Flu Scenario Modeling Hub Report

29 September, 2022
Scenario Modeling Hub Team[1]

Executive Summary

This report presents the results of the first round from the Flu Scenario Modeling Hub. A consortium of ten modeling groups convened to generate long-term scenario projections of hospitalizations and deaths that cover the period of 10 months from Aug 14, 2022 to June 3, 2023, across four scenarios. In this first round of influenza projections, we assessed the impact of reduced prior population immunity coming into the 2022-2023 influenza season as a result of decreased influenza circulation during the COVID-19 pandemic. We also assess the impact of low versus high vaccine-induced immunity (vaccine effectiveness combined with vaccination coverage). A full list of contributors is included at the end of the report. See the table on the next page for an overview of the scenarios included in this round. Detailed scenario descriptions and setting assumptions are provided here.

Key Takeaways from the First Round

- There is large variability in the projected burden of the 2022-23 epidemic depending on vaccine and prior immunity assumptions; yet the 50% projection intervals of all scenarios support a larger cumulative burden this season compared to the 2021-22 winter and the lowest previous pre-pandemic season (2015-2016 season).
- In the worst case scenario D, weekly hospitalizations are projected to peak at or above the highest pre-COVID-19 season (2017-2018), with an ensemble median of 35,800 nationally (50% PI, 17,300-53,400). In the best case scenario A, this is significantly reduced to 7,500 (50% PI, 4,900-17,800), which is still 2.1-fold higher than in the 2021-22 season.
- With a large immunity gap due to COVID-19 (pessimistic immunity scenarios), hospitalizations are projected to be 27%-89% higher than with a typical level of immunity in the pre-COVID-19 period (optimistic immunity scenarios; range of ensemble medians across vaccine assumptions).
- Increased vaccine effectiveness and coverage is expected to substantially decrease peak and cumulative hospitalizations regardless of existing population immunity, reducing hospitalizations by 45% in low prior immunity scenarios (representing around 165,000 hospitalizations averted) and 67% in high prior immunity scenarios (representing around 187,000 hospitalizations averted). Cumulative deaths would be reduced by around 67% and 76%, or 32,000 and 17,000 deaths averted, respectively.
- In scenario D, where immunity from prior seasons and 2022-23 vaccination is at its lowest, ensemble hospitalizations are projected to peak in the week of December 17 (50% PI, November 26-January 7). In scenario A, where immunity is the highest of all scenarios considered, the ensemble peaks in the week of January 14 (50% PI, December 3-January 28).
- A few caveats are worth noting:
  - There is substantial uncertainty in this first round of influenza projections due to lack of complete historical surveillance data from prior seasons. Further, the transmissibility of influenza strain(s)

[1] Compiled by Sara Loo, Shaun Truelove, Cecile Viboud, Lucie Contamin, Emily Howerton.

circulating in the 2022-23 season in the US is still unknown. As the season starts this uncertainty should reduce.

- There is also uncertainty in the amount of influenza reporting in the coming months as testing practices for respiratory viruses have changed during the COVID-19 pandemic.
- The trajectories of individual models are asynchronous, likely due to differences in seasonality assumptions, among others. This flattens the ensemble median and 50% PI for incident hospitalizations and deaths. Ensemble estimates of the peak size and cumulative burden are less affected by differences in the timing of individual models and are considered a more reliable indicator of the potential impact of the 2022-23 season than the trajectory ensembles.
- Scenarios did not consider immunological interactions with SARS-CoV-2 or reactive behavior changes and interventions in response to a new SARS-CoV-2 variant that may arise in the 2022-23 respiratory virus season, either of which could affect the transmission and disease burden of influenza.
- These hospitalization projections represent the expected number of influenza hospitalizations reported to the HHS system. These are not meant to reflect the final CDC estimates from the pyramid approach, which takes into account underreporting and various delays.
- The most pessimistic assumed vaccine effectiveness in these scenarios was VE=30% against hospitalization. It should be noted that recent seasons have had substantially lower estimated seasonal VE (e.g., 2014-15 with VE=19% overall), thus a substantial mis-match of the vaccine to circulating influenza strains could drive higher transmission than these scenarios.
- These projections were made with a data cutoff of August 14, 2022; no data after that day was to be used to calibrate or otherwise inform the model.

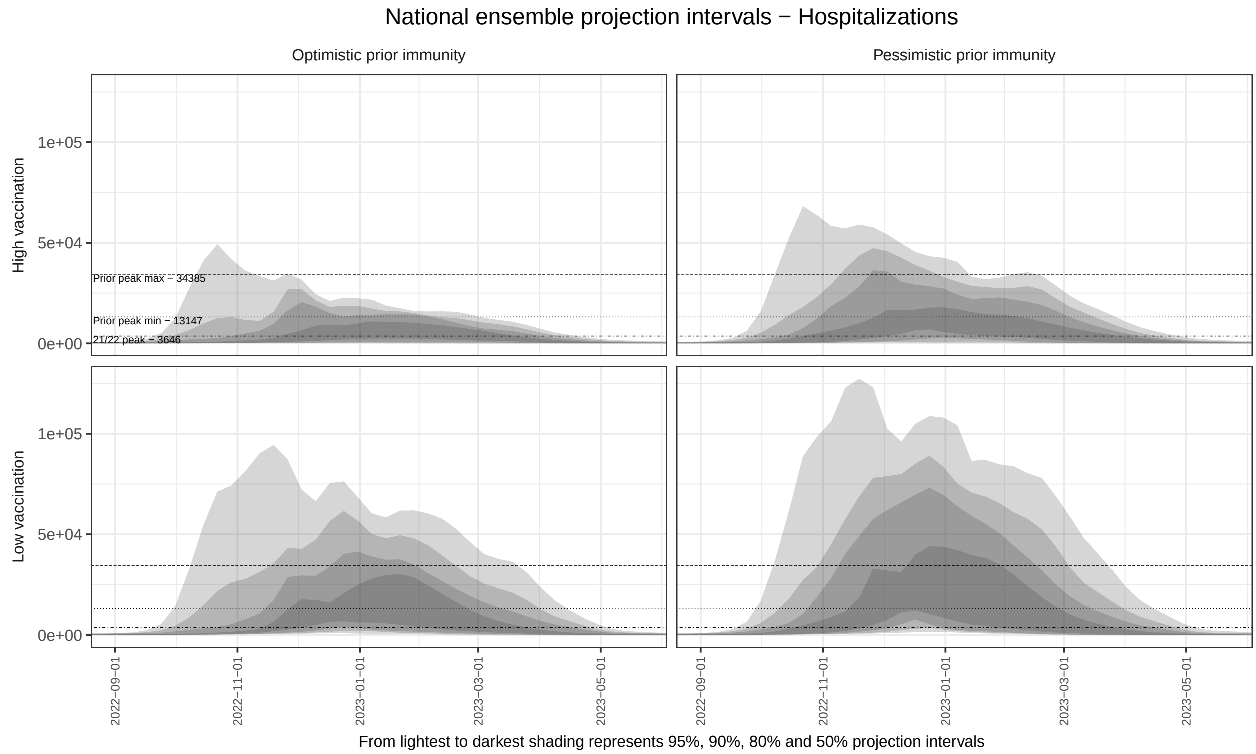
A note on empirical data

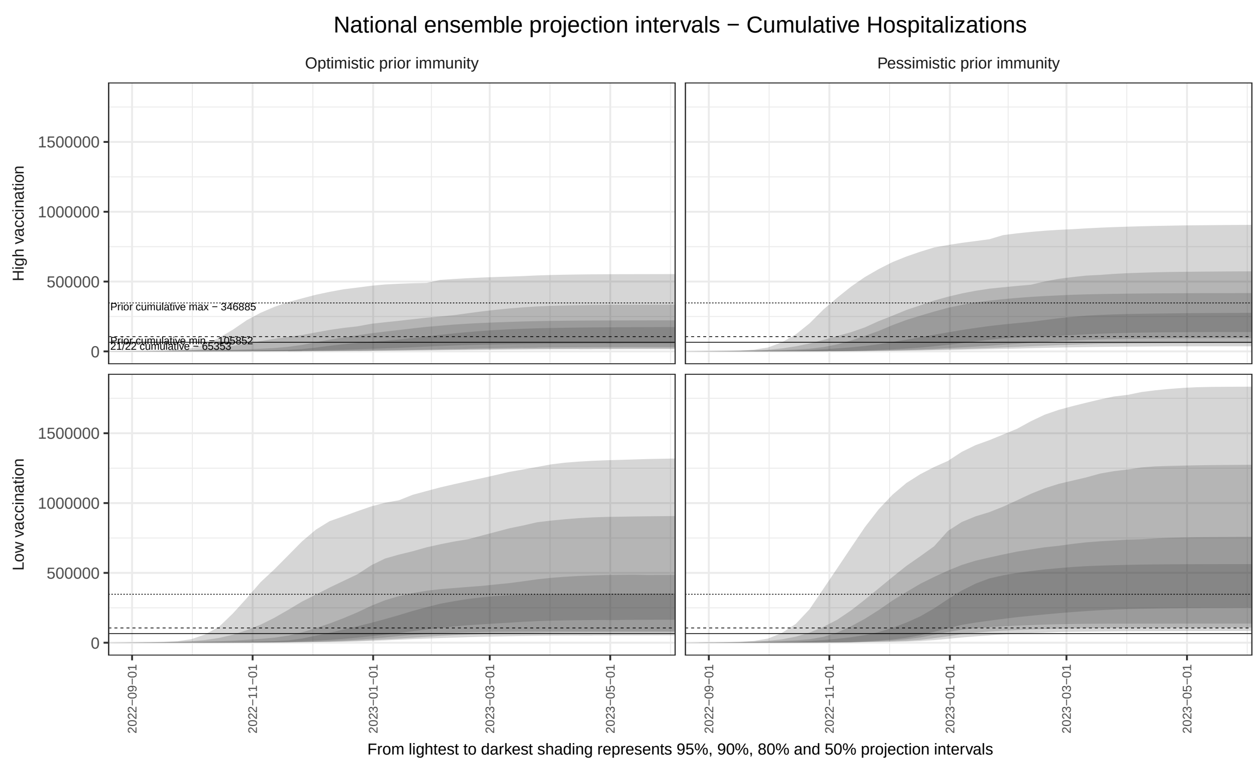
To compare projections to previous flu seasons, we present values for prior peak incident and cumulative hospitalizations. These values are in reference to all pre-COVID seasons from 2012-13 to 2019-20. The minimum and maximum peaks across these seasons are taken from FluSurv-NET (which is used as a proxy for hospitalizations). Nationally, the highest value is from the 2017-18 season, and the lowest from 2015-16. The 2021-22 flu season based on HHS data is also included to mark a small season.

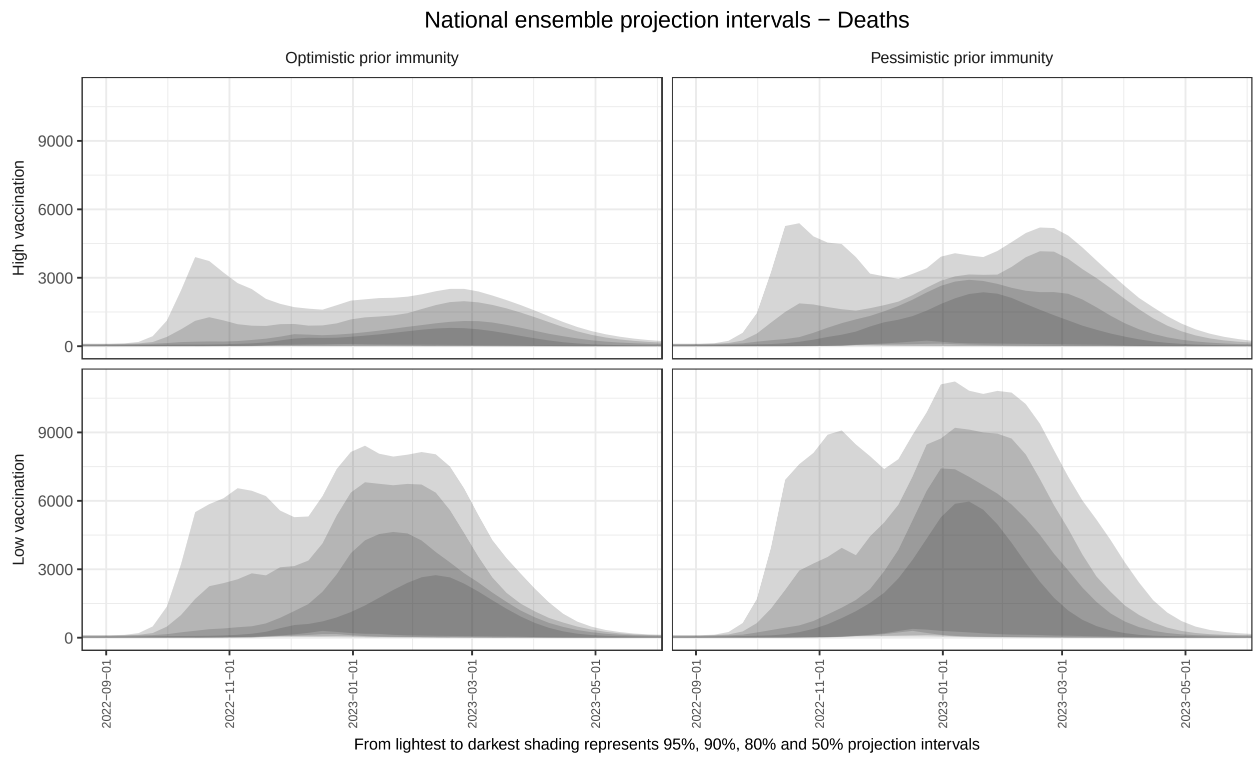
Round 1 Scenario Specifications

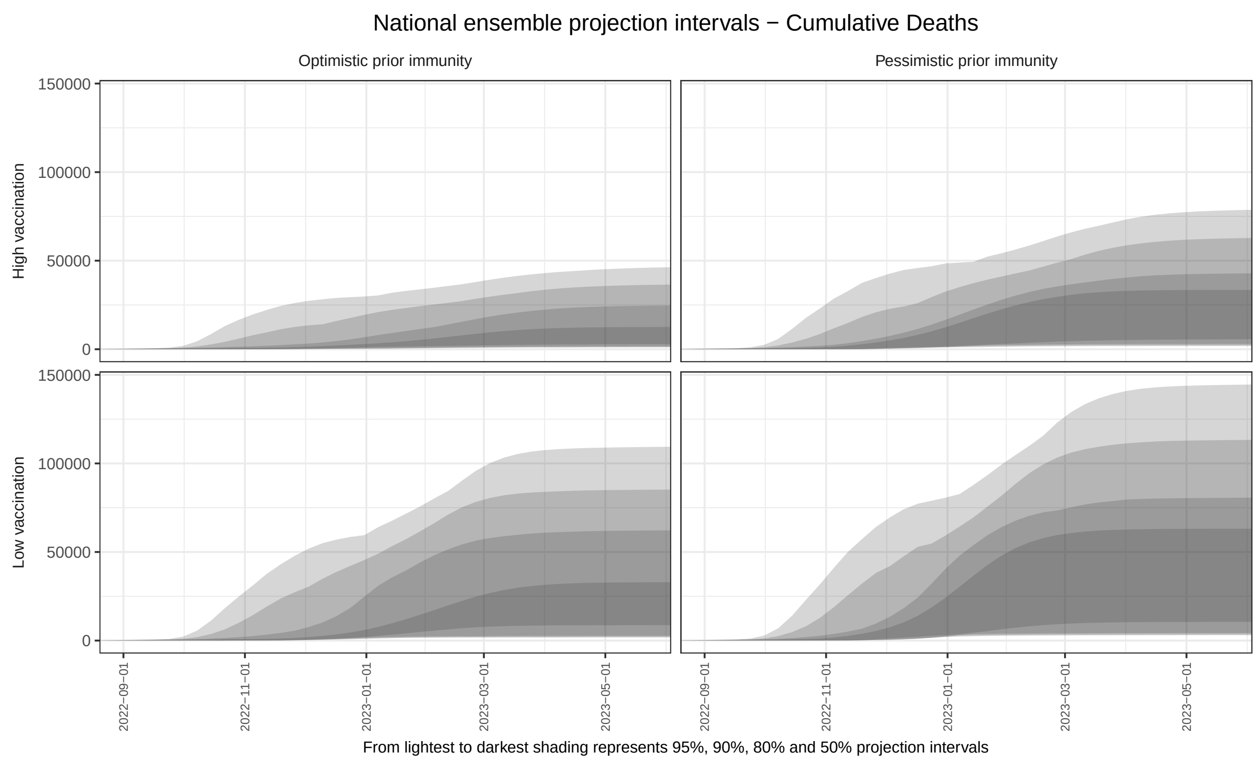
	Optimistic flu prior immunity No impact of missed flu seasons due to the COVID-19 pandemic on prior immunity.* ***Same amount of prior immunity as in a typical, pre-COVID19 pandemic prior season***	**Pessimistic flu prior immunity** Substantial impact of missed flu seasons due to the COVID-19 pandemic and/or new variants on prior immunity.* ***50% lower immunity than a typical, pre-COVID19 pandemic season***
High Vaccination Protection ● Vaccination coverage is ***10% higher than 2020-21*** for each age group [p(vacc) = 60% for adults)] ● VE = 60% against medically attended influenza illnesses and hospitalizations (comparable to 2010-11 season)	**Scenario A**	**Scenario B**
Low Vaccination Protection ● Vaccination coverage is ***10% lower than 2020-21*** for each age group [p(vacc) = 40% for adults)] ● VE = 30% against medically attended influenza illnesses and hospitalizations (comparable to 2018-19 season)	**Scenario C**	**Scenario D**

Ensemble projection intervals





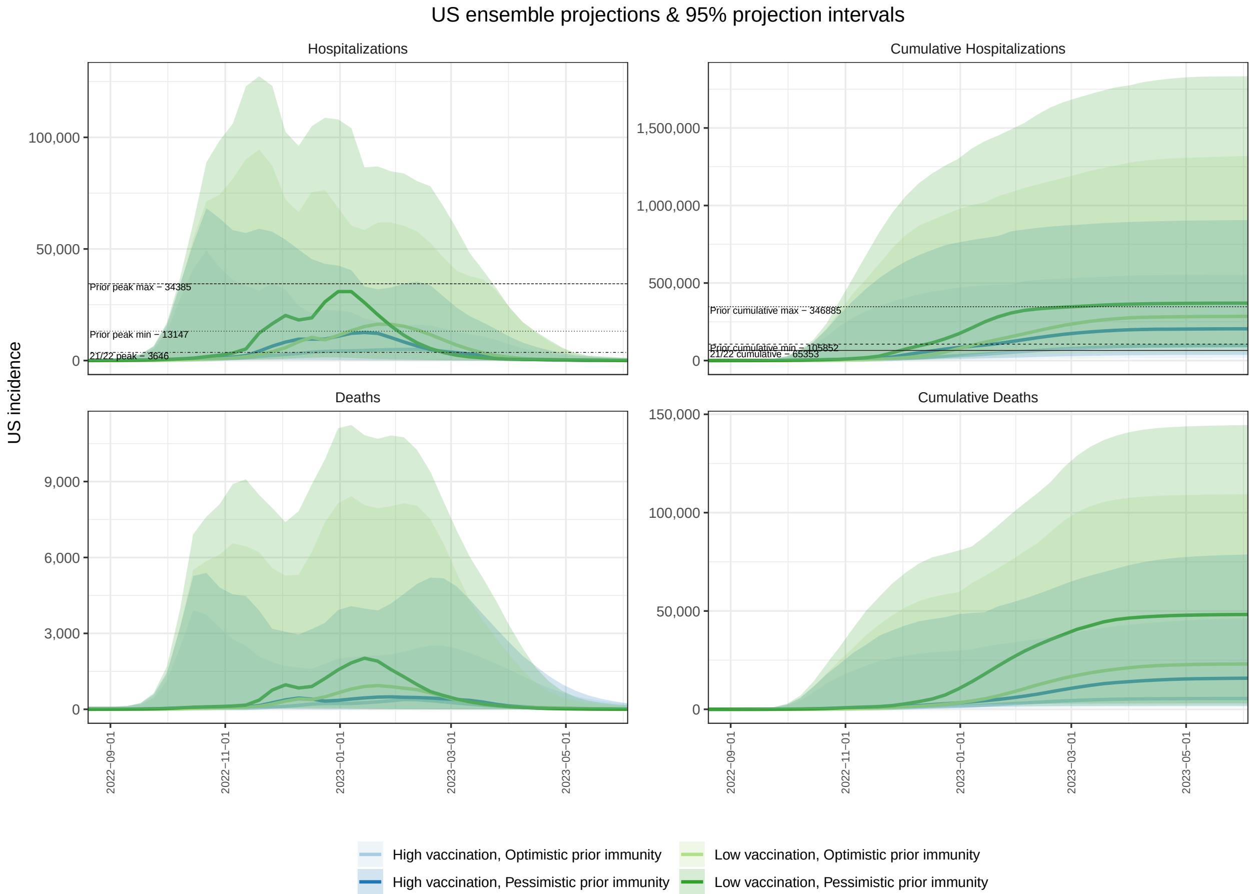




Horizontal lines are given for prior peak incident and cumulative hospitalizations, from seasons from 2012-13 to 2019-20. The minimum and maximum peaks across these seasons are taken from FluSurv-NET (which is used as a proxy for hospitalizations). Nationally, the highest value is from the 2017-18 season, and the lowest from 2015-16. The 2021-22 flu season based on HHS data is also included to mark a small season.

