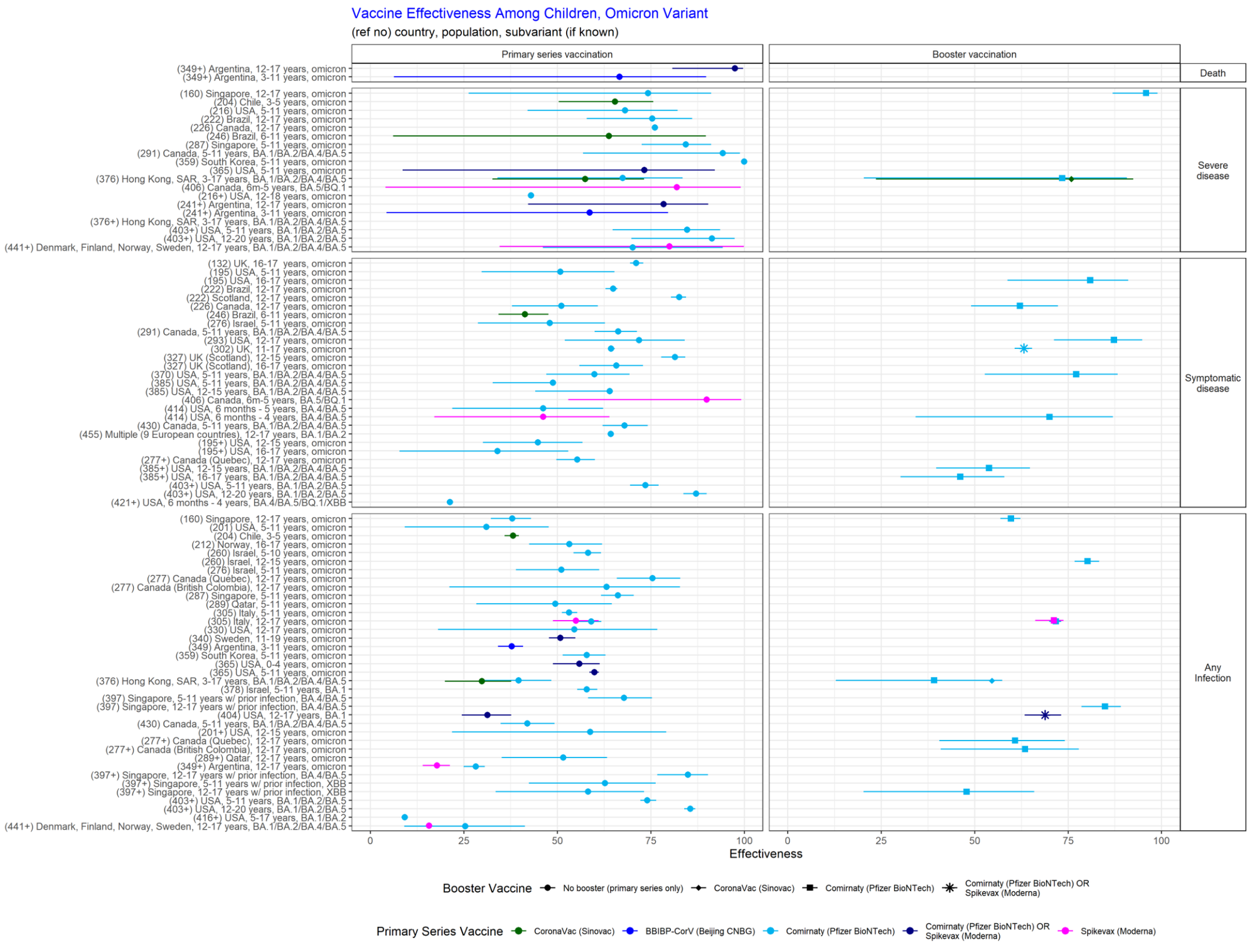


+ Indicates estimates that that include a follow-up time extending beyond 4 months post final dose.