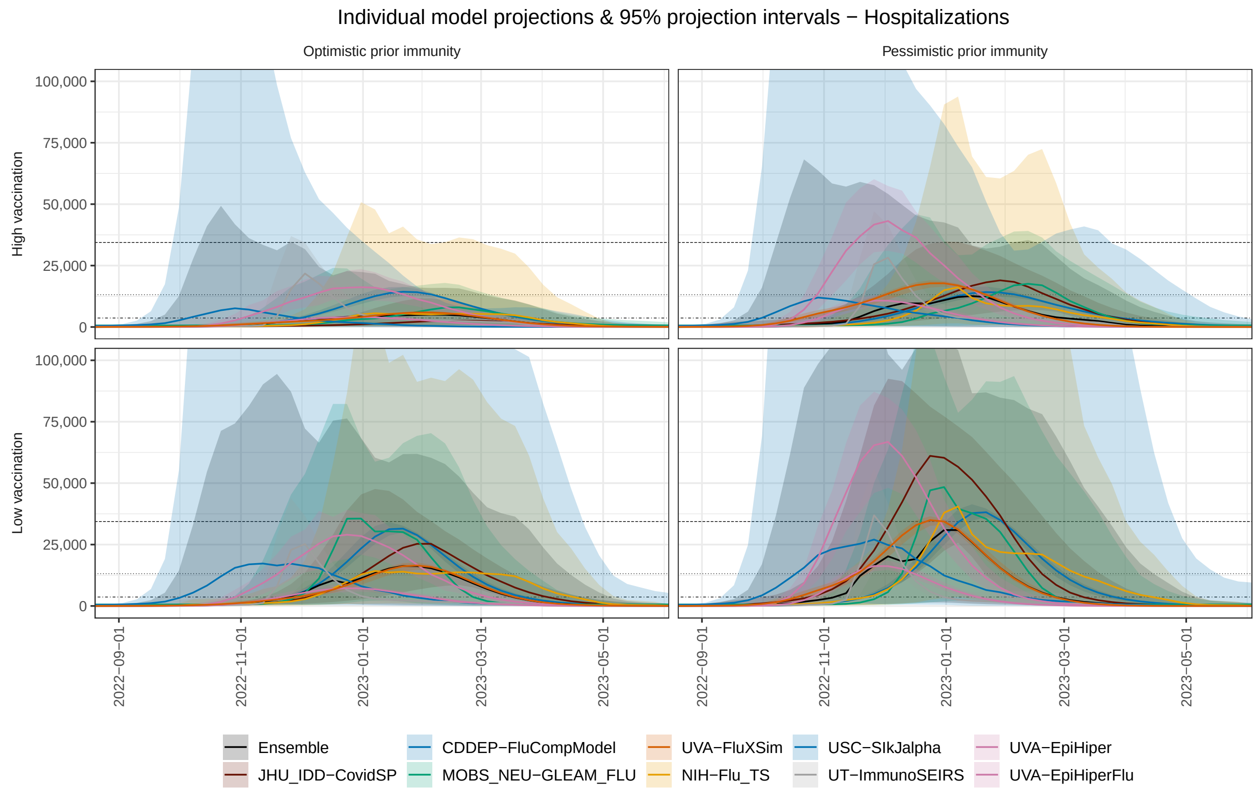
National ensemble projections

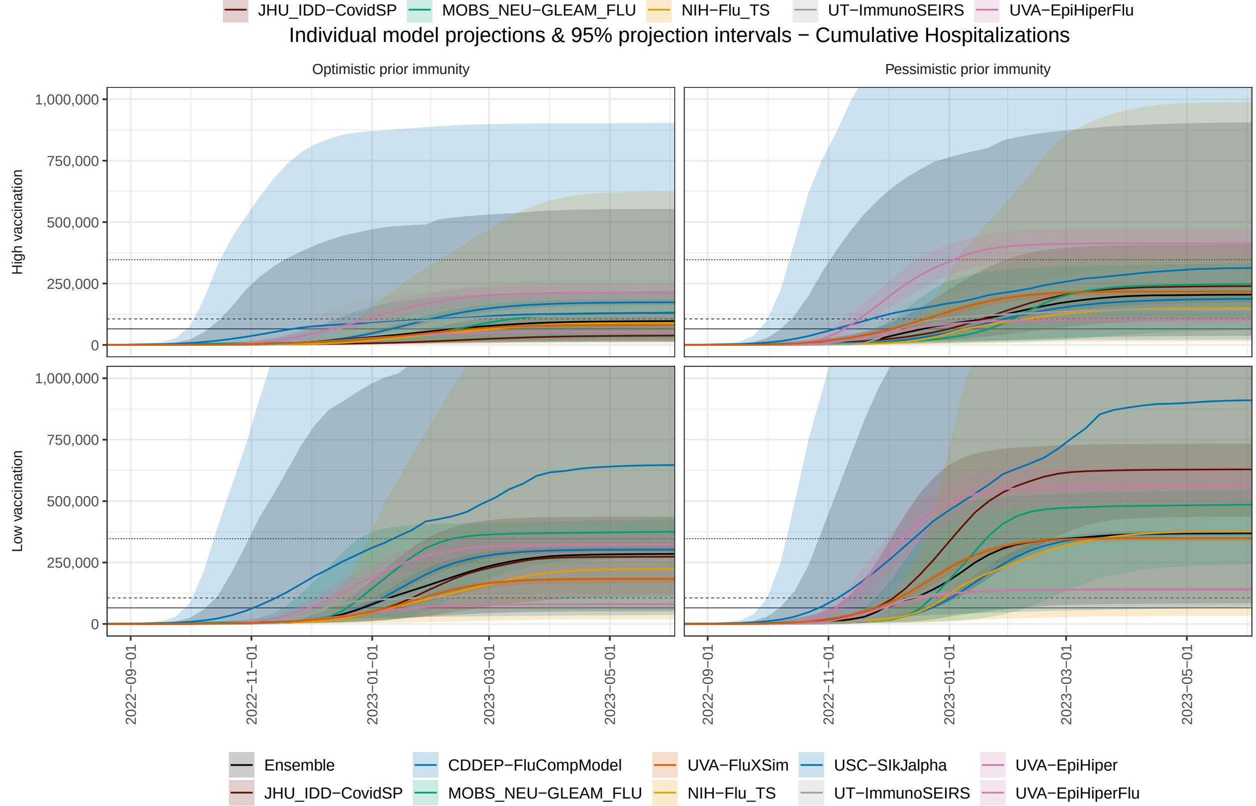
Ensemble projections for national incident and cumulative hospitalizations and deaths separated by scenario.

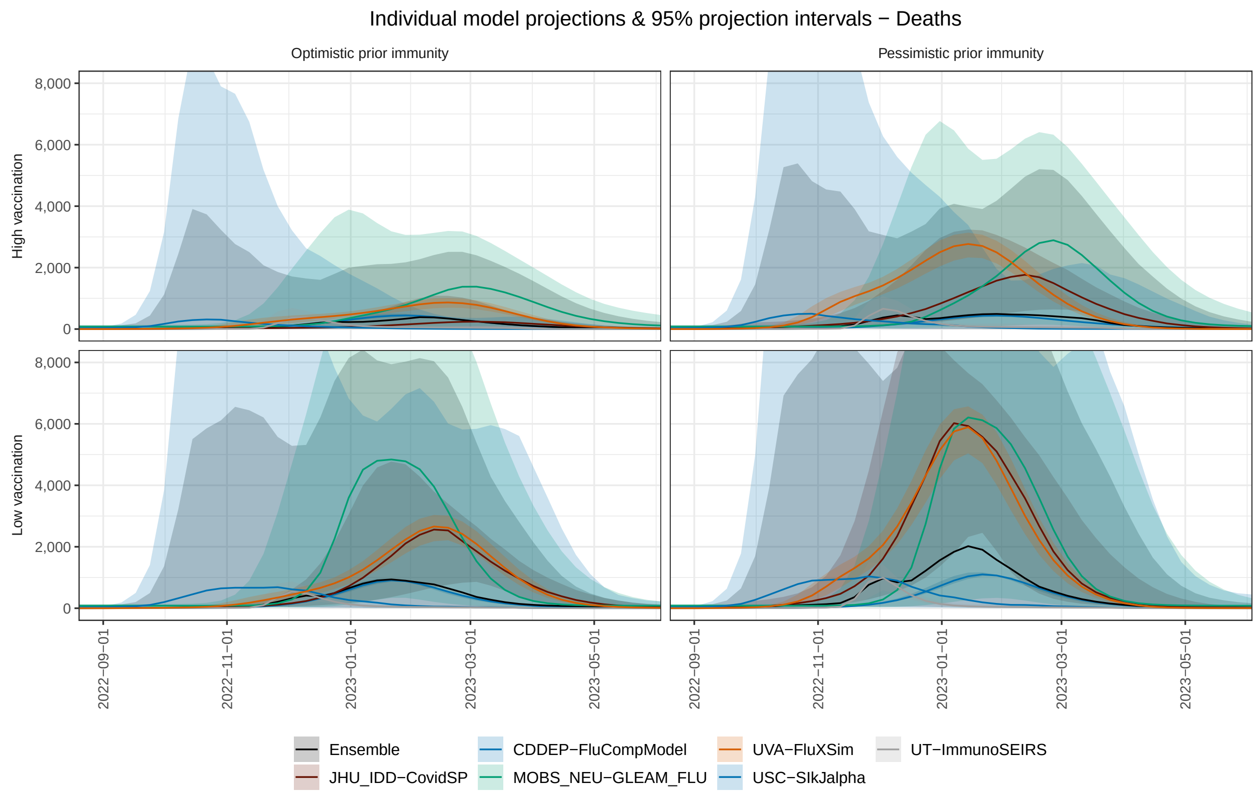


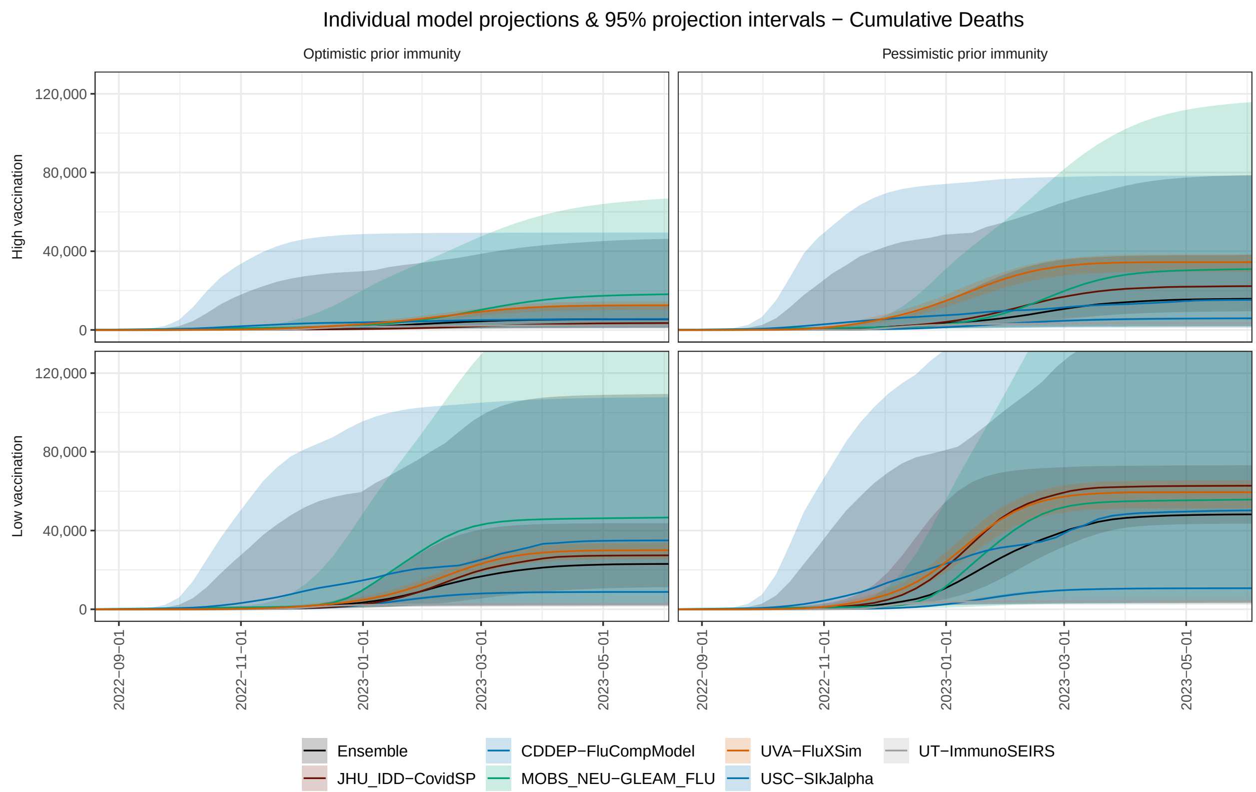
National individual model projections

Individual model projections and ensemble by scenario for national hospitalizations, deaths and cumulative hospitalizations. For visualization we set axes limits; full confidence intervals are shown as supplemental plots on pages 16-17.

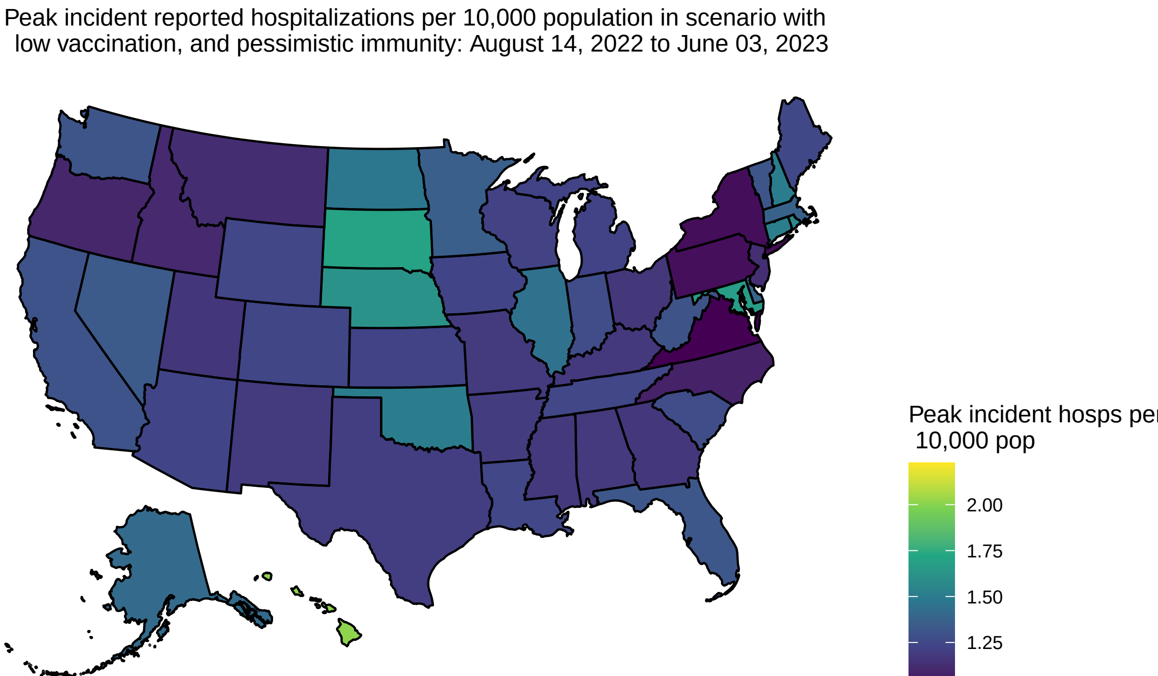




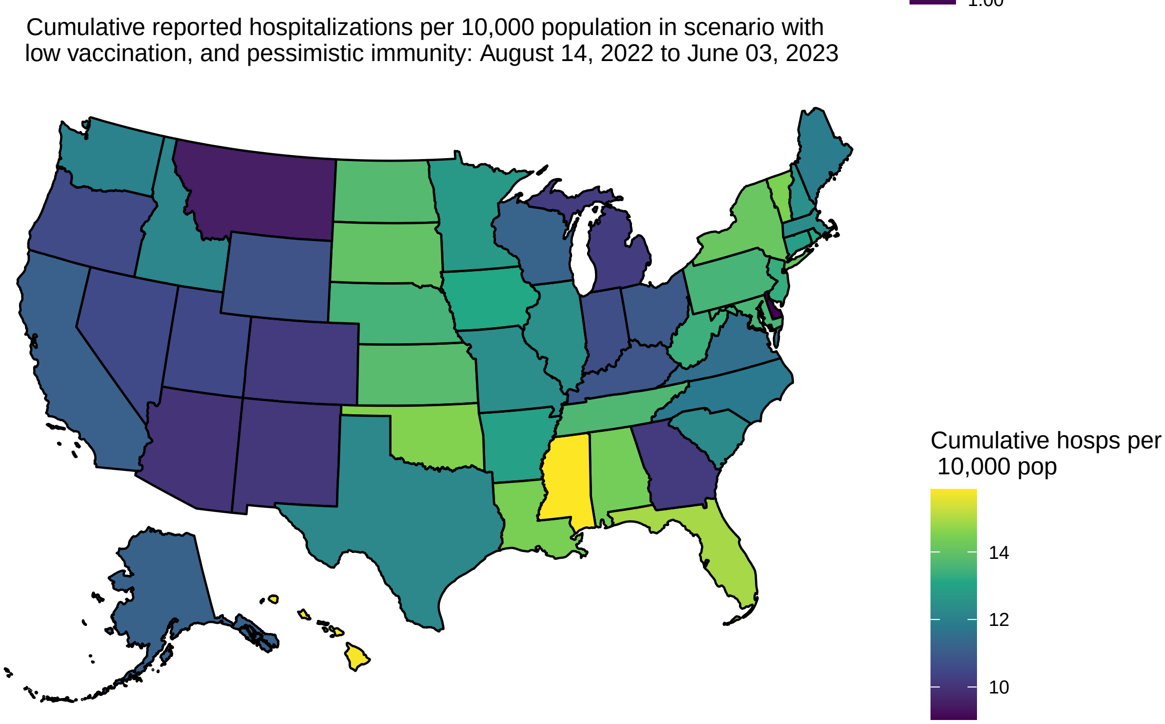

Individual model projections & 95% projection intervals − Deaths
Optimistic prior immunity
Pessimistic prior immunity
High vaccination
Low vaccination
8,000
6,000
4,000
2,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
JHU_IDD−CovidSP
CDDEP−FluCompModel
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS


Individual model projections & 95% projection intervals − Cumulative Deaths
Optimistic prior immunity
Pessimistic prior immunity
High vaccination
Low vaccination
120,000
80,000
40,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
JHU_IDD−CovidSP
CDDEP−FluCompModel
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS

Risk maps



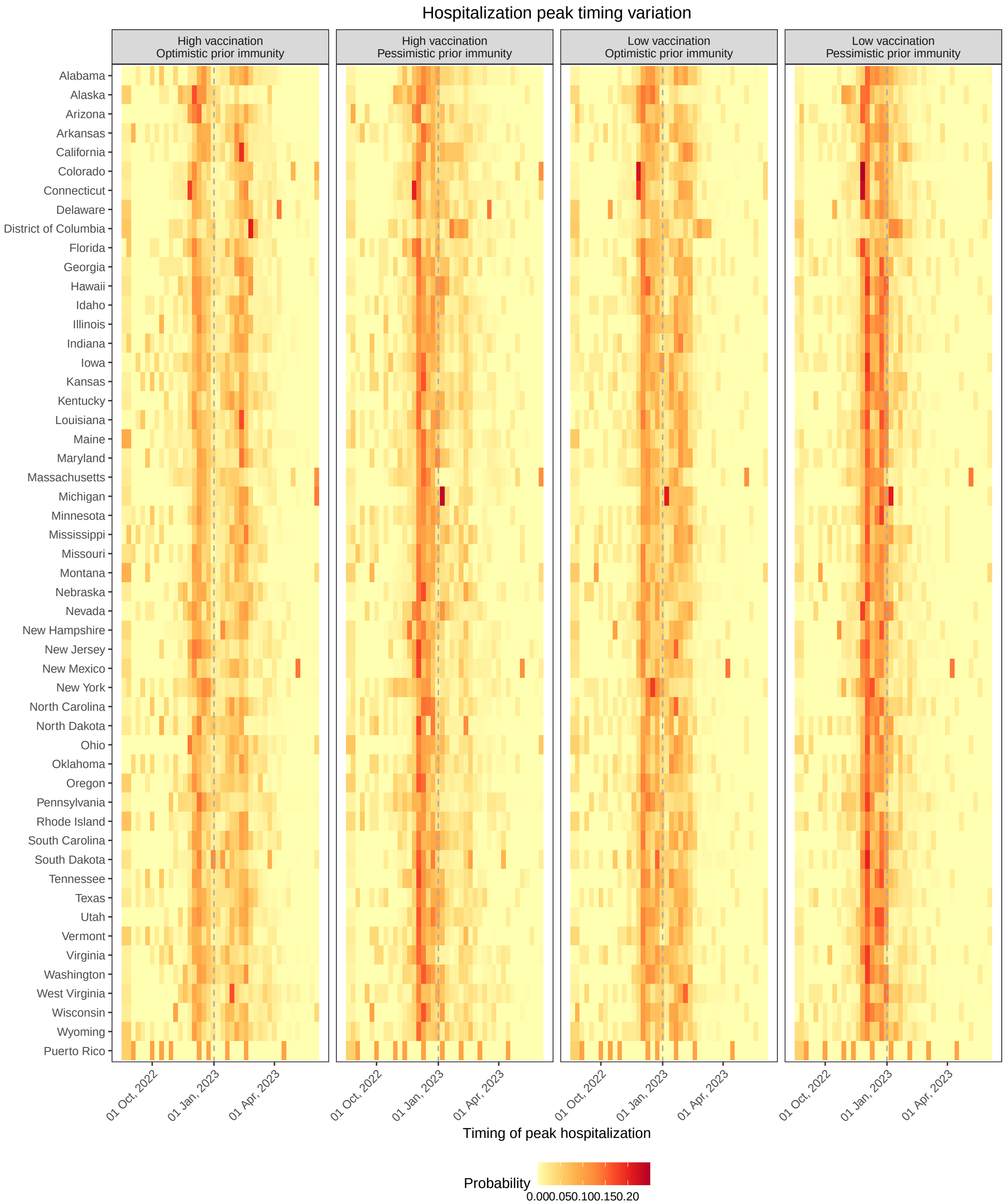
map-1.pdf



map-2.pdf

State variability in peak timing

Ensembles projections for state-level timing of peak hospitalization incidence.

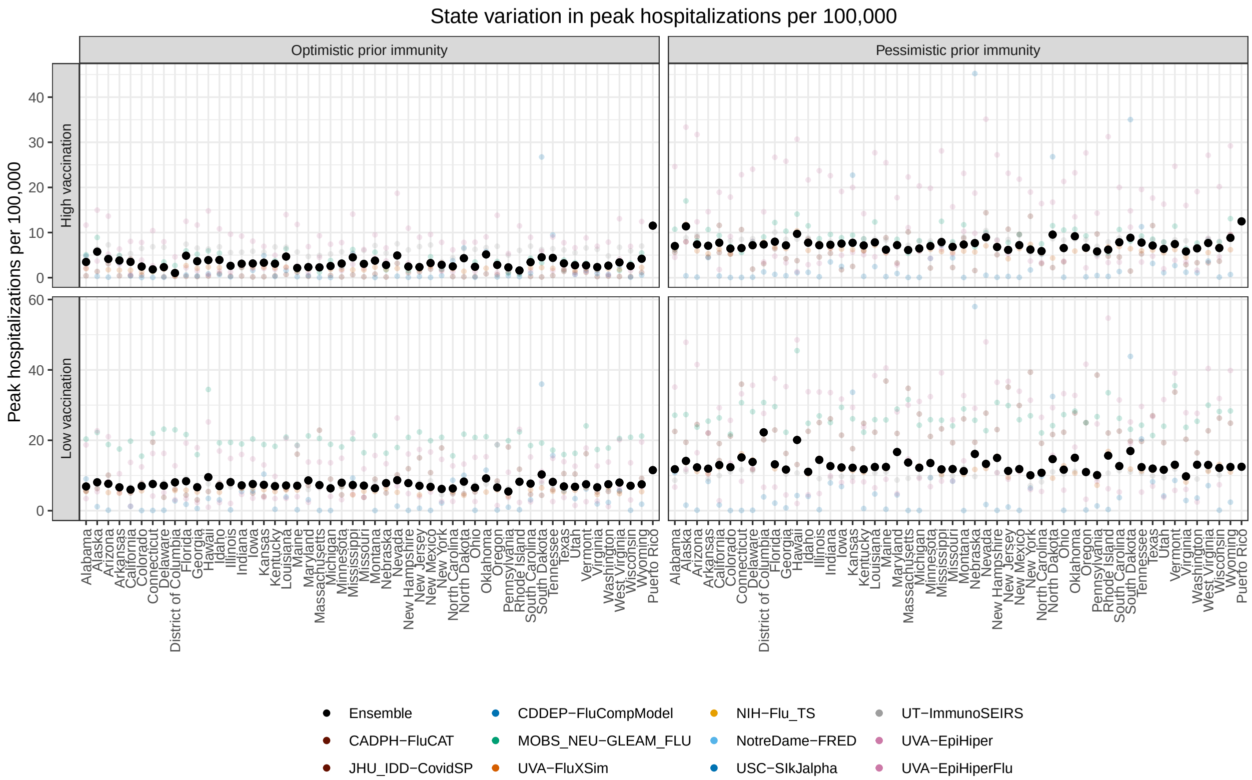


Peak hospitalizations timing

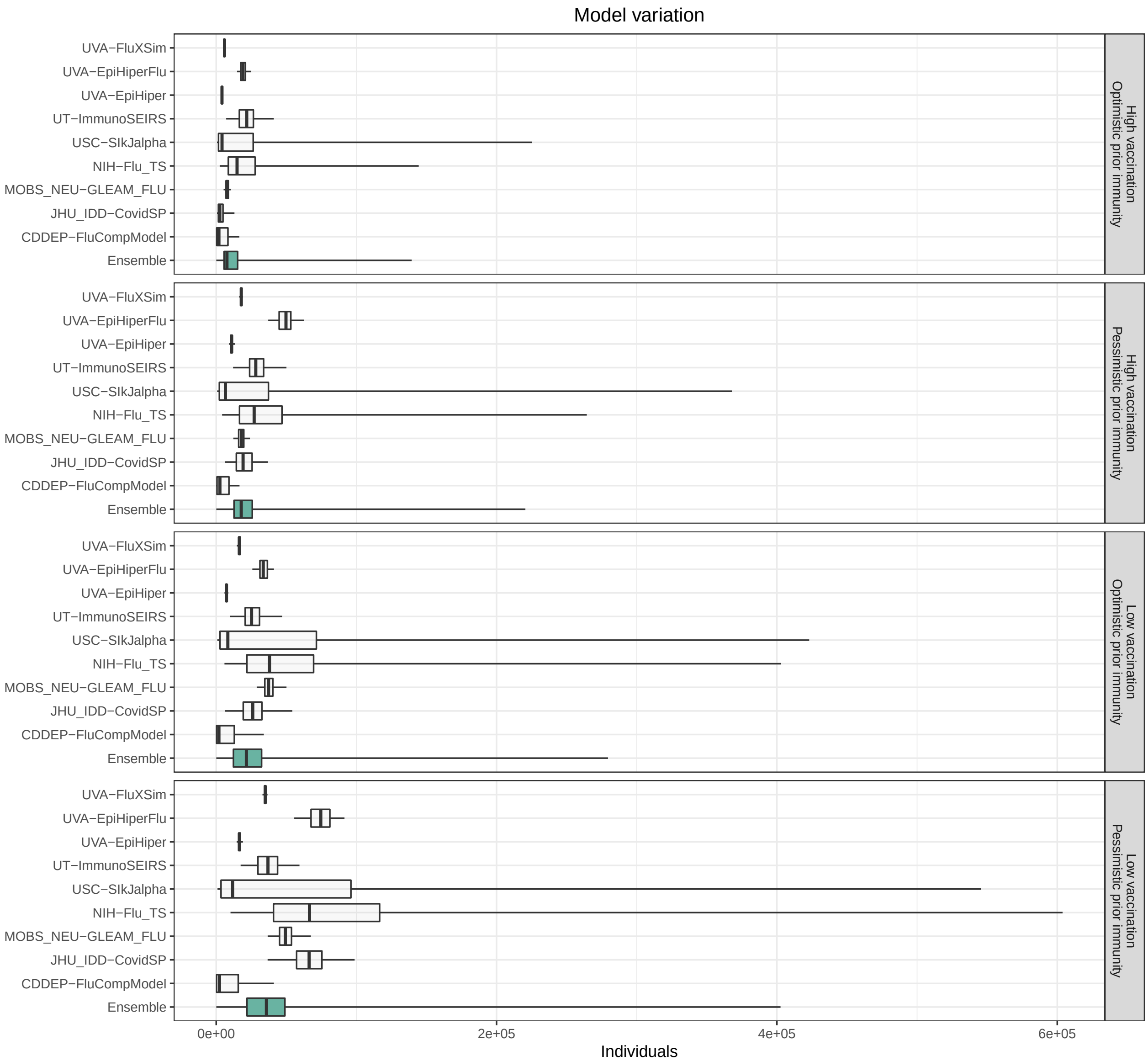
Individual model probabilities for national timing of peak hospitalizations.

State-level deviation in hospitalization incidence

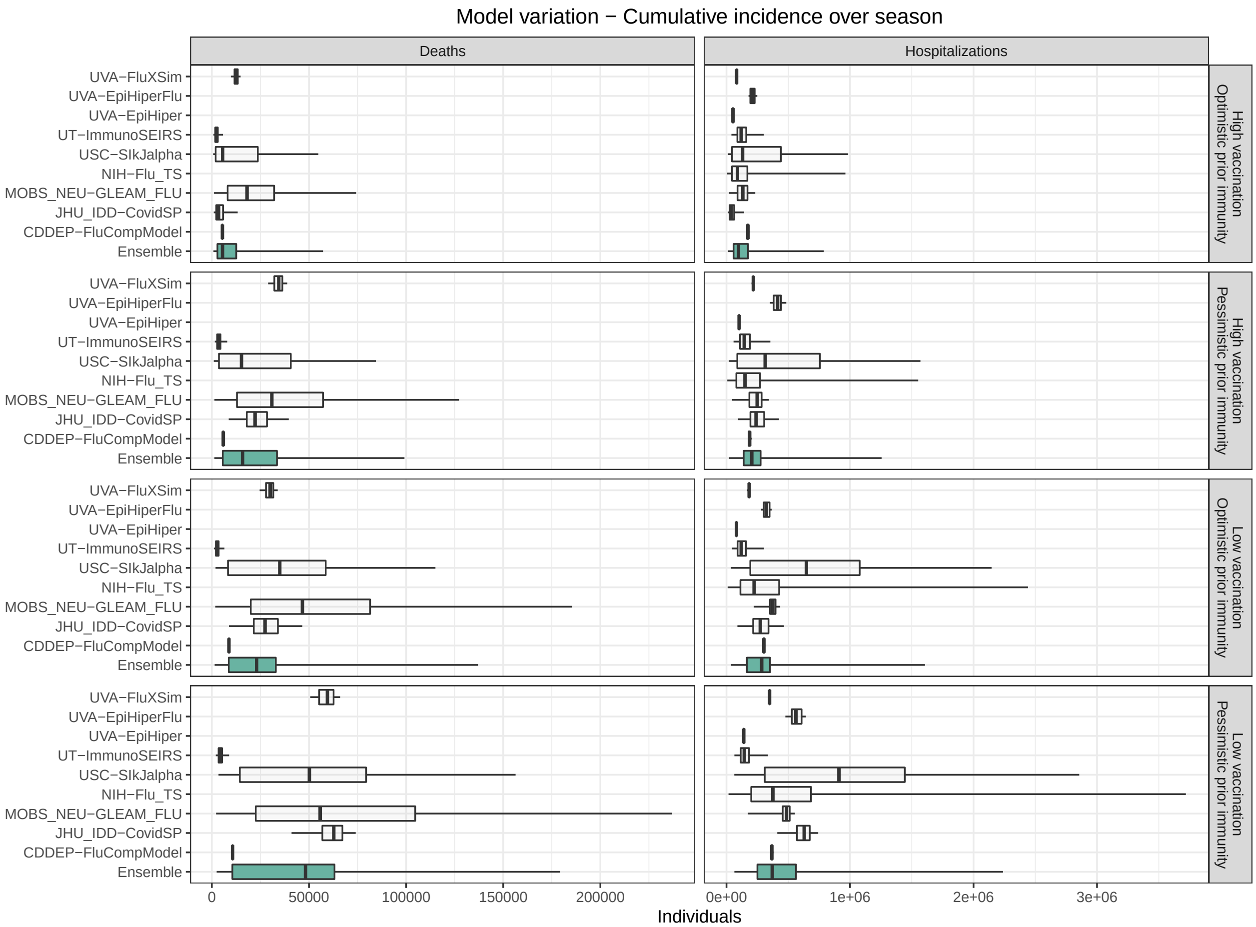
Individual model and ensembles projections for state-level peak hospitalization incidence.