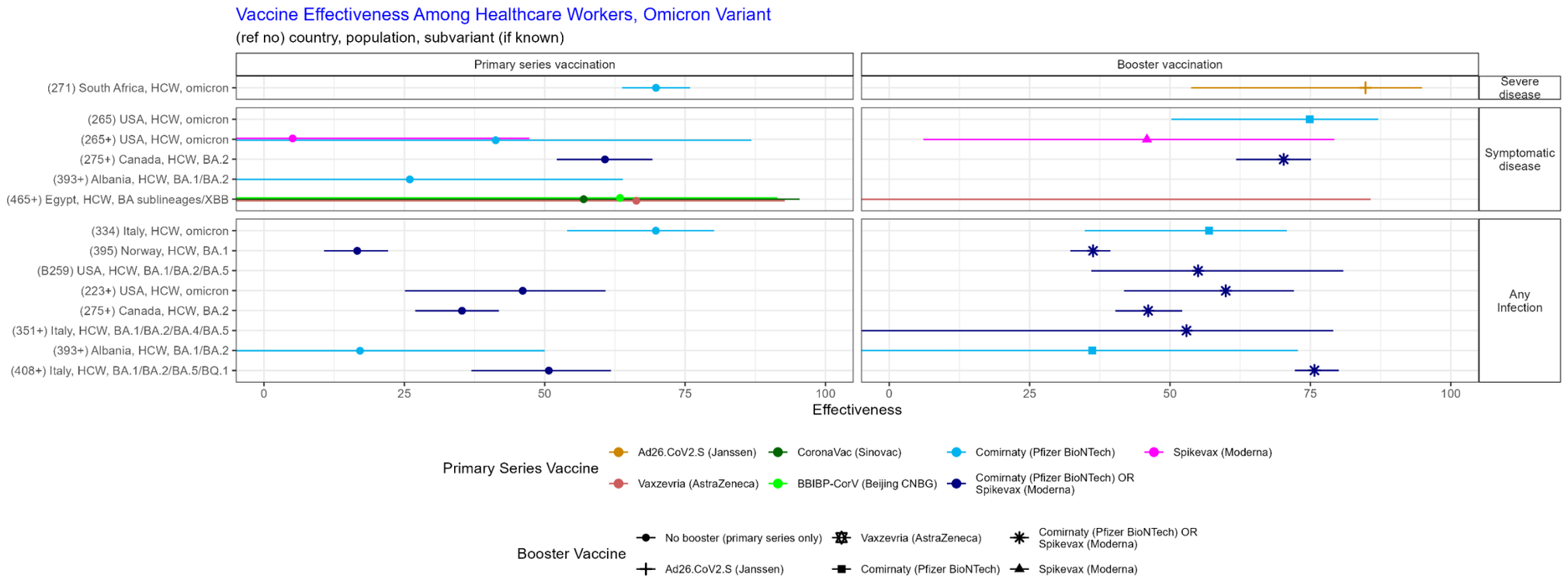
By Study Population of Special Interest

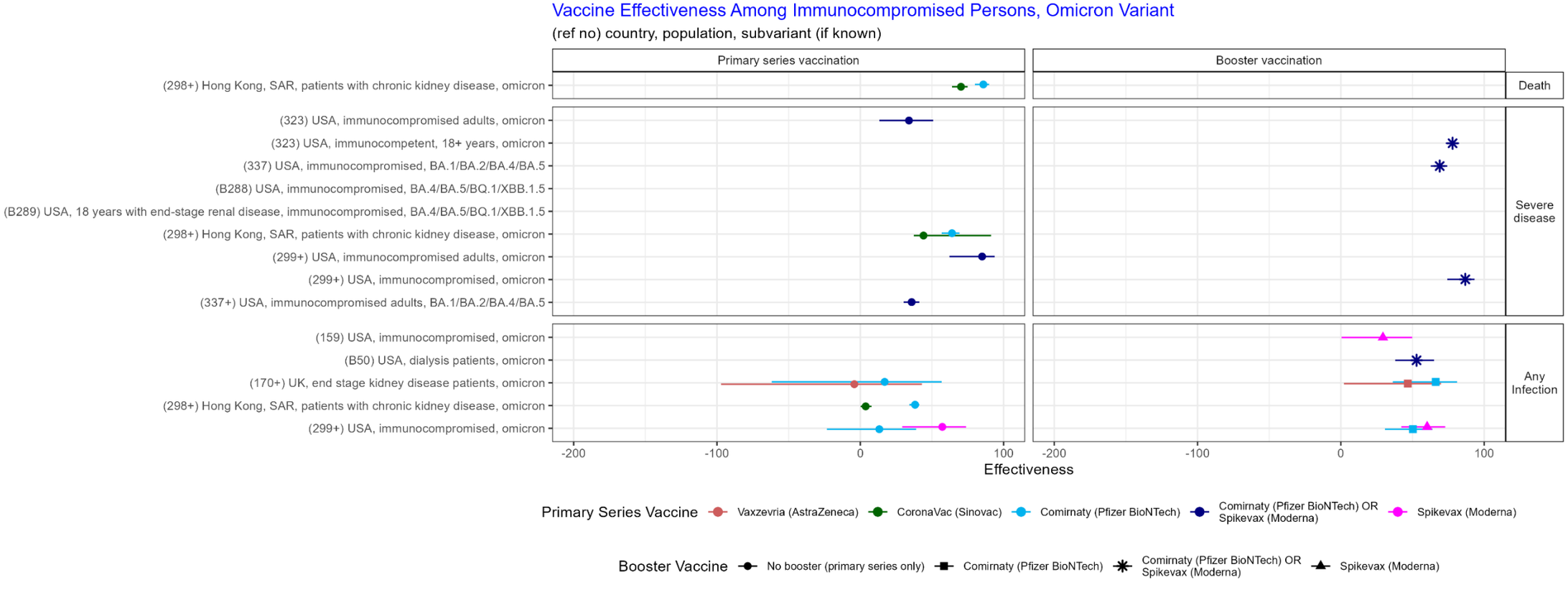


+ Indicates estimates that that include a follow-up time extending beyond 4 months post final dose.