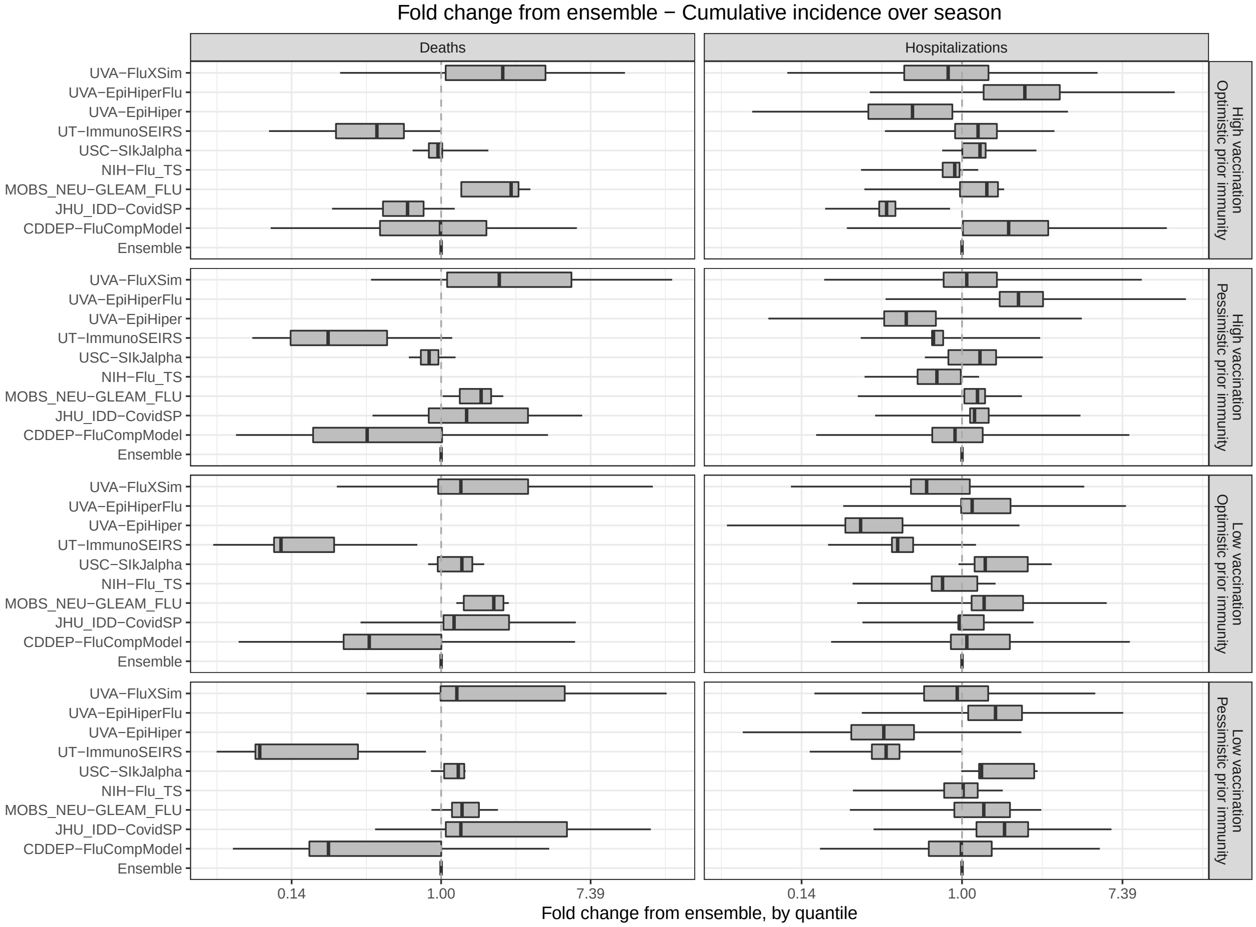
Model Variation in National Peak Hospitalizations



Cumulative incidence over season by model

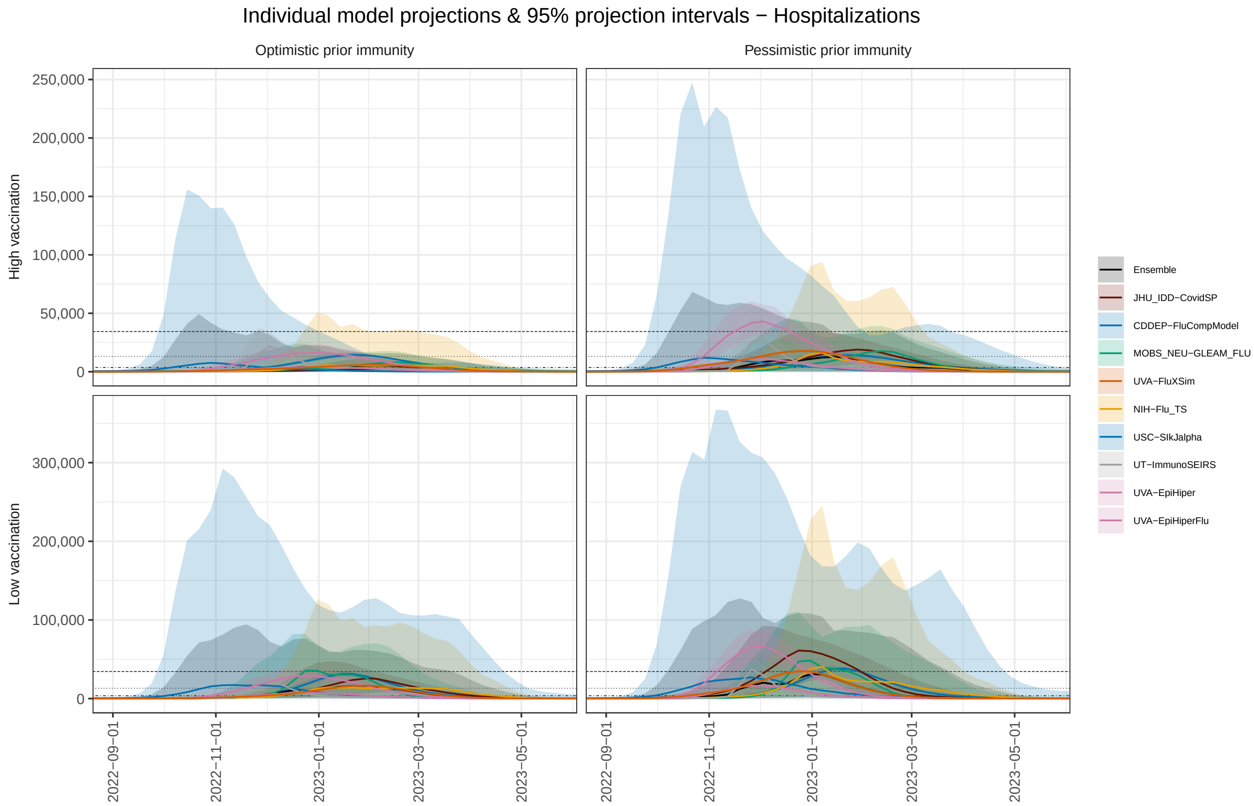


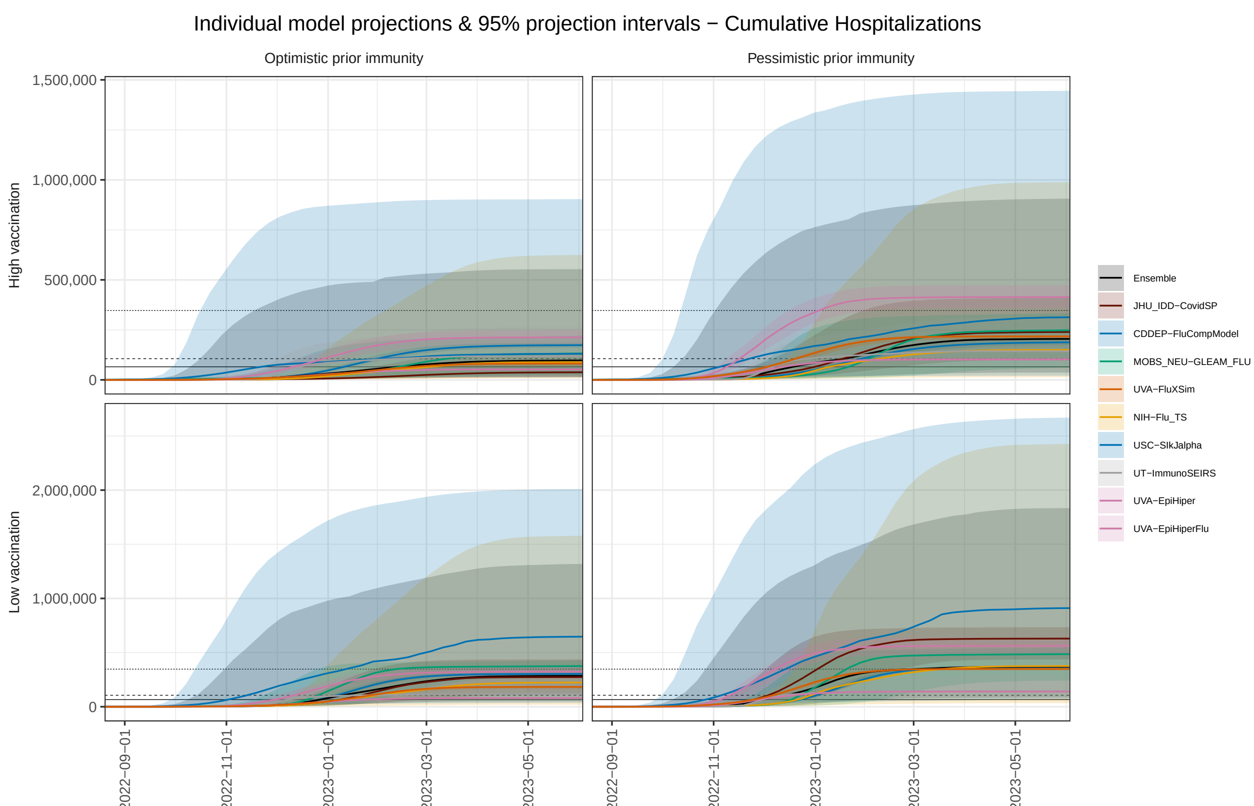
Difference between model and ensemble distributions

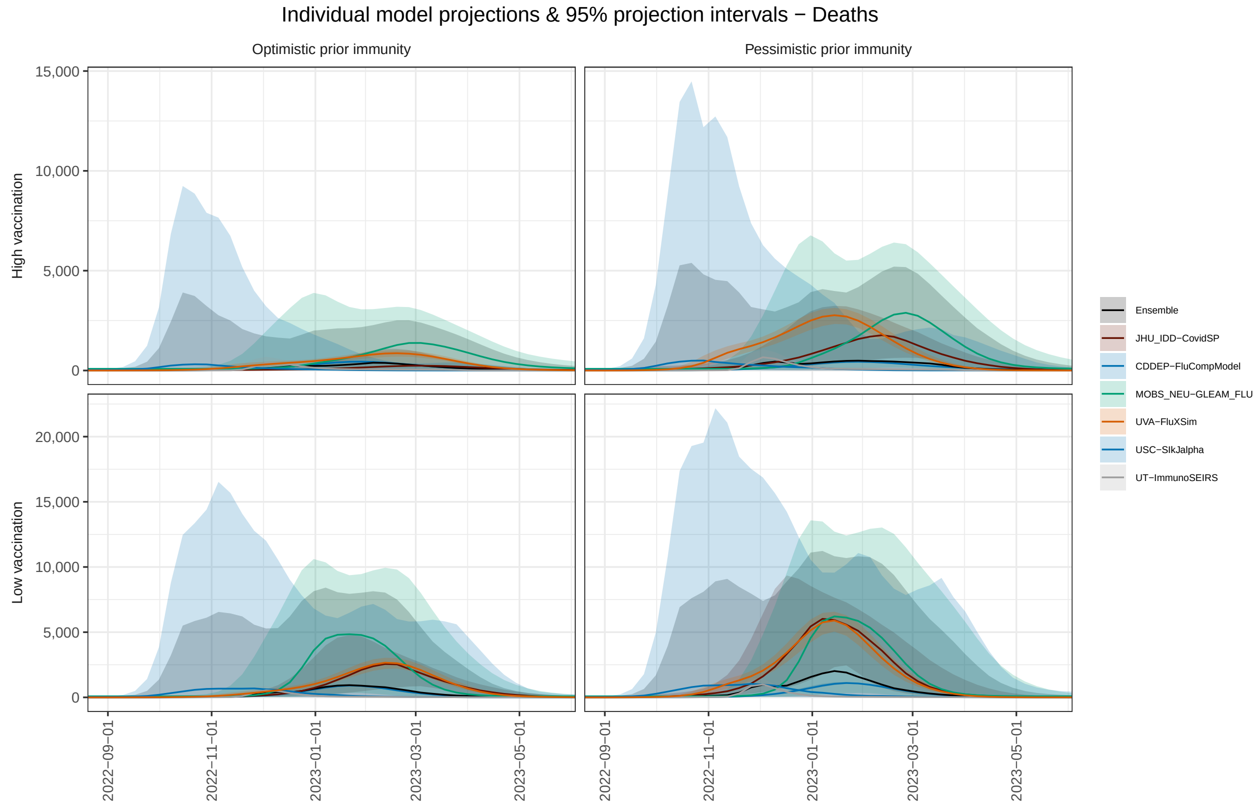


Supplemental Plots

National individual model projections - full confidence intervals






Individual model projections & 95% projection intervals − Deaths
Optimistic prior immunity
Pessimistic prior immunity
High vaccination
Low vaccination
15,000
10,000
5,000
0
20,000
15,000
10,000
5,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
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UVA−FluXSim
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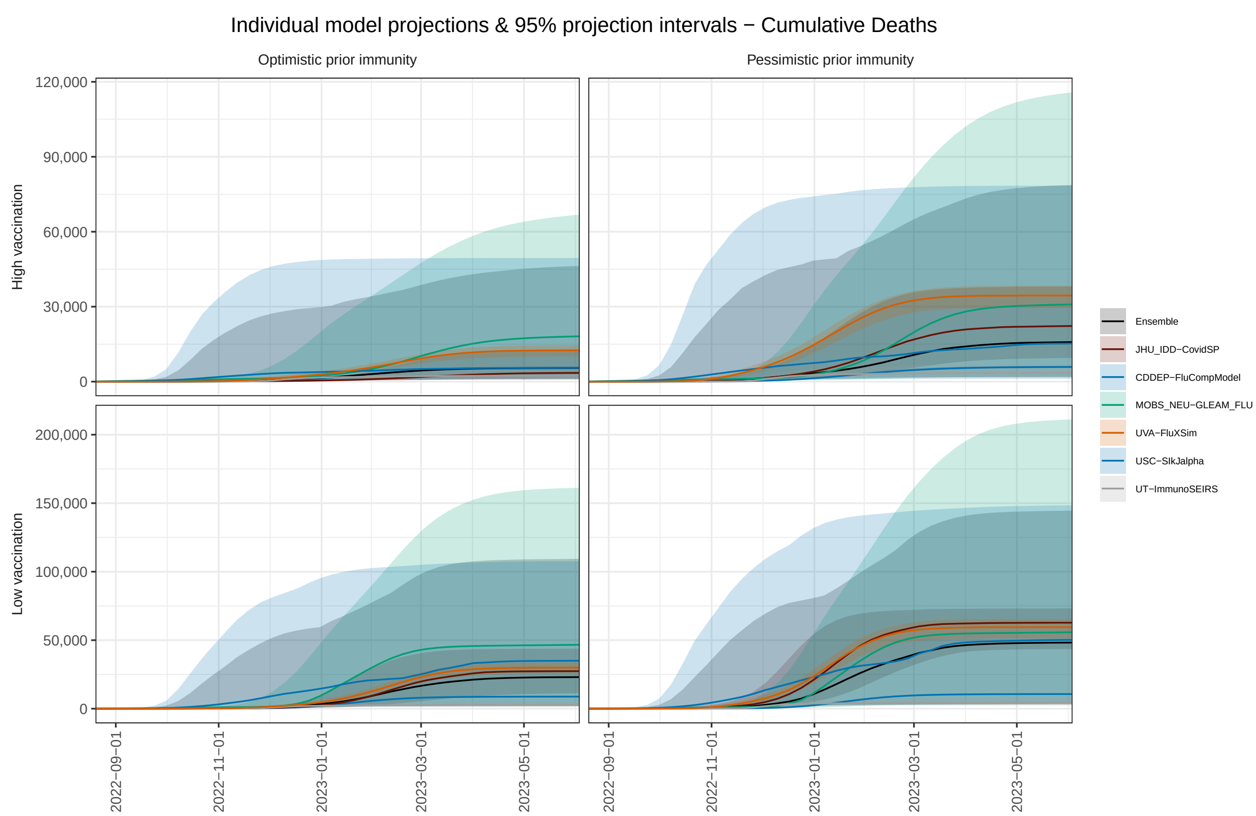
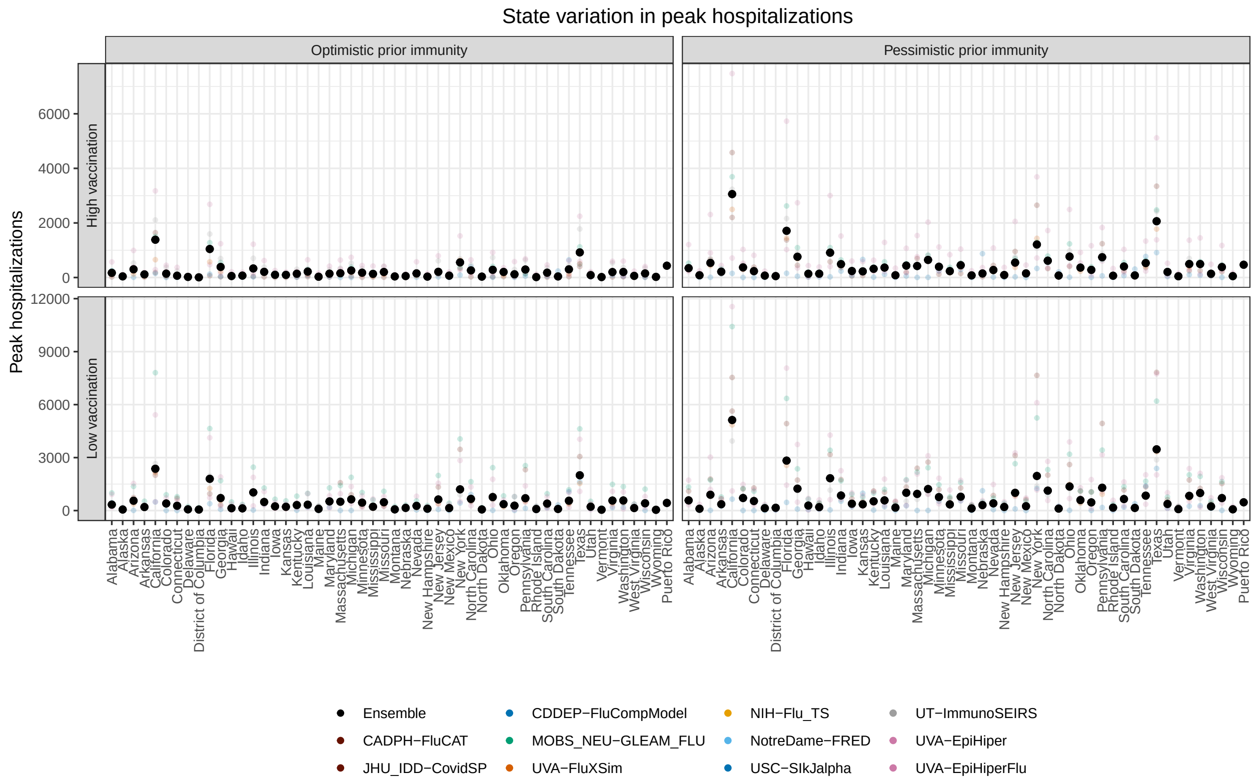
UT−ImmunoSEIRS

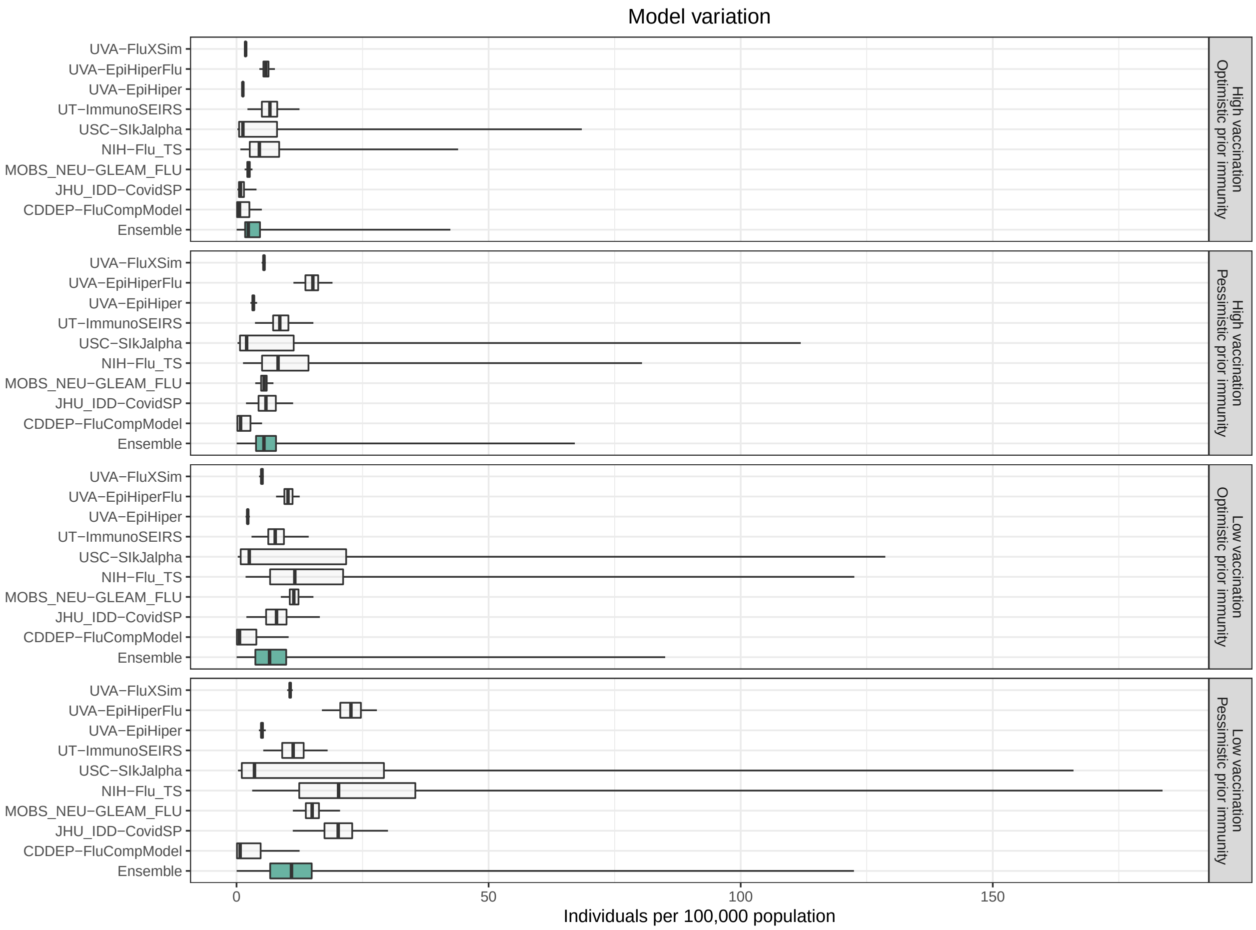

Individual model projections & 95% projection intervals − Cumulative Deaths
Optimistic prior immunity
Pessimistic prior immunity
High vaccination
Low vaccination
120,000
90,000
60,000
30,000
0
200,000
150,000
100,000
50,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
JHU_IDD−CovidSP
CDDEP−FluCompModel
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS

State-level deviation in hospitalization incidence

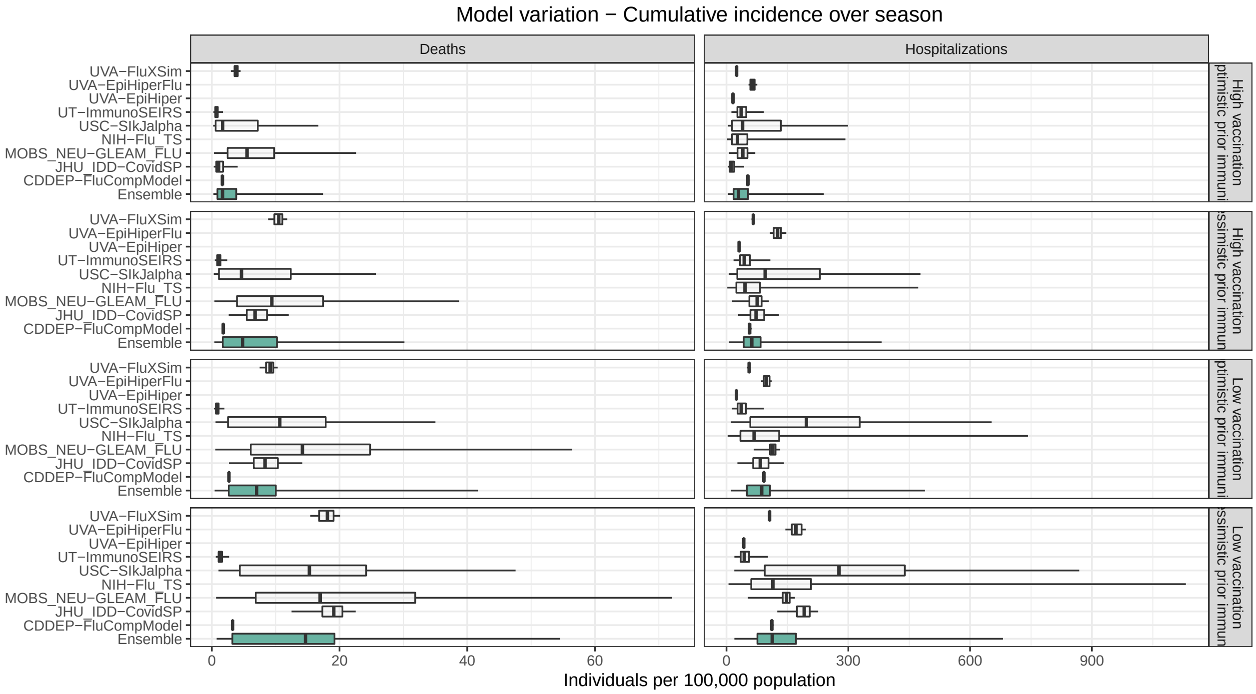
Individual model and ensembles projections for state-level peak hospitalization incidence.



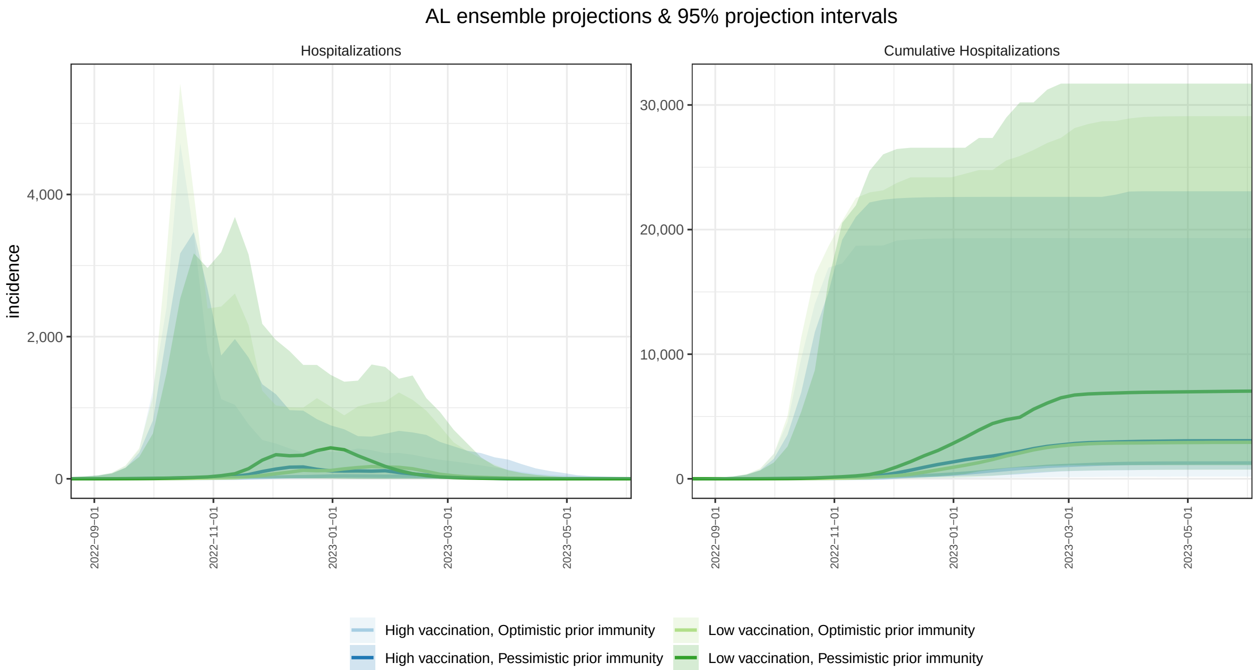
Model Variation in National Peak Hospitalizations - rates per 100,000 population

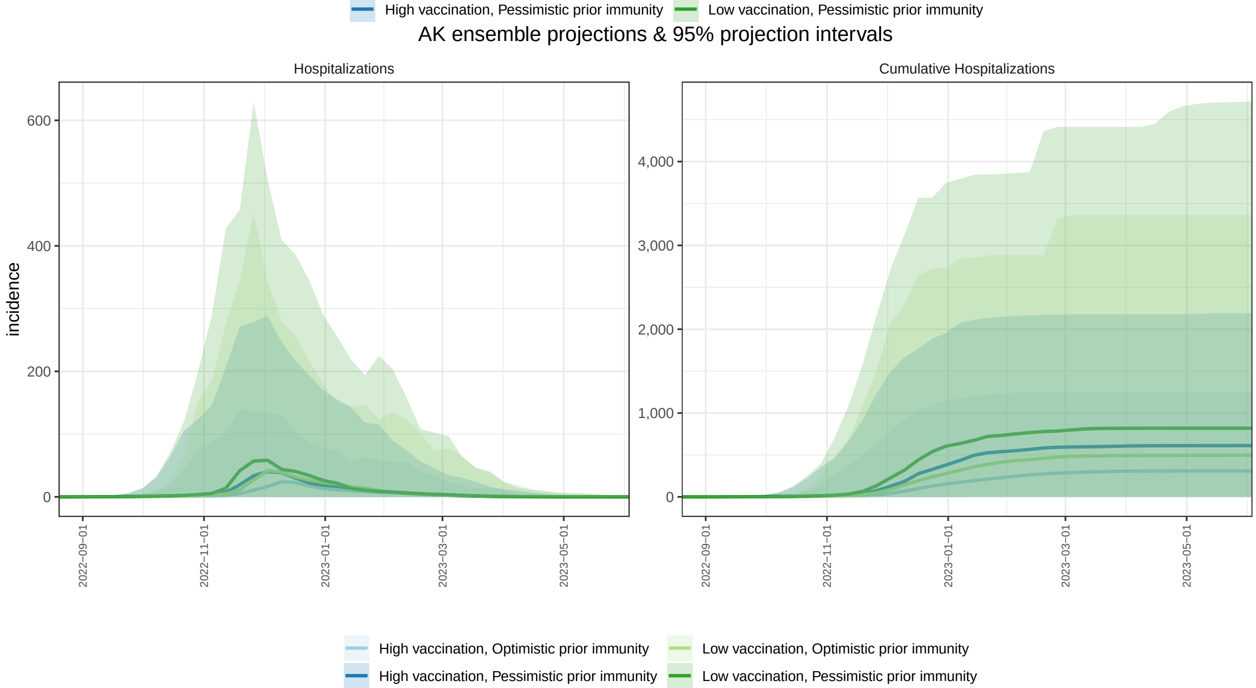


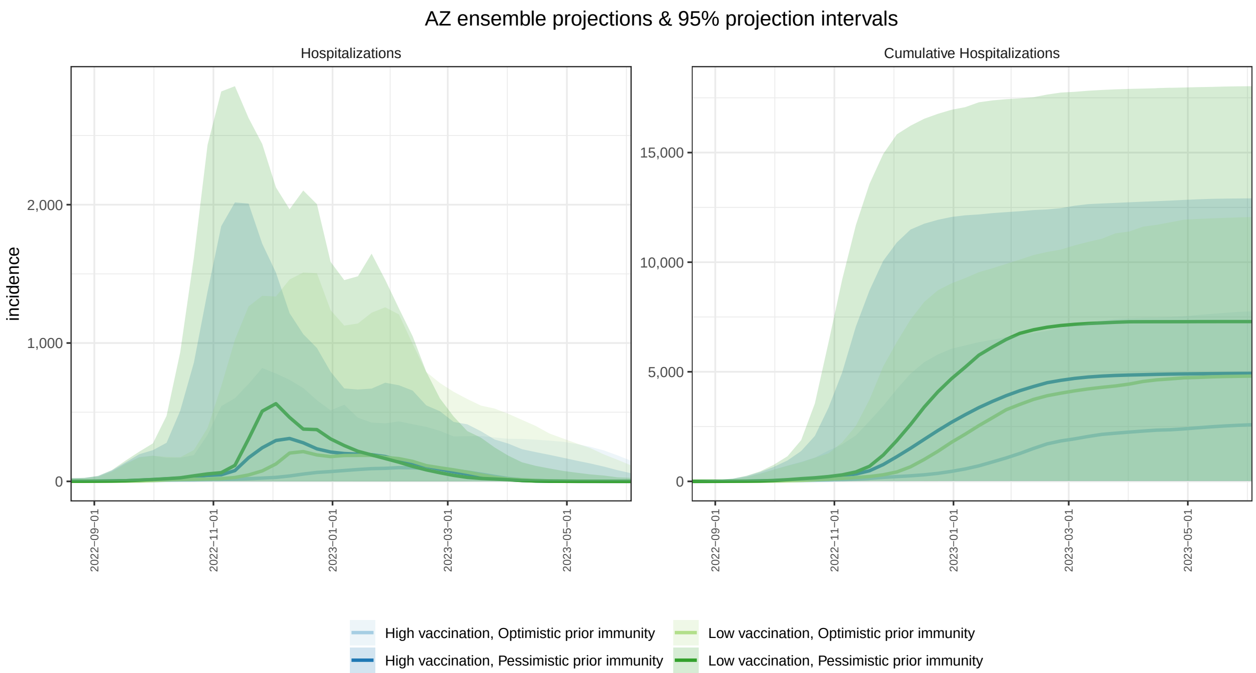
Cumulative incidence over season - rates per 100,000 population