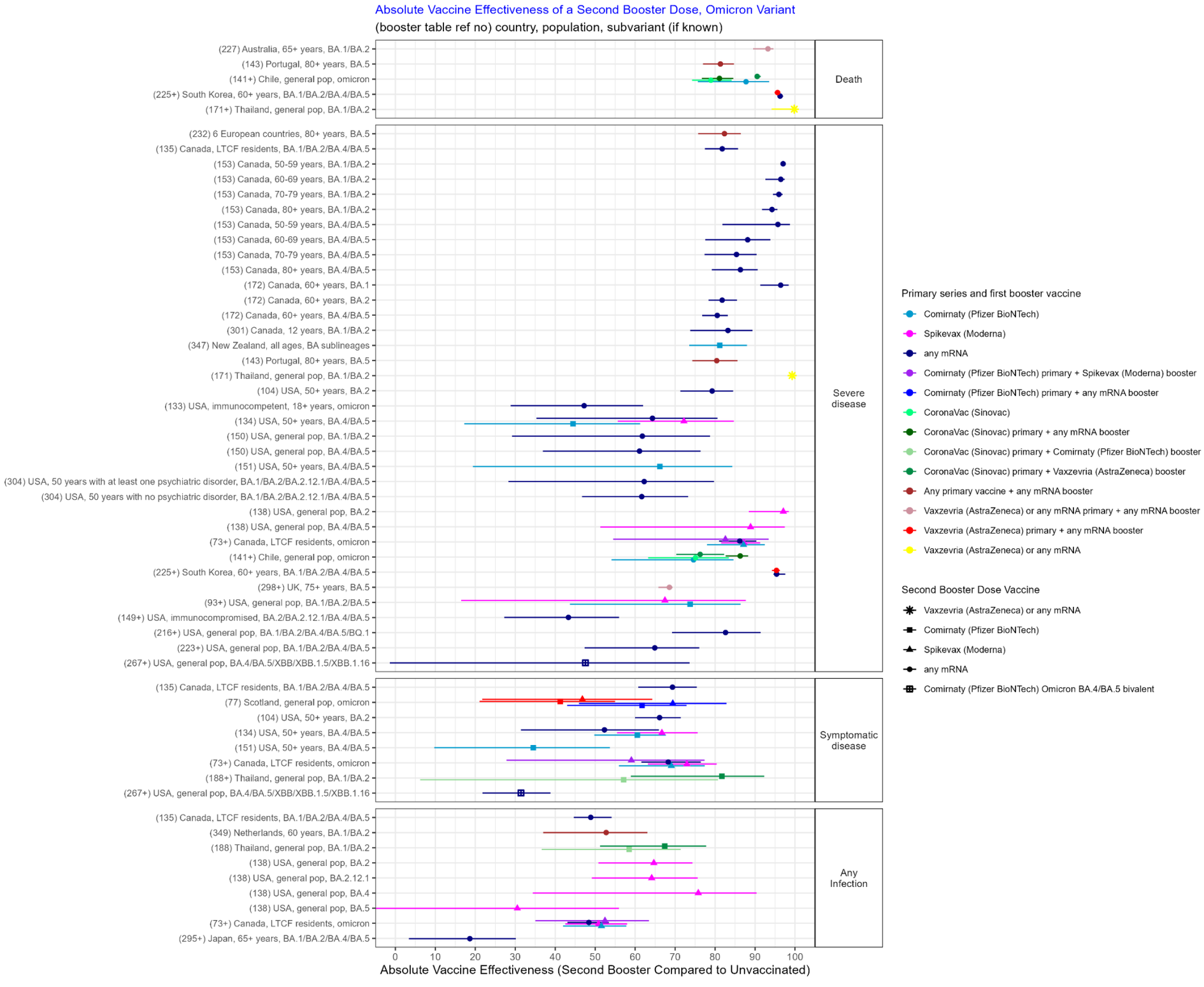
+ Indicates estimates that that include a follow-up time extending beyond 4 months post final dose.





+ Indicates estimates that that include a follow-up time extending beyond 4 months post final dose.

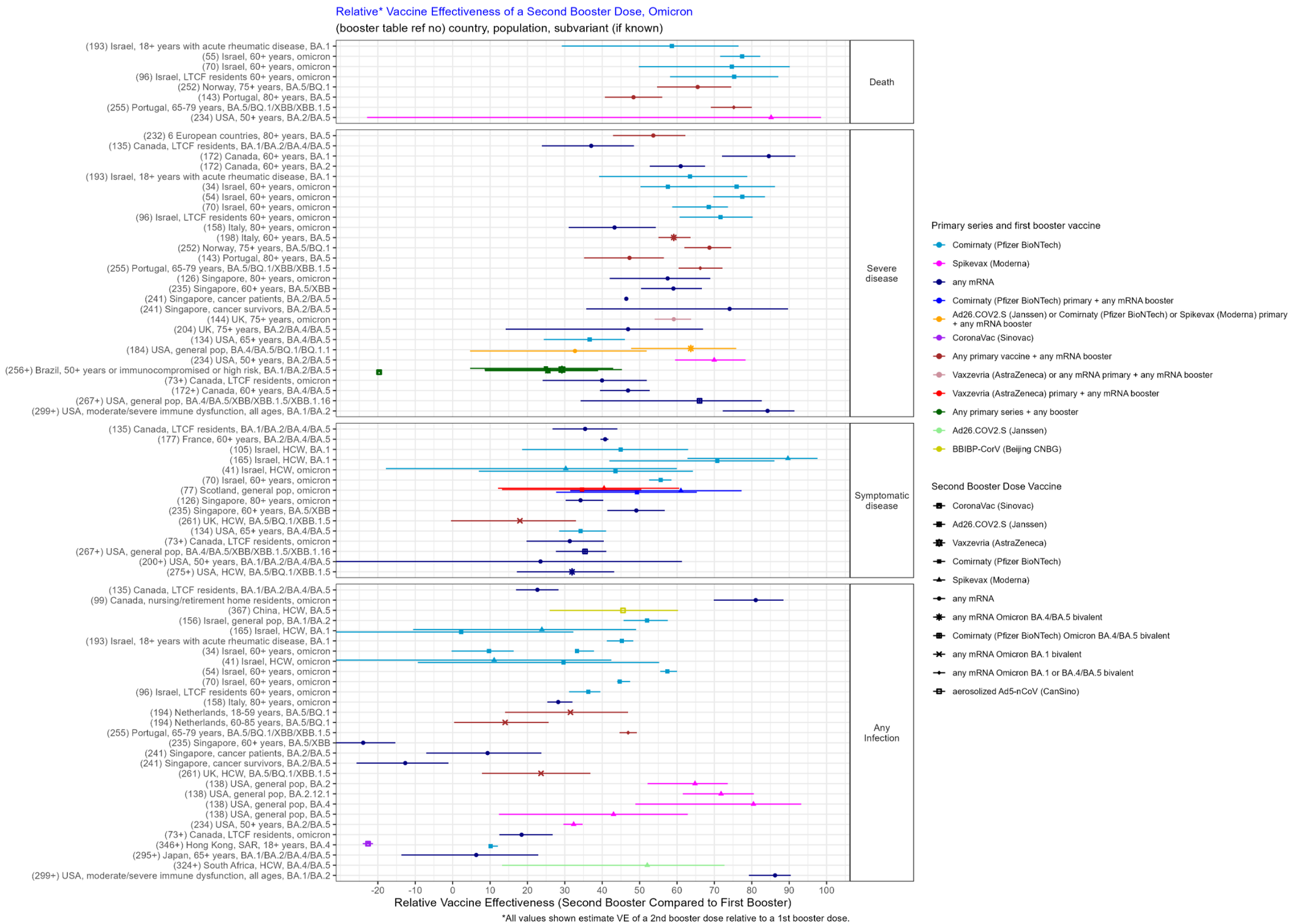
SECOND BOOSTER DOSE ABSOLUTE VACCINE EFFECTIVENESS AGAINST OMICRON



+ Indicates estimates that that include a follow-up time extending beyond 4 months post final dose.