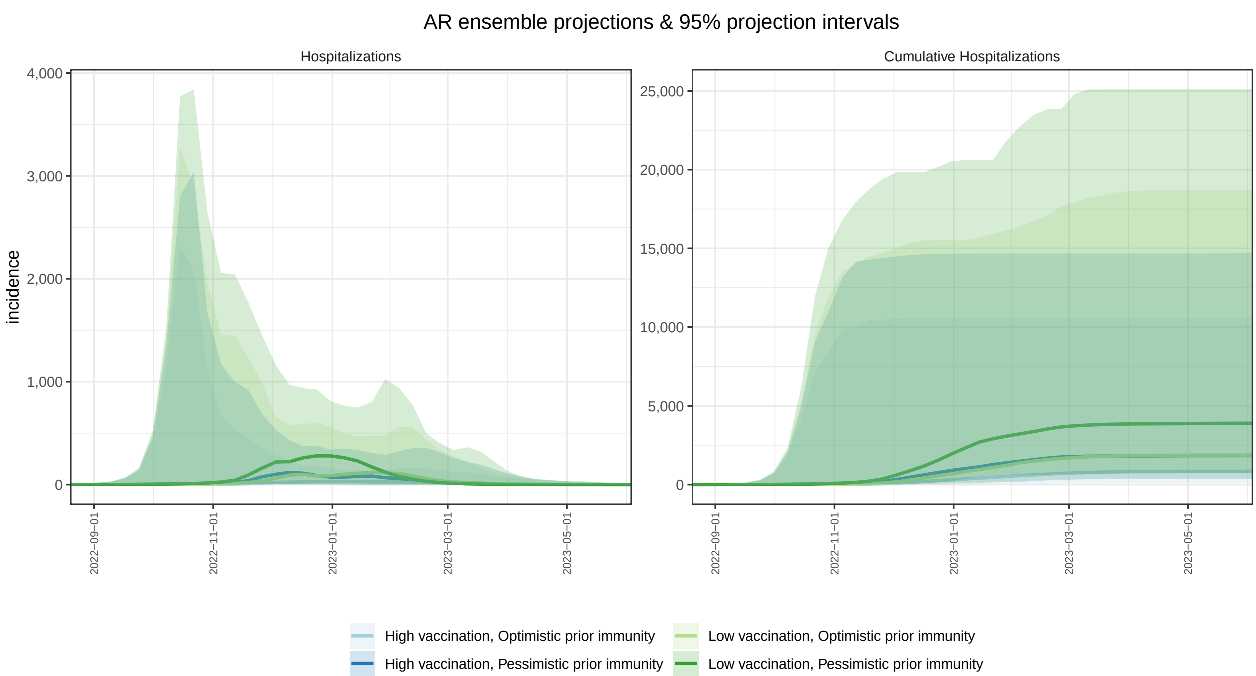


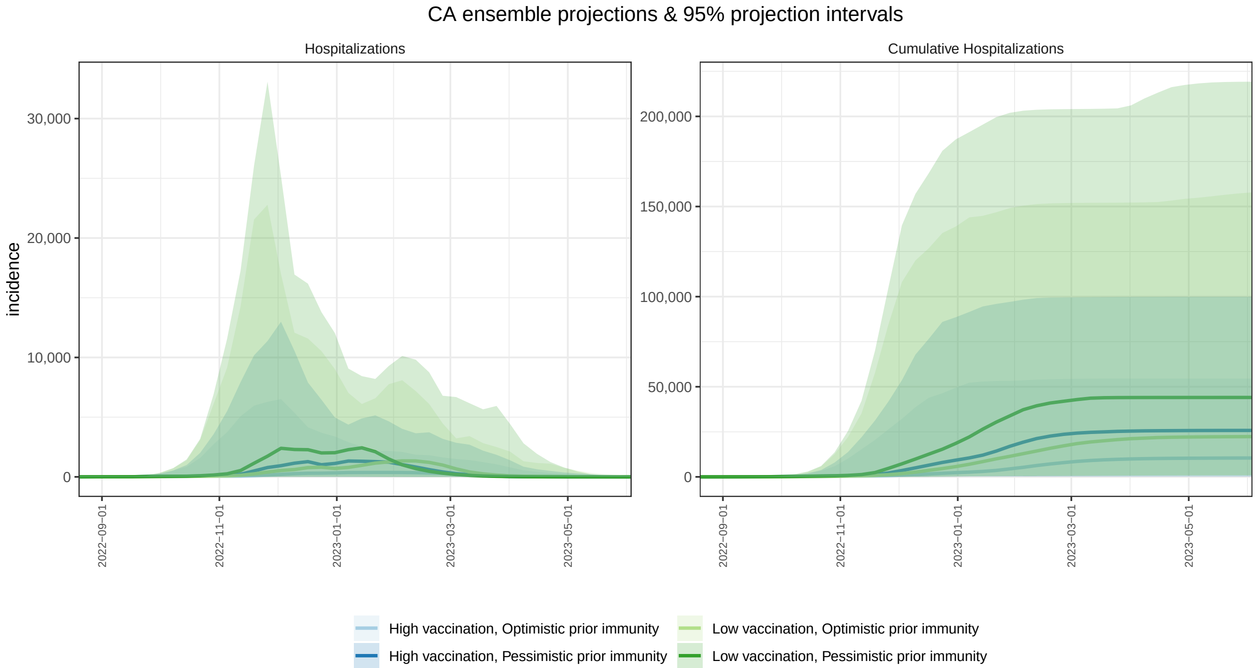
State-level ensemble plots

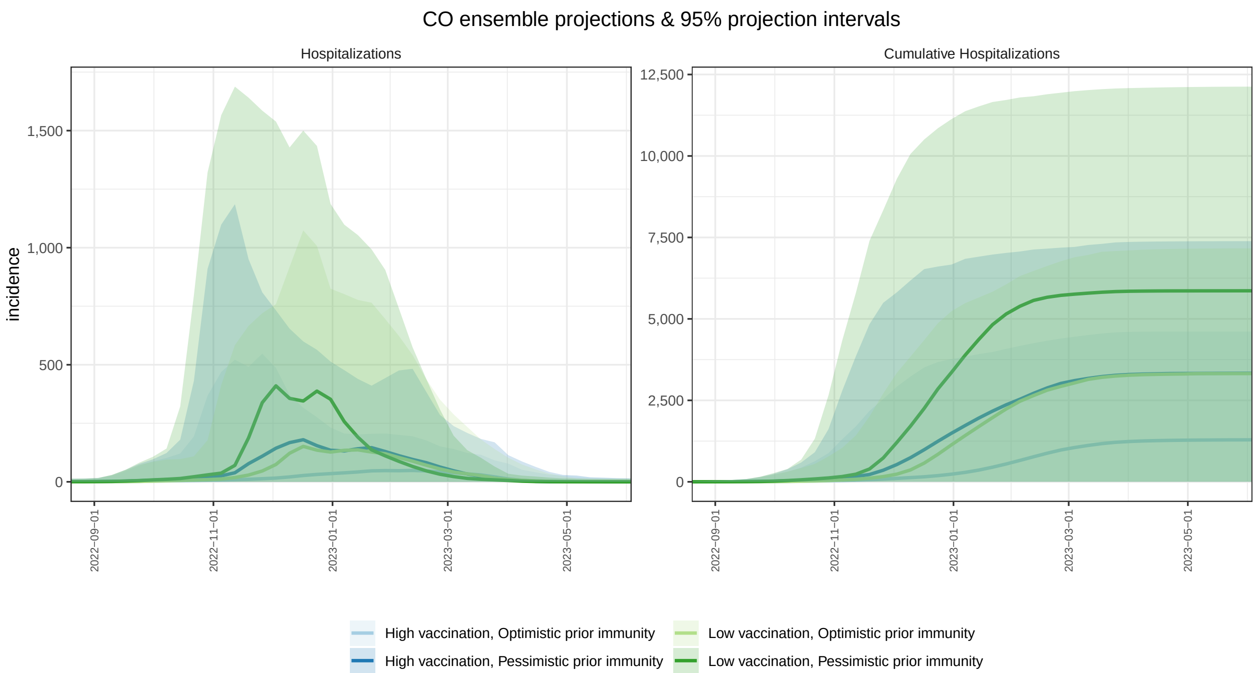





AZ ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
0
1,000
2,000
5,000
10,000
15,000
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity


AR ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
0
1,000
2,000
3,000
4,000
5,000
10,000
15,000
20,000
25,000
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity


CA ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
30,000
20,000
10,000
0
200,000
150,000
100,000
50,000
2022-09-01
2022-11-01
2023-01-01
2023-03-01
2023-05-01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity


CO ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
1,500
1,000
500
0
12,500
10,000
7,500
5,000
2,500
2022-09-01
2022-11-01
2023-01-01
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2023-05-01
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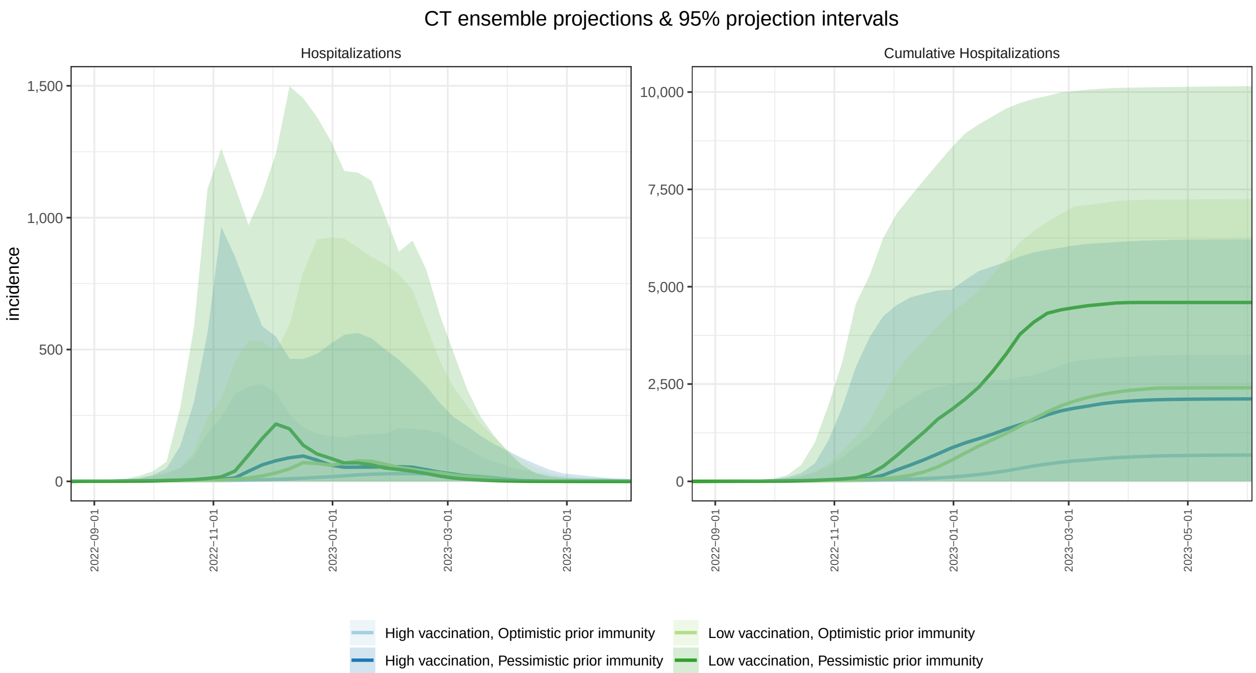
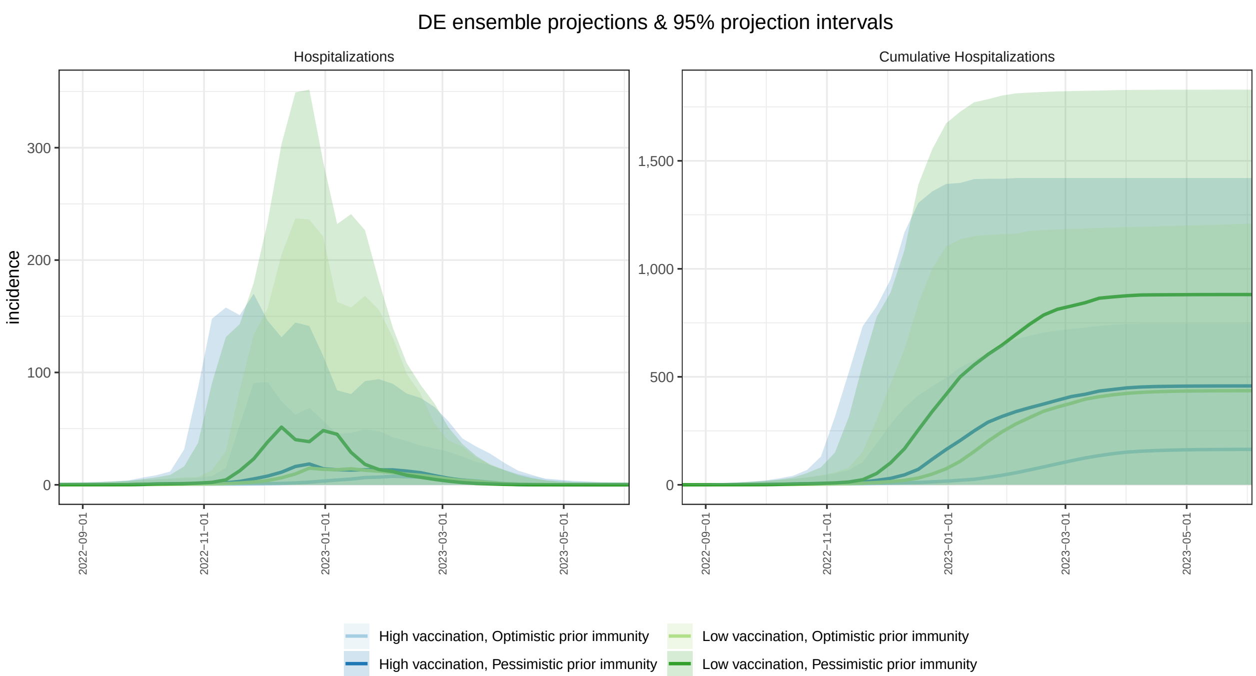
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity


CT ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
1,500
1,000
500
0
10,000
7,500
5,000
2,500
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity


DE ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
300
200
100
0
1,500
1,000
500
2022−09−01
2022−11−01
2023−01−01
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2023−05−01
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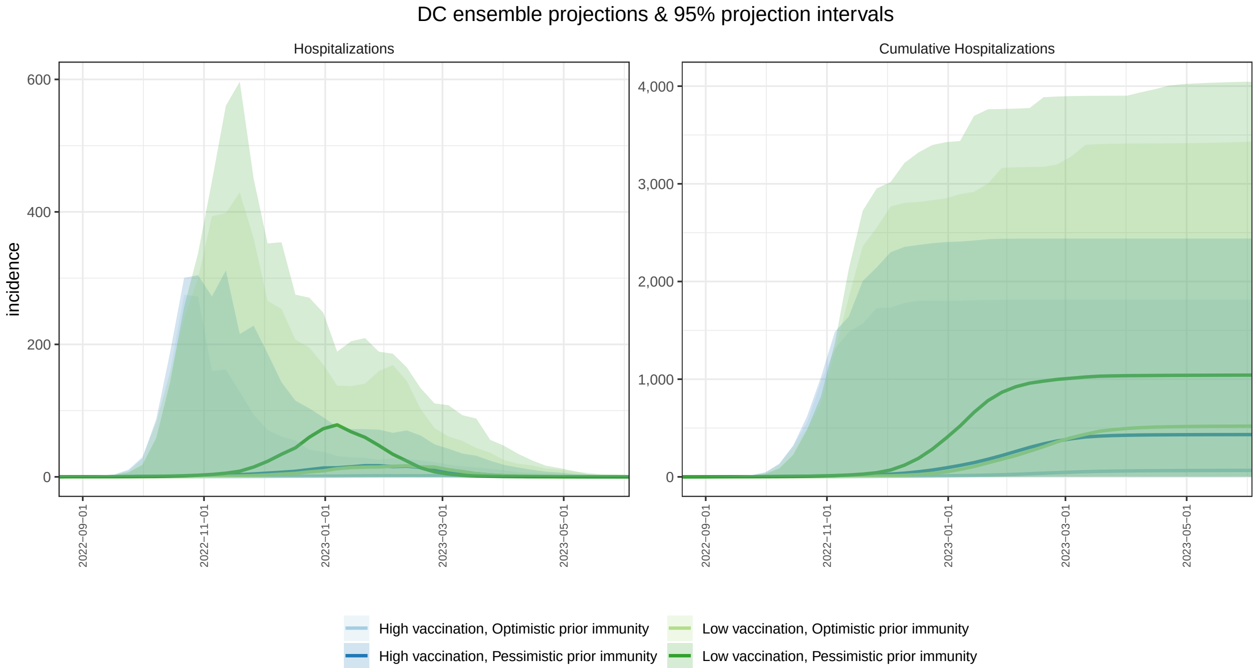
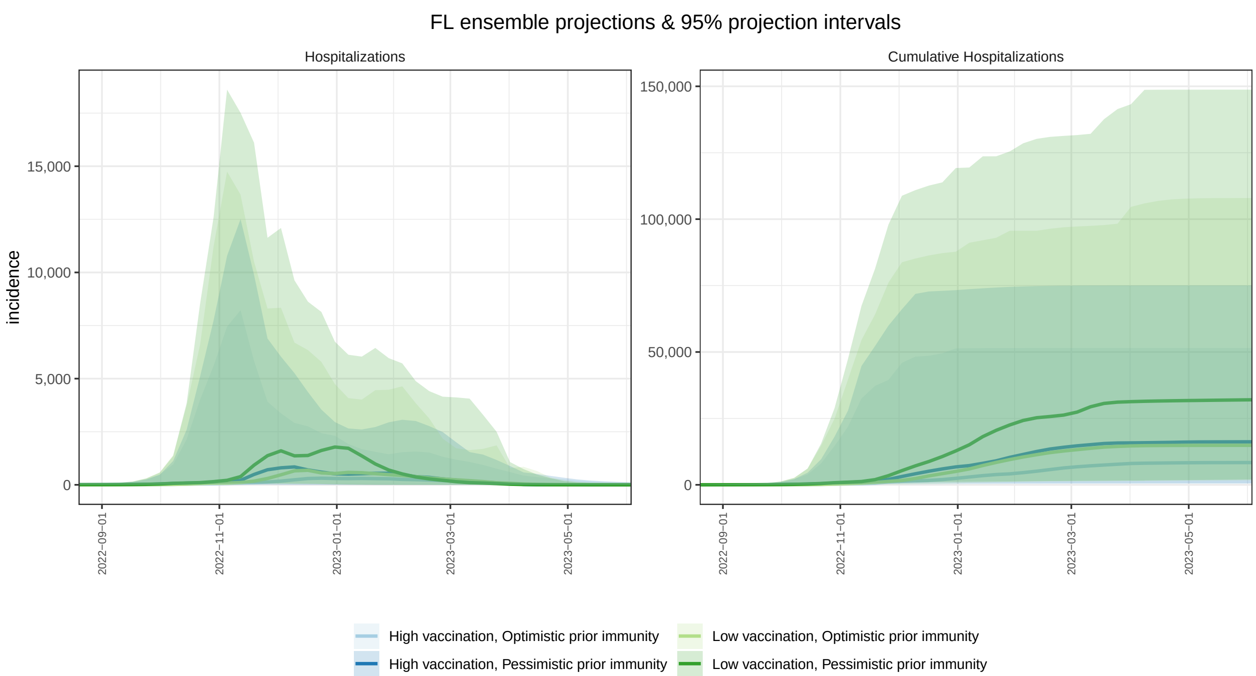
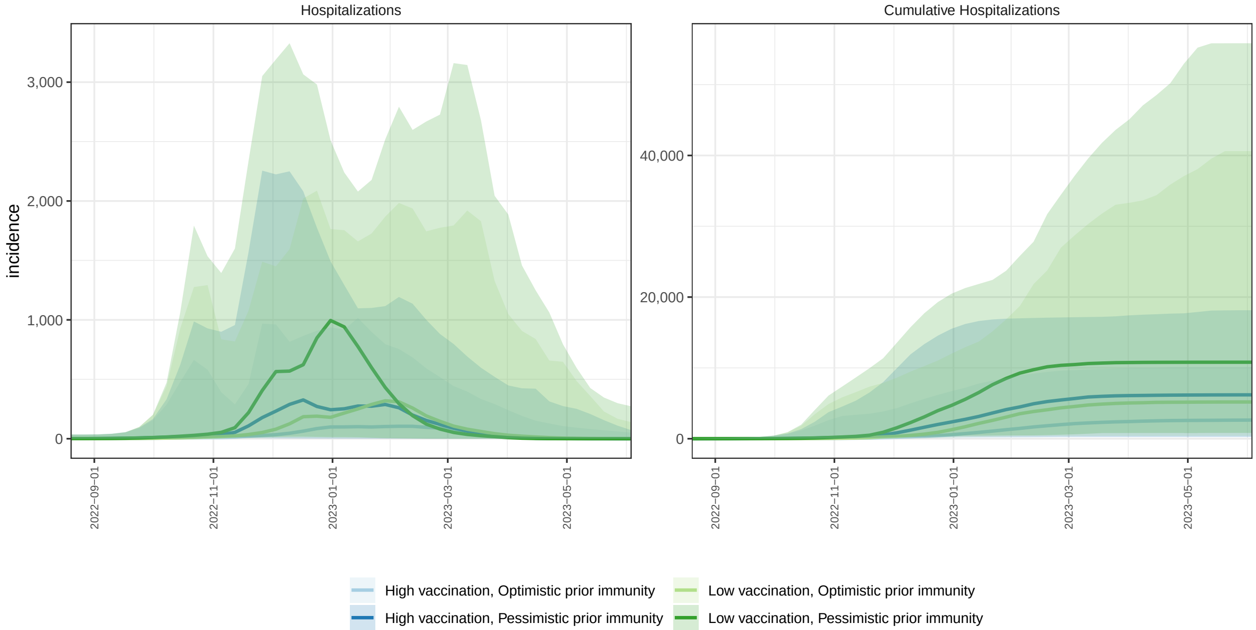
Low vaccination, Pessimistic prior immunity