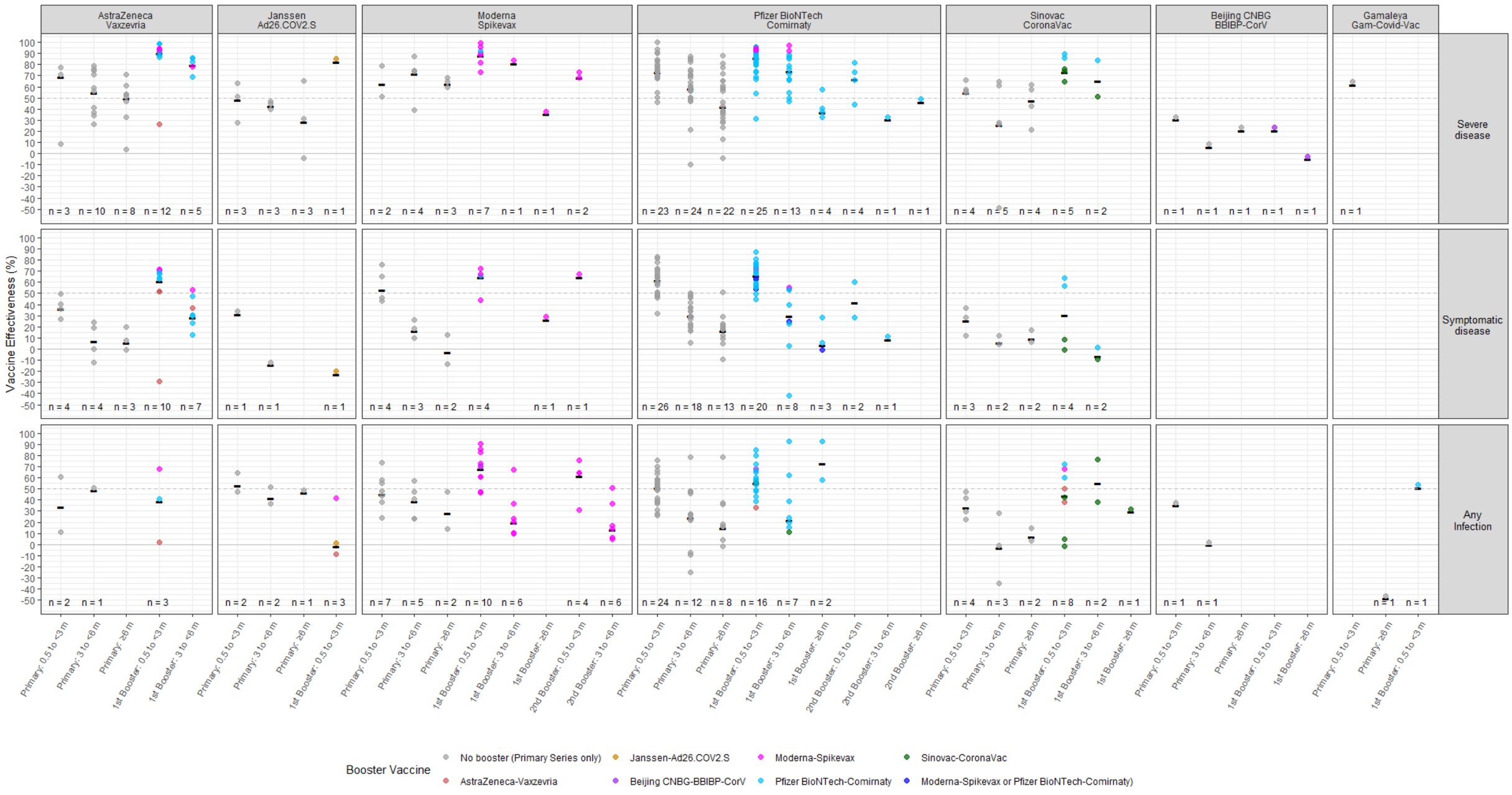
SECOND BOOSTER DOSE RELATIVE VACCINE EFFECTIVENESS AGAINST OMICRON

*(Note: For more information on interpreting relative VE, see the special focus on relative vaccine effectiveness from the **WHO June 29th Weekly Epidemiologic Update.)***



*All values shown estimate VE of a 2nd booster dose relative to a 1st booster dose.

DURATION OF VACCINE EFFECTIVENESS AGAINST OMICRON: PRIMARY SERIES, FIRST BOOSTER DOSE, AND SECOND BOOSTER DOSE (WHERE DATA AVAILABLE)



Dots represent point estimates of VE from each study; dark black horizontal lines represent median VE across all studies in stratum. Vertical panels represent VE for full primary series (grey dots) and VE for homologous or heterologous booster vaccination (other colored dots) following completion of primary series vaccination with vaccine of primary series noted in panel header. Not shown in plot: VE against severe disease at 0.5-<3 month post primary series of Beijing CNBG-BBIBP-CorV (59%). Additional details on the methods for inclusion of the estimates in the plots provided below.

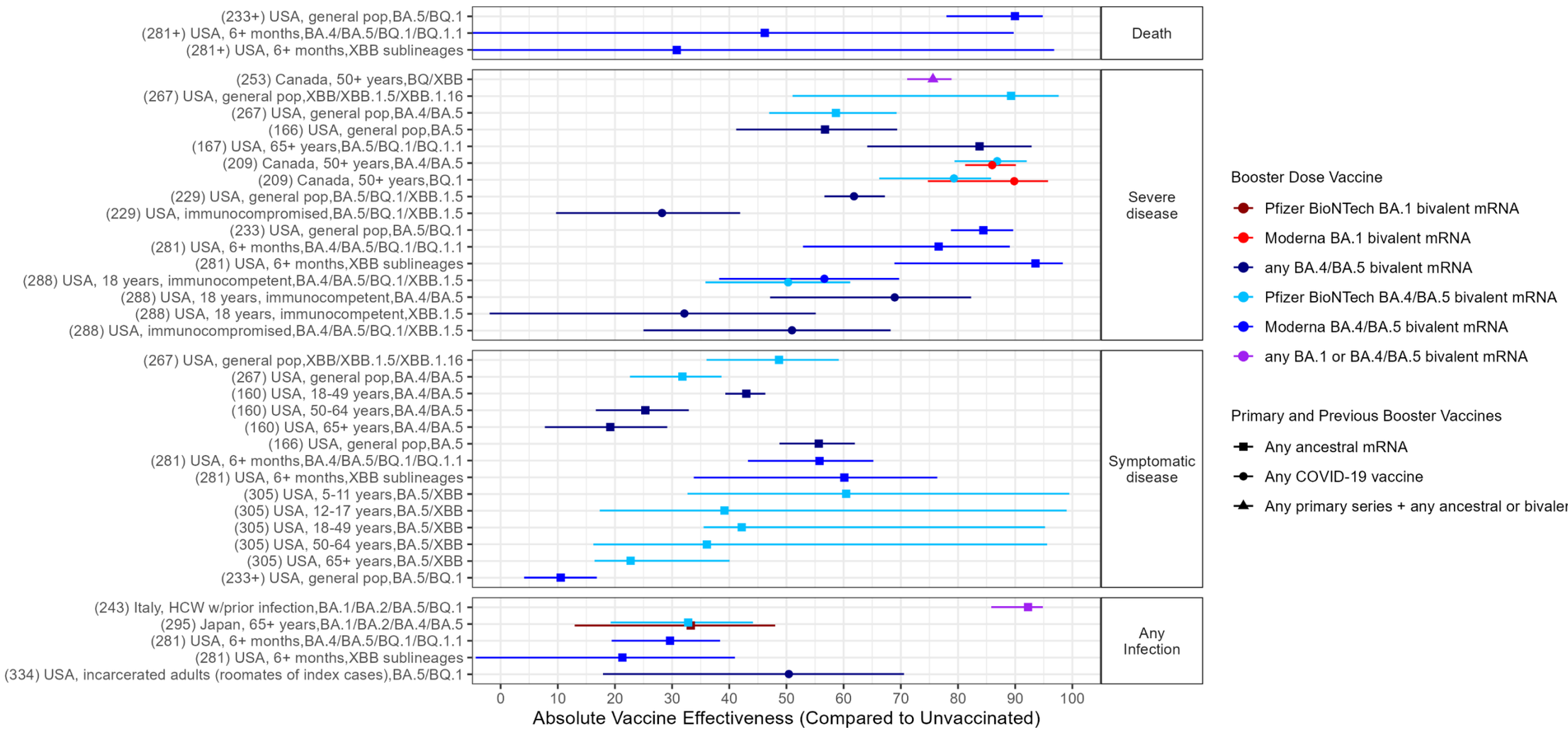
Methods for Duration of Vaccine Effectiveness Figure

- VE studies included in the plot were identified from an ongoing systematic review of COVID-19 vaccine effectiveness studies. All studies were cohort or test-negative designs conducted when Omicron was the predominant circulating variant. Methods for the systematic review and inclusion/exclusion criteria are available on view-hub.org.
- Only studies providing VE estimates of individual vaccines are included in the plot; studies assessing combined VE of more than one vaccine are excluded except for studies of heterologous primary and booster schedules where all participants included in a VE estimate received the same brands of vaccines in the same order.
- Only studies providing VE estimates for discrete time intervals since vaccination or estimates with limited follow-up time (such that the median time point falls clearly in one of the intervals for the plot) are included. Studies that only provide VE estimates over a cumulative period of time covering more than one time interval are excluded because they are difficult to interpret due to the marked waning of VE over time with Omicron.
- Only estimates of absolute vaccine effectiveness (i.e., the comparison group is unvaccinated persons) are included in the plot; estimates of relative vaccine effectiveness (e.g., the comparison group for booster doses is persons having completed the primary series) are excluded as the interpretation of relative vaccine effectiveness is not comparable to absolute vaccine effectiveness.

BIVALENT VACCINE ABSOLUTE VACCINE EFFECTIVENESS AGAINST OMICRON

Absolute Vaccine Effectiveness of Bivalent mRNA Vaccines Received as Most Recent Dose