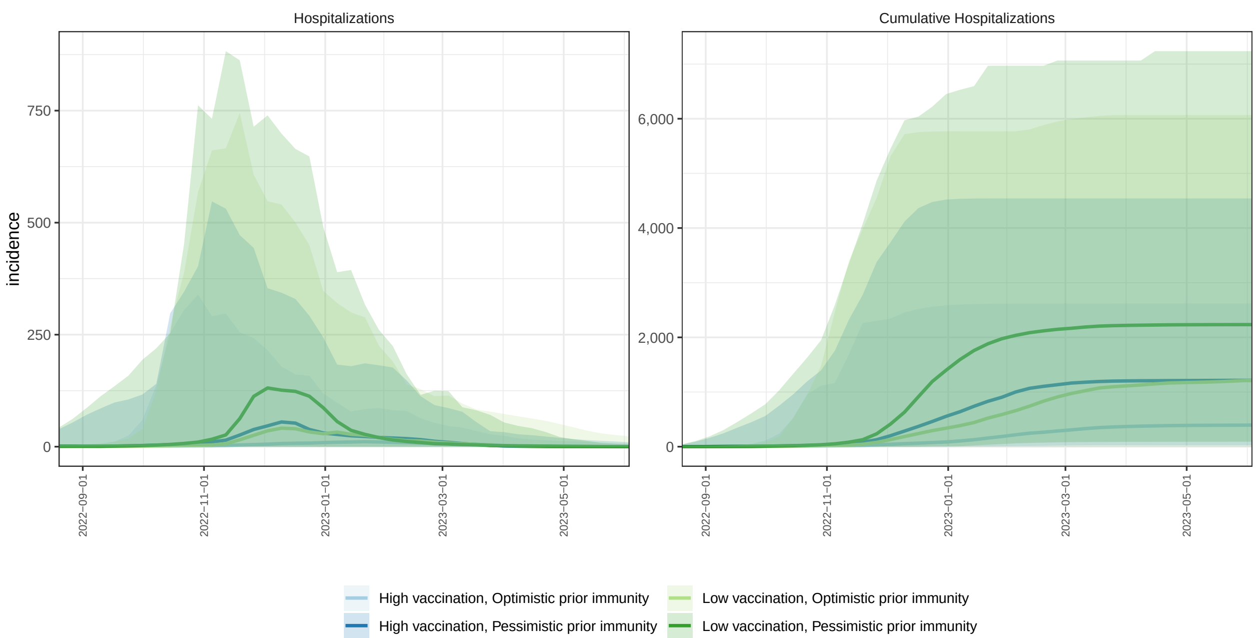

DC ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
0
200
400
600
0
1,000
2,000
3,000
4,000
2022-09-01
2022-11-01
2023-01-01
2023-03-01
2023-05-01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

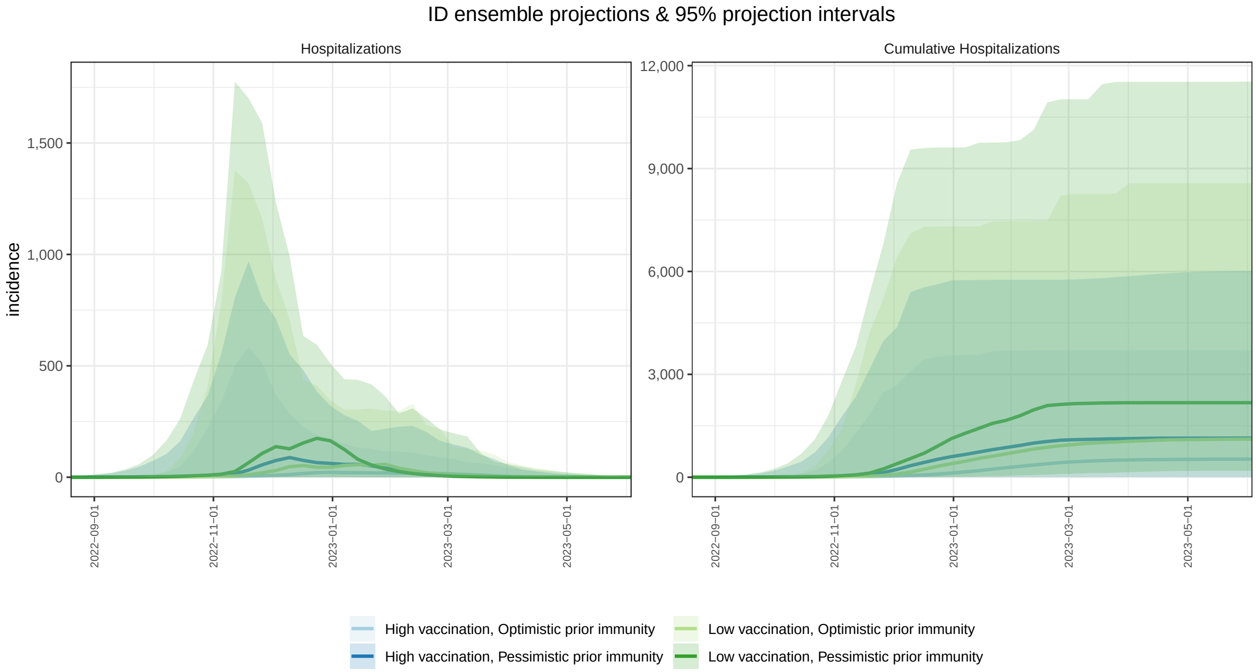

FL ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
0
5,000
10,000
15,000
0
50,000
100,000
150,000
2022-09-01
2022-11-01
2023-01-01
2023-03-01
2023-05-01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

GA ensemble projections & 95% projection intervals

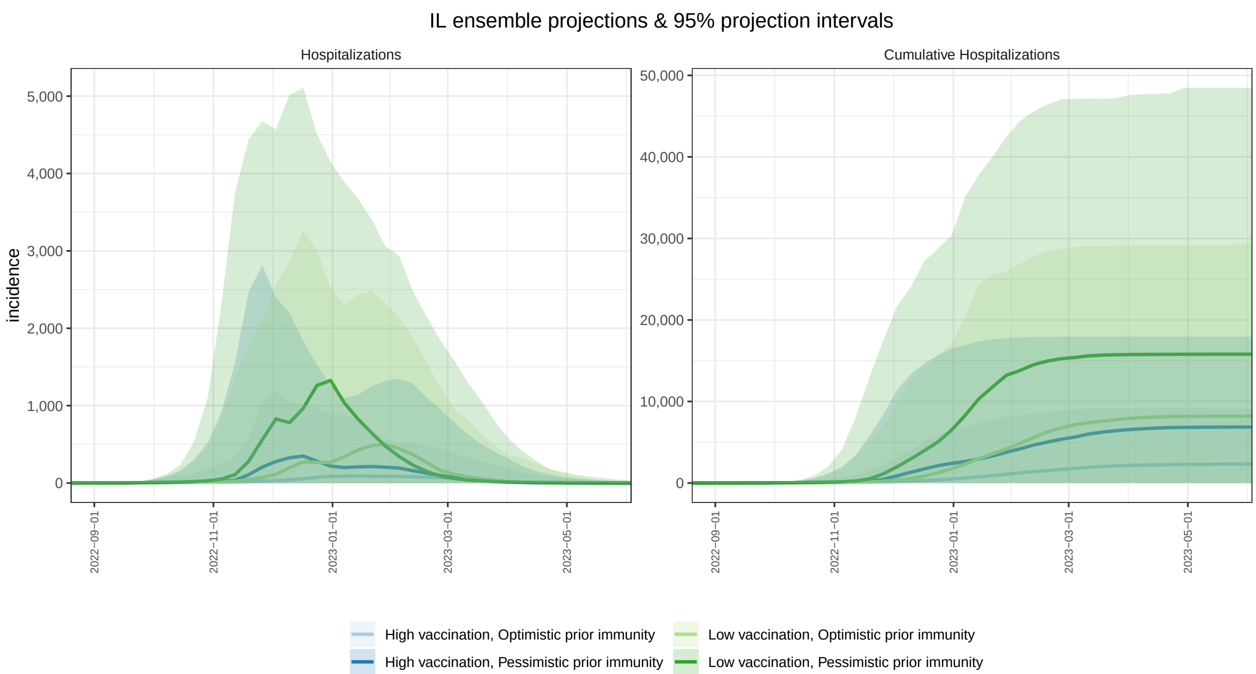


HI ensemble projections & 95% projection intervals

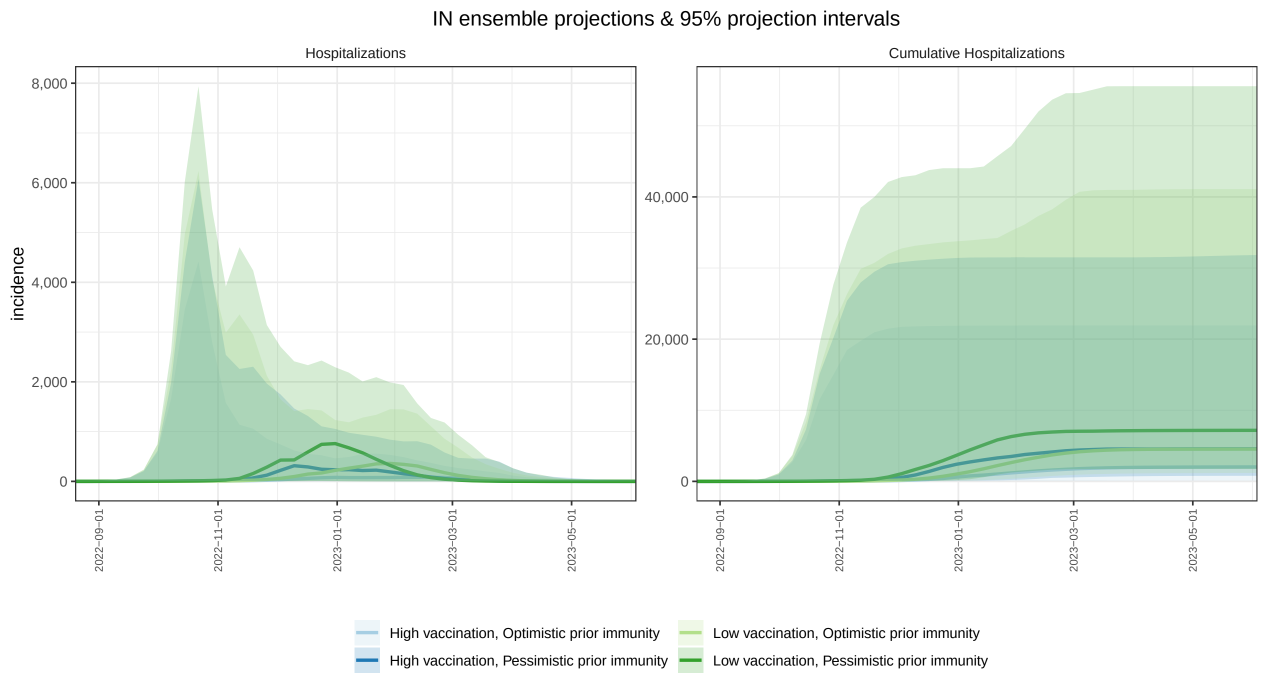


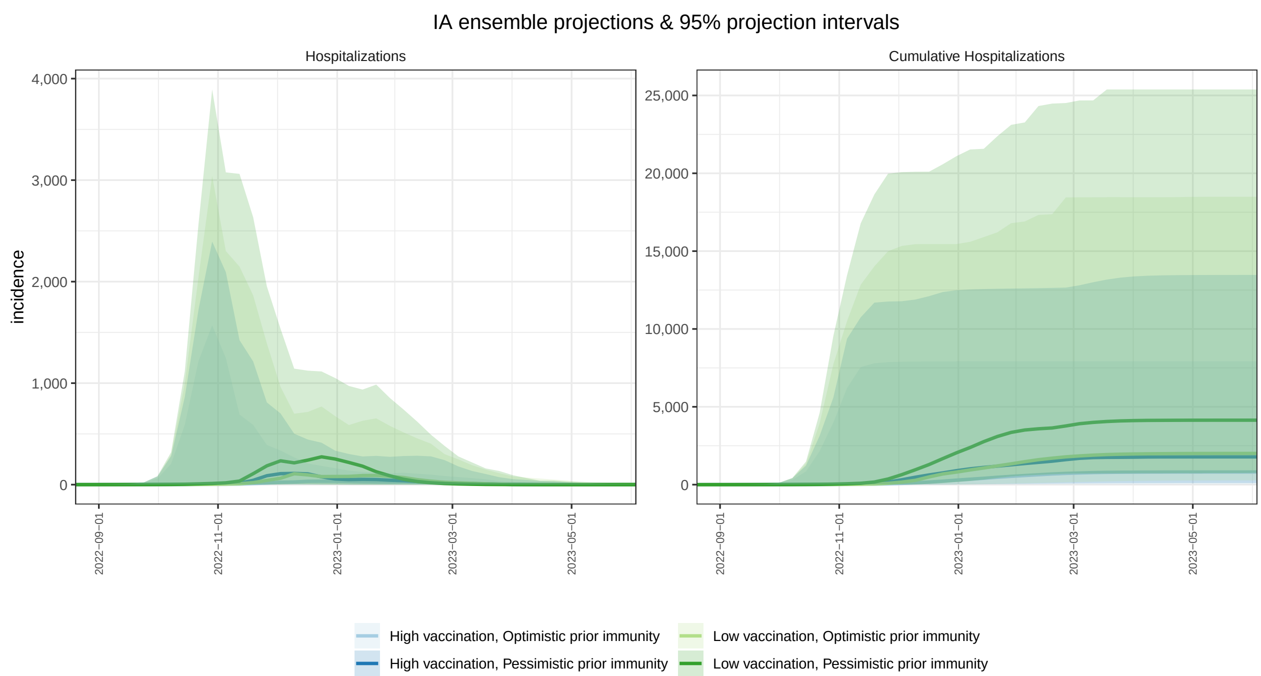


ID ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
0
500
1,000
1,500
0
3,000
6,000
9,000
12,000
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

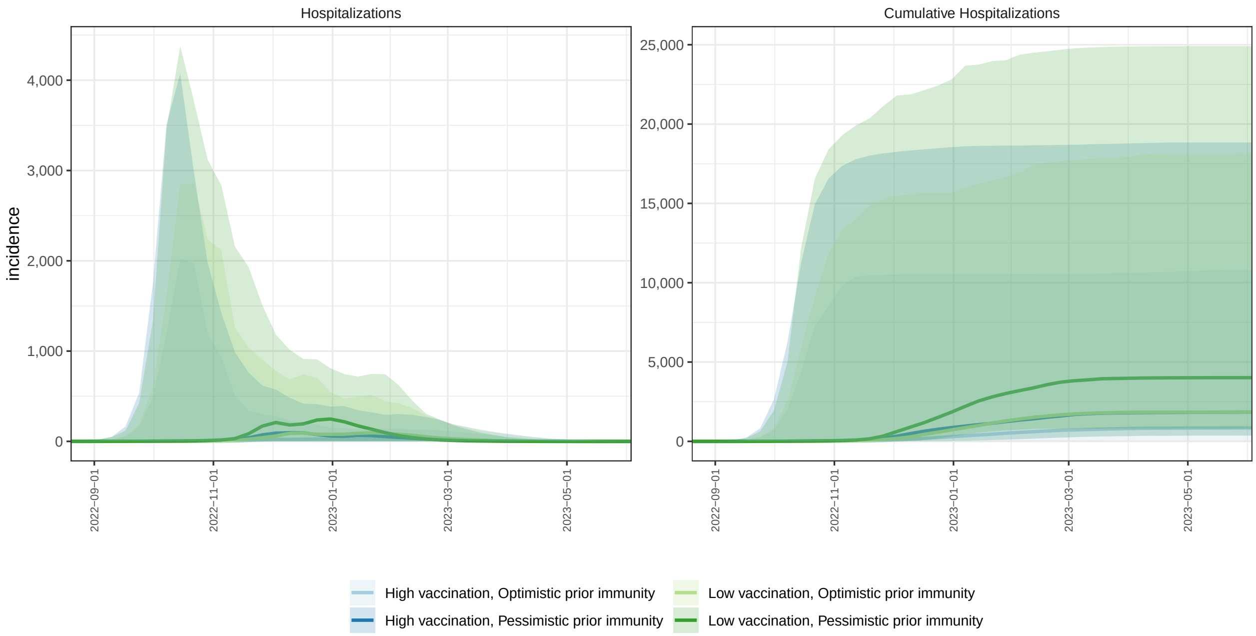


IL ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
0
1,000
2,000
3,000
4,000
5,000
0
10,000
20,000
30,000
40,000
50,000
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

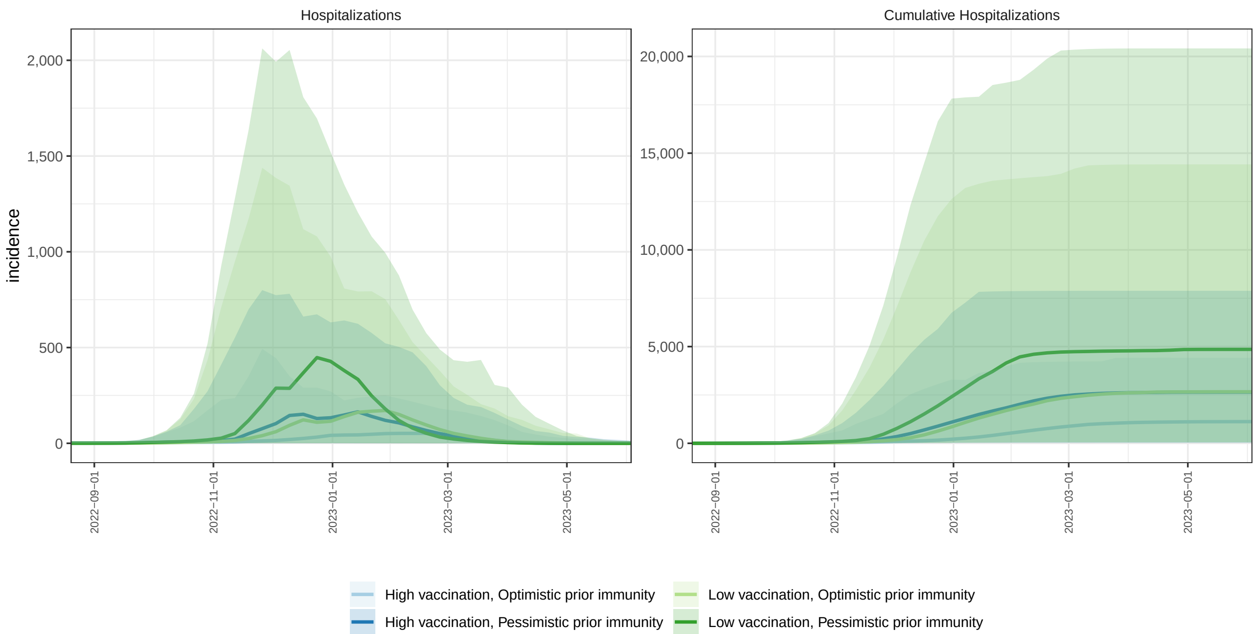

IN ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
8,000
6,000
4,000
2,000
0
40,000
20,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