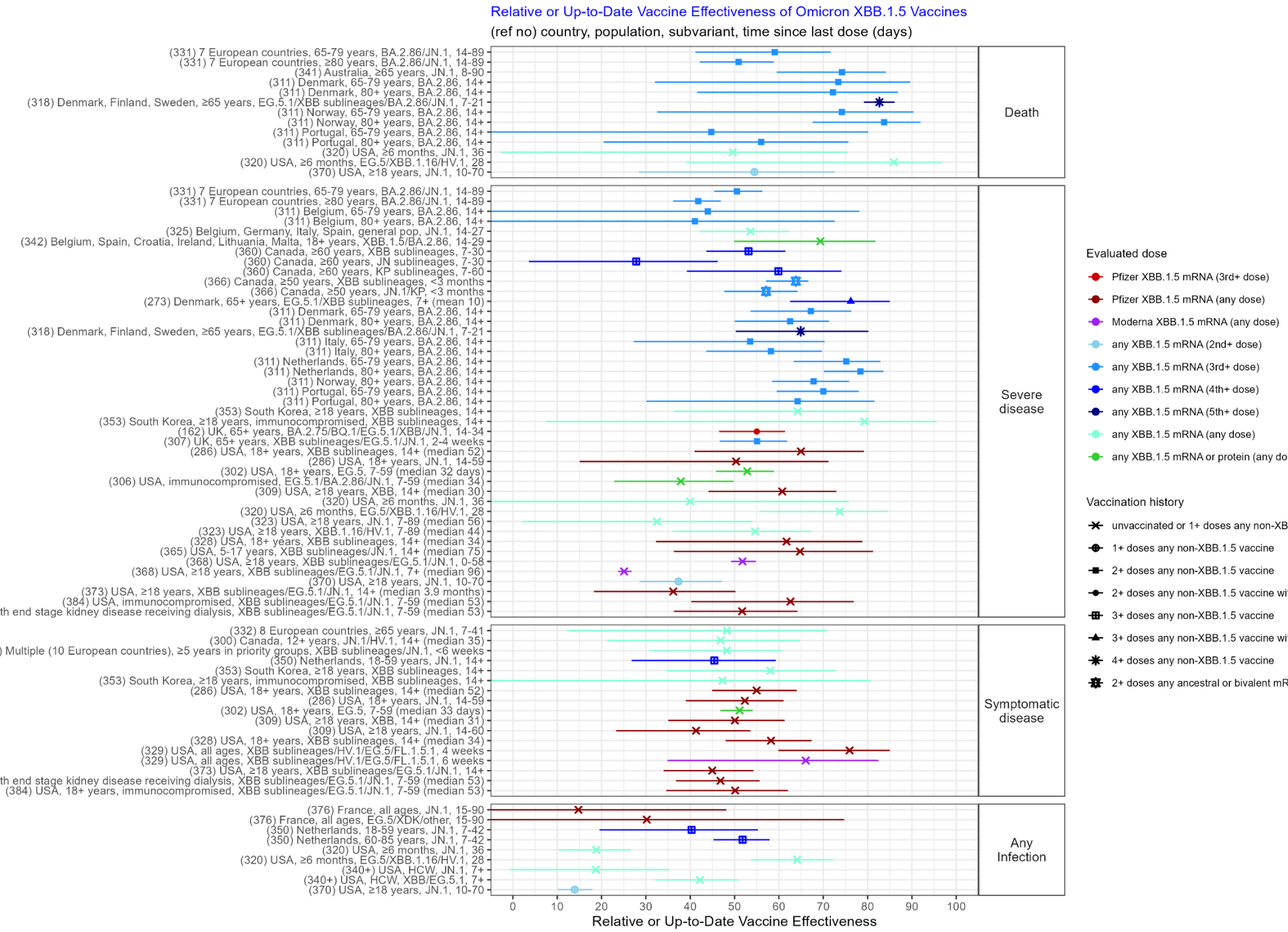
(booster table ref no) country, population, subvariant (if known)



+ Indicates estimates that that include a follow-up time extending beyond 4 months post final dose.

MONOVALENT XBB.1.5 RELATIVE OR UP-TO-DATE VACCINE EFFECTIVENESS AGAINST OMICRON

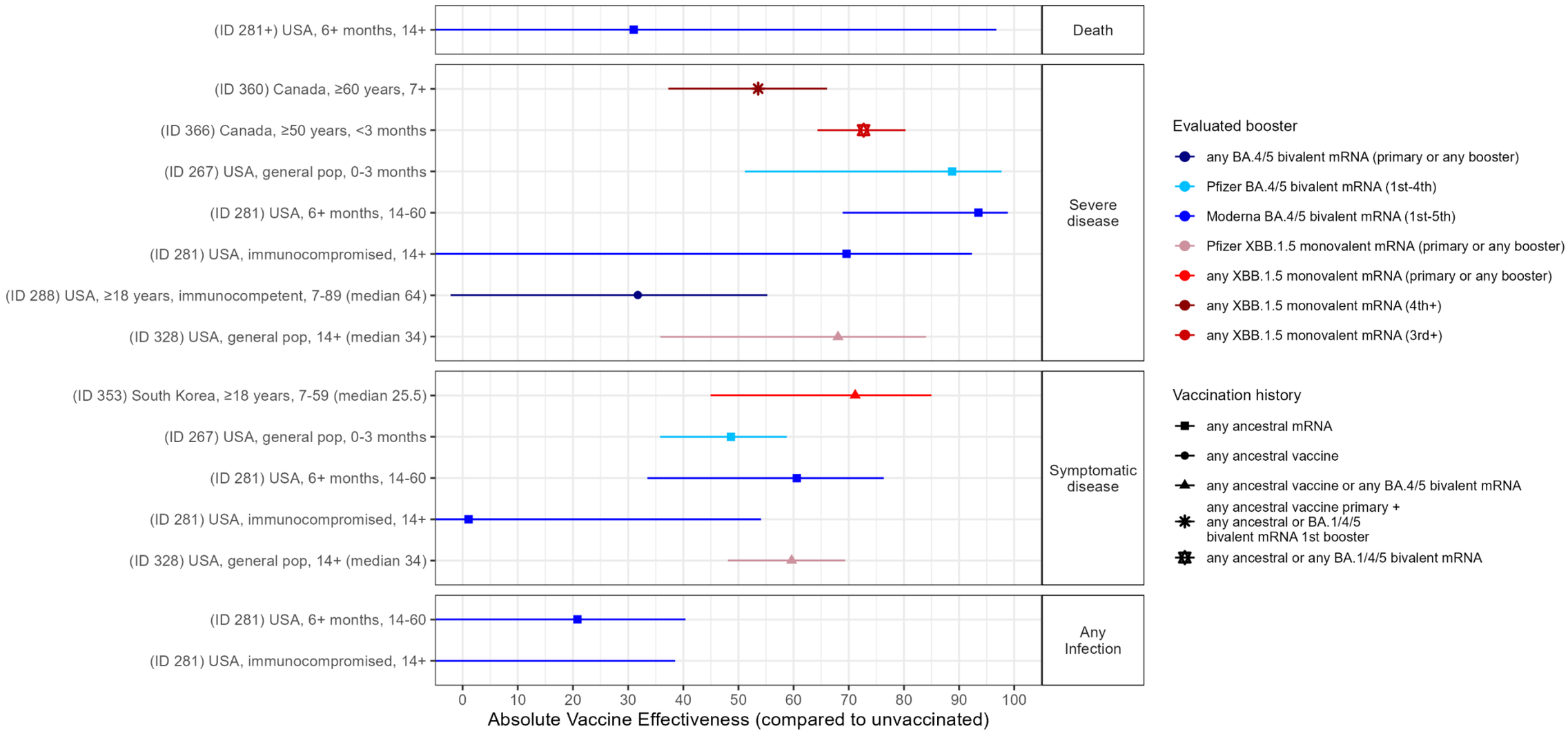
(Note: For more information on interpreting relative VE, see the special focus on relative vaccine effectiveness from the ***WHO June 29th Weekly Epidemiologic Update***; *"Up-to-Date" refers to XBB.1.5 vaccine being received as any dose, regardless of the number of doses received previously with comparator group including both unvaccinated individuals and individuals previously vaccinated with non-XBB.1.5 vaccines.)*



+ Indicates estimates that that include a follow-up time extending beyond 4 months post final dose.

Absolute Booster Dose Vaccine Effectiveness against Omicron XBB Sublineages

(booster table ref no) country, population, time since last dose (days)

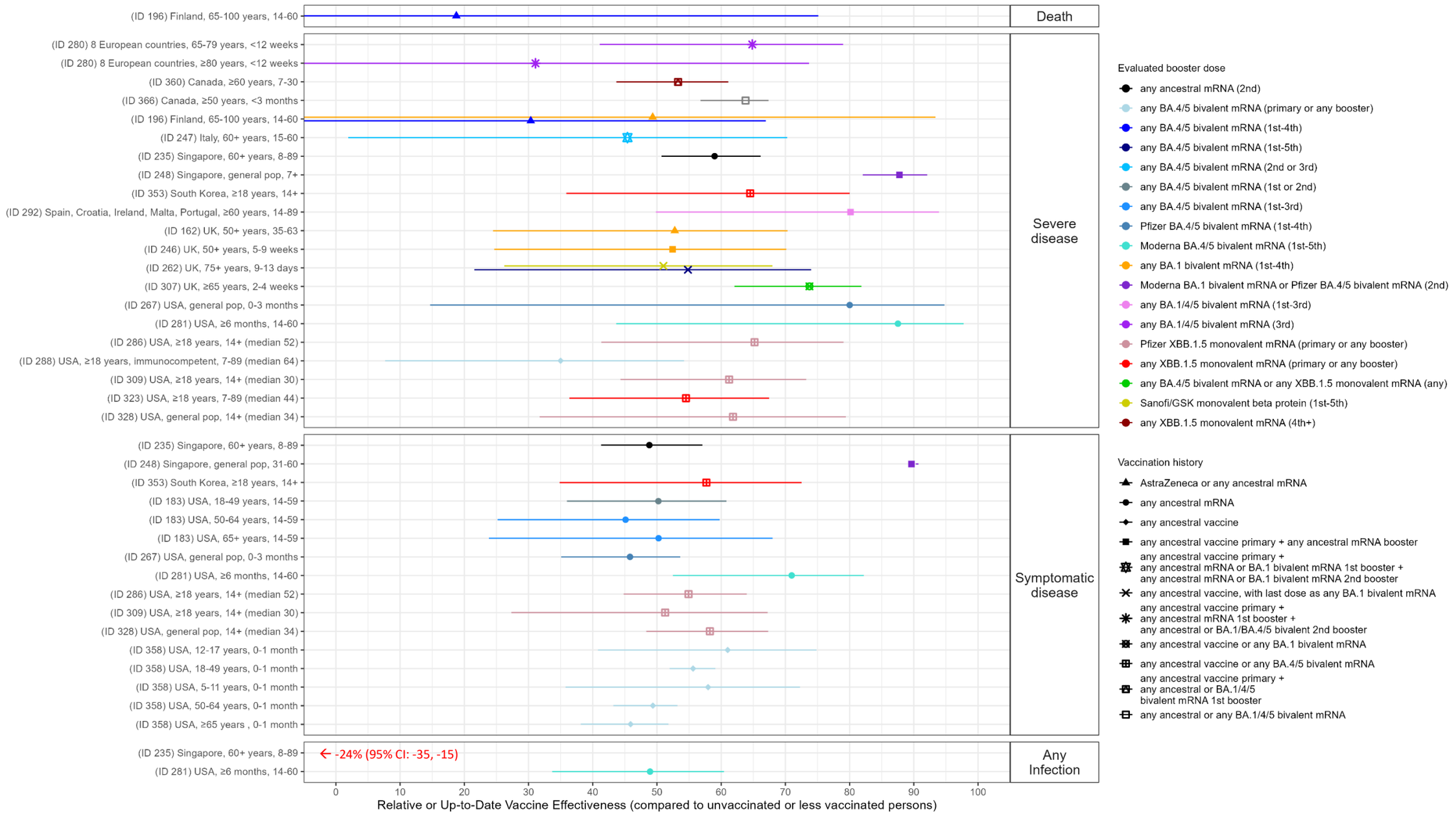


+ Indicates estimates that that include a follow-up time extending beyond 4 months post final dose.

Early (<3 months post vaccination) Relative Booster Dose Vaccine Effectiveness against Omicron XBB Sublineages

*(Note: For more information on interpreting relative VE, see the special focus on relative vaccine effectiveness from the **WHO June 29th Weekly Epidemiologic Update**.)*

(booster table ref no) country, population, time since last dose (days)



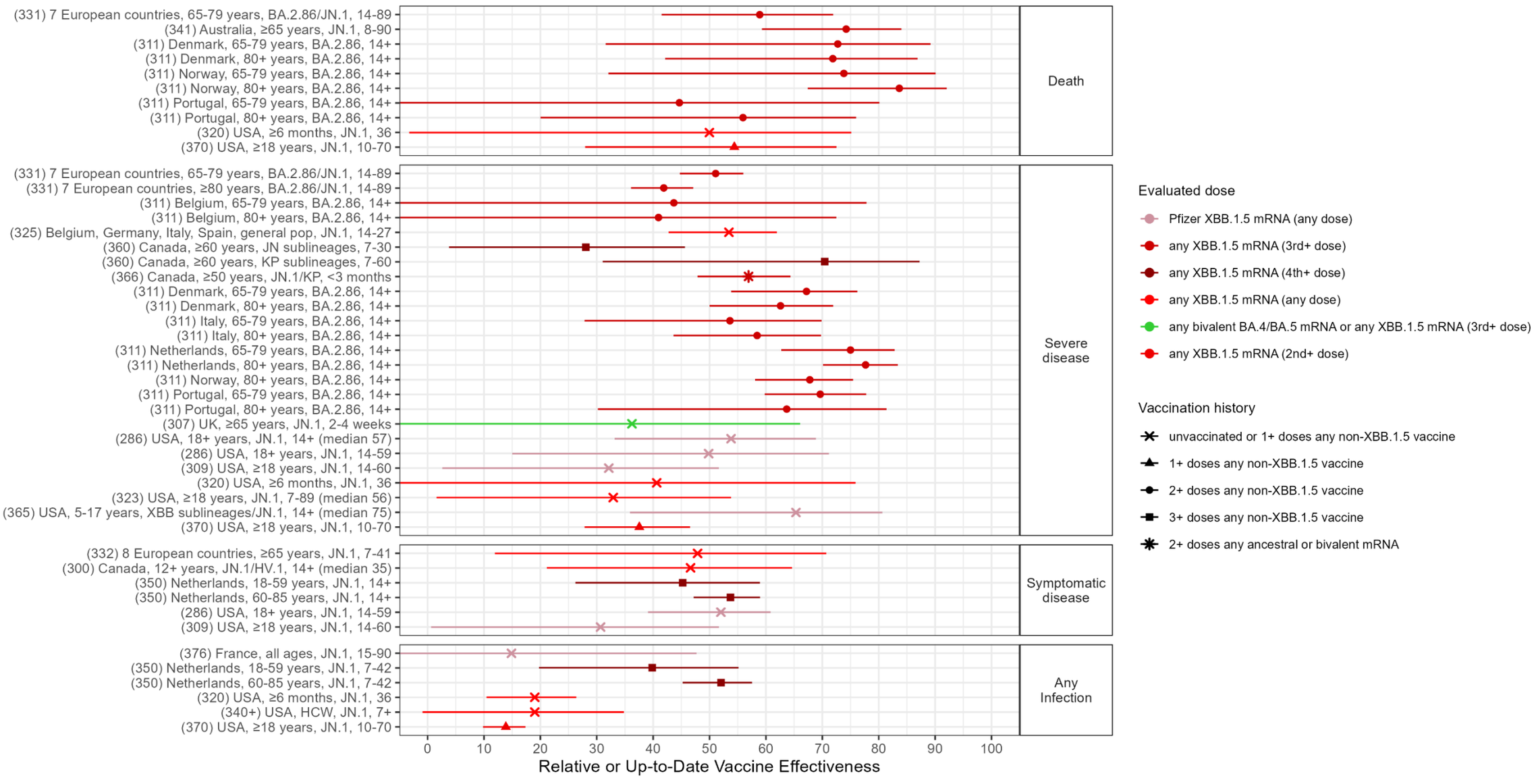
+ Indicates estimates that that include a follow-up time extending beyond 4 months post final dose.

VACCINE EFFECTIVENESS AGAINST OMICRON BA.2.86/JN.1 AND KP SUBVARIANTS

Early (<3 months post vaccination) Relative Booster Dose Vaccine Effectiveness against Omicron BA.2.86/JN.1 and KP Sublineages

*(Note: For more information on interpreting relative VE, see the special focus on relative vaccine effectiveness from the **WHO June 29th Weekly Epidemiologic Update**.)*

(booster table ref no) country, population, subvariant, time since last dose (days)



+ Indicates estimates that that include a follow-up time extending beyond 4 months post final dose.

MONOVALENT JN.1/KP.2 UP-TO-DATE VACCINE EFFECTIVENESS AGAINST OMICRON

(Note: For more information on interpreting relative VE, see the special focus on relative vaccine effectiveness from the ***WHO June 29th Weekly Epidemiologic Update***; *"Up-to-Date" refers to XBB.1.5 vaccine being received as any dose, regardless of the number of doses received previously with comparator group including both unvaccinated individuals and individuals previously vaccinated with non-XBB.1.5 vaccines.)*

Early (<3 months post vaccination) Up-to-Date Booster Dose Vaccine Effectiveness of JN.1 and KP.2 Vaccines

(booster table ref no) country, population, subvariant, time since last dose (days)