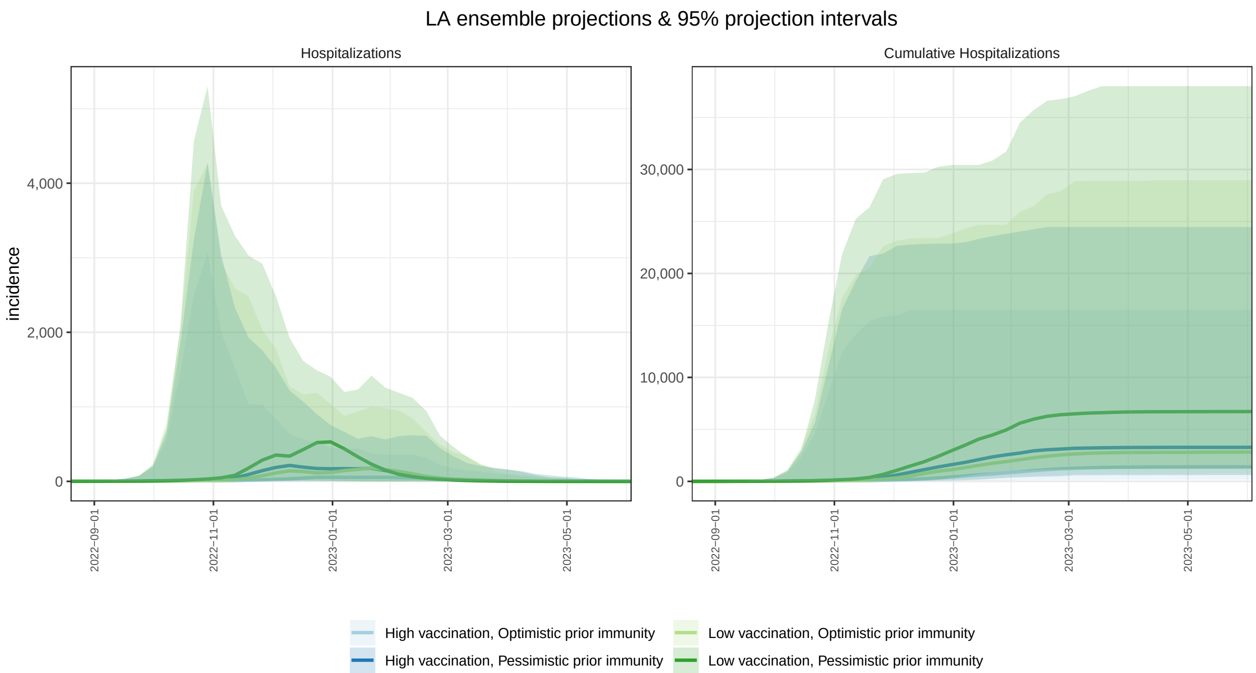

IA ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
4,000
3,000
2,000
1,000
0
25,000
20,000
15,000
10,000
5,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

KS ensemble projections & 95% projection intervals

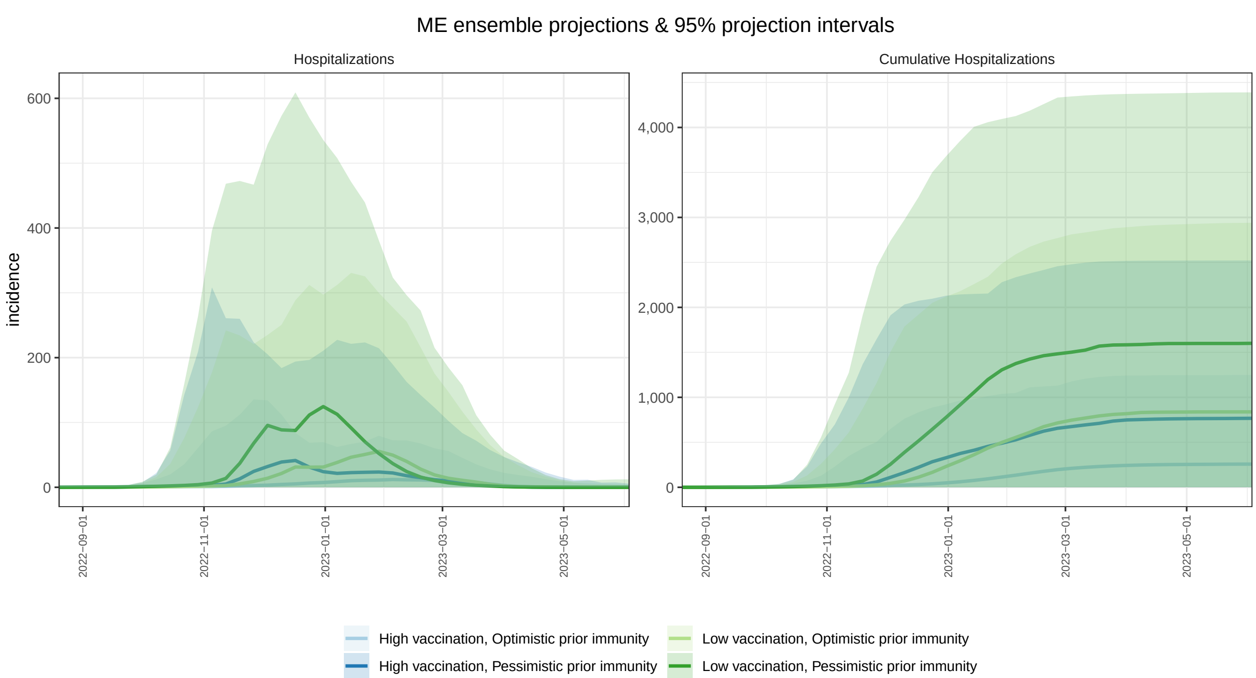


KY ensemble projections & 95% projection intervals

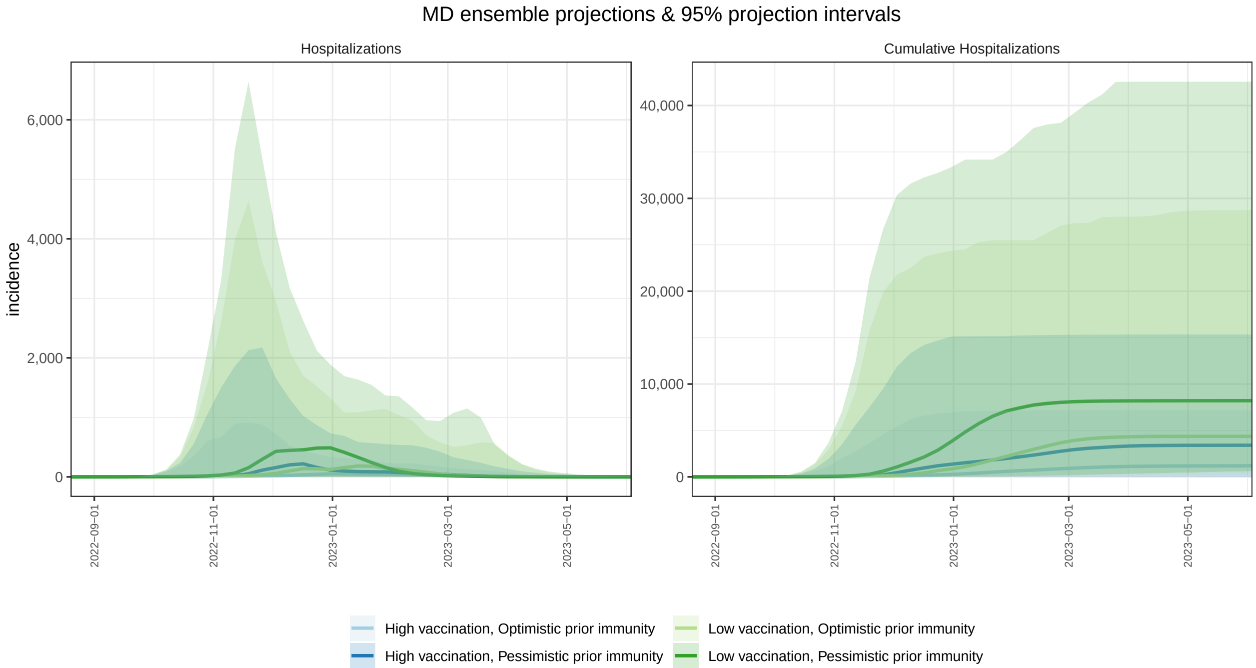




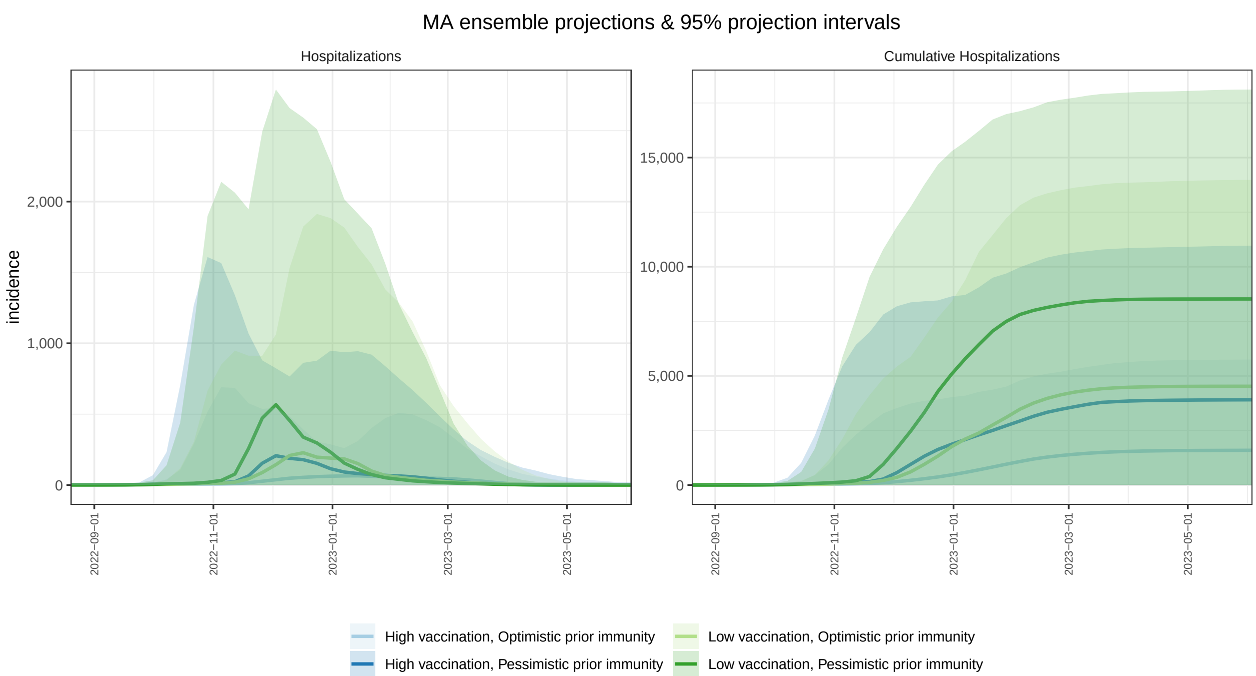
LA ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
4,000
2,000
0
30,000
20,000
10,000
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity



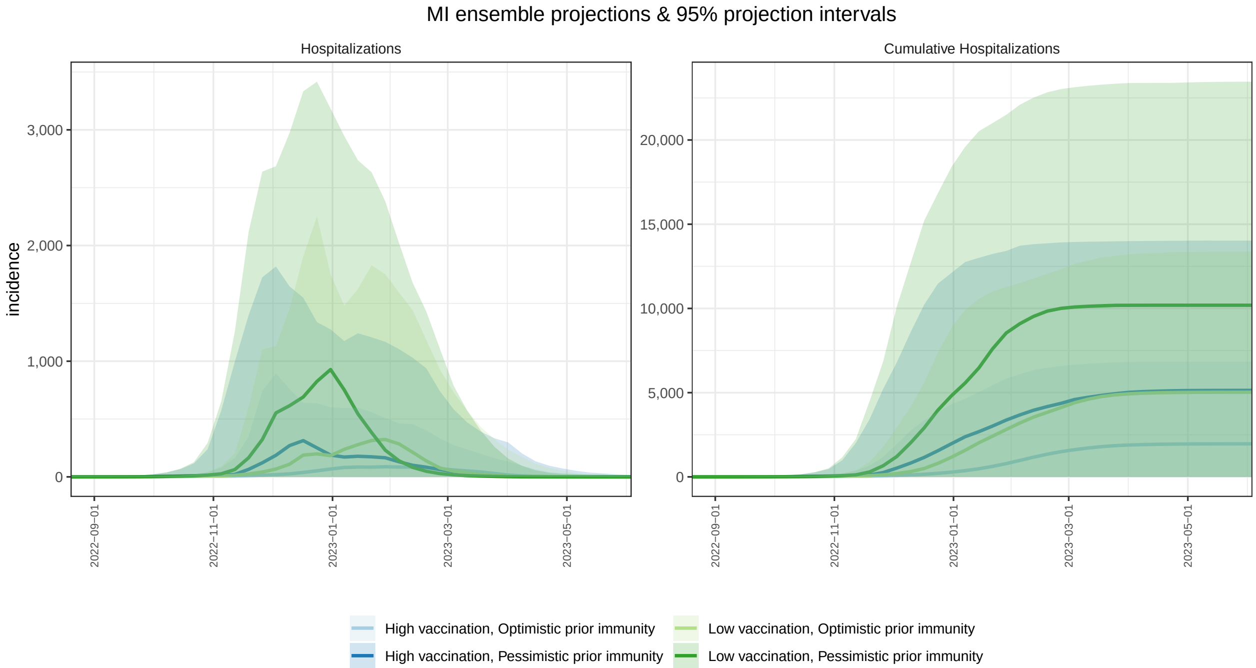
ME ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
600
400
200
0
4,000
3,000
2,000
1,000
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity



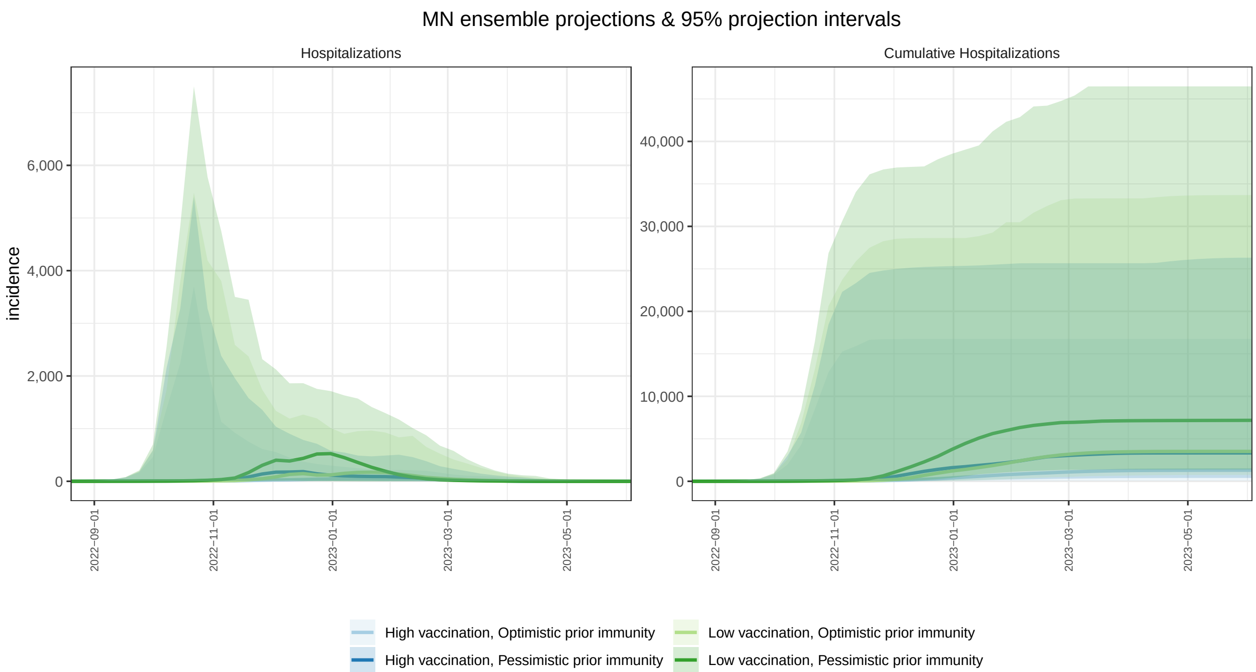
MD ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
6,000
4,000
2,000
0
40,000
30,000
20,000
10,000
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity



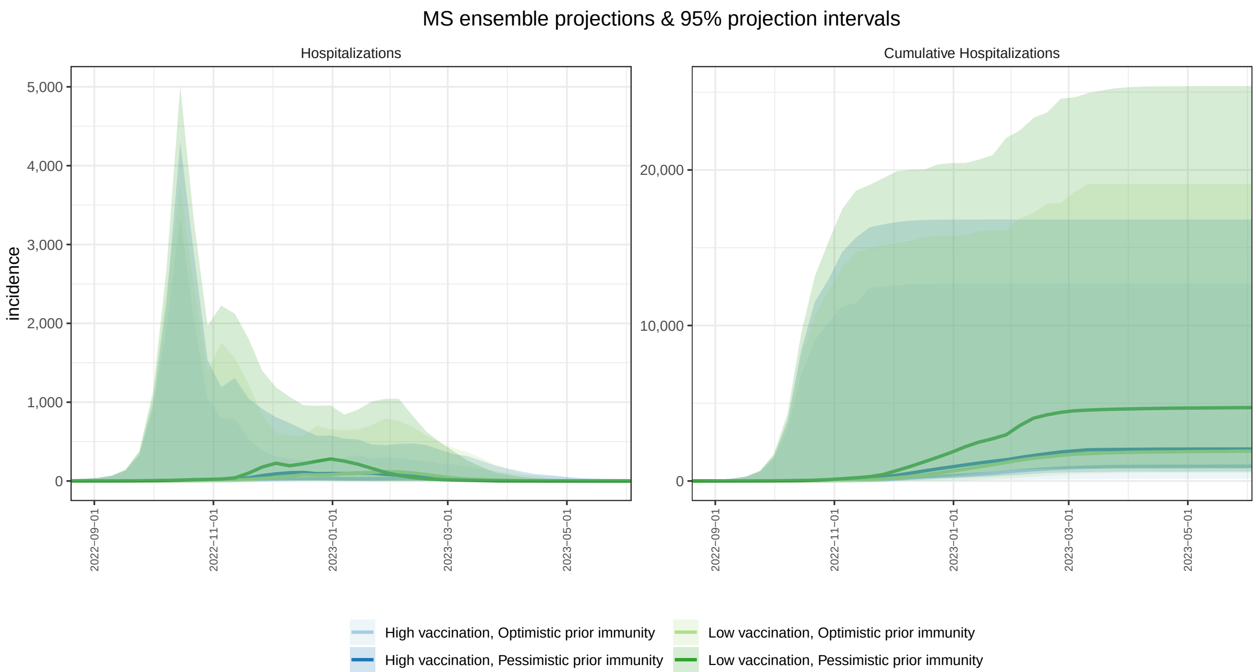
MA ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
2,000
1,000
0
15,000
10,000
5,000
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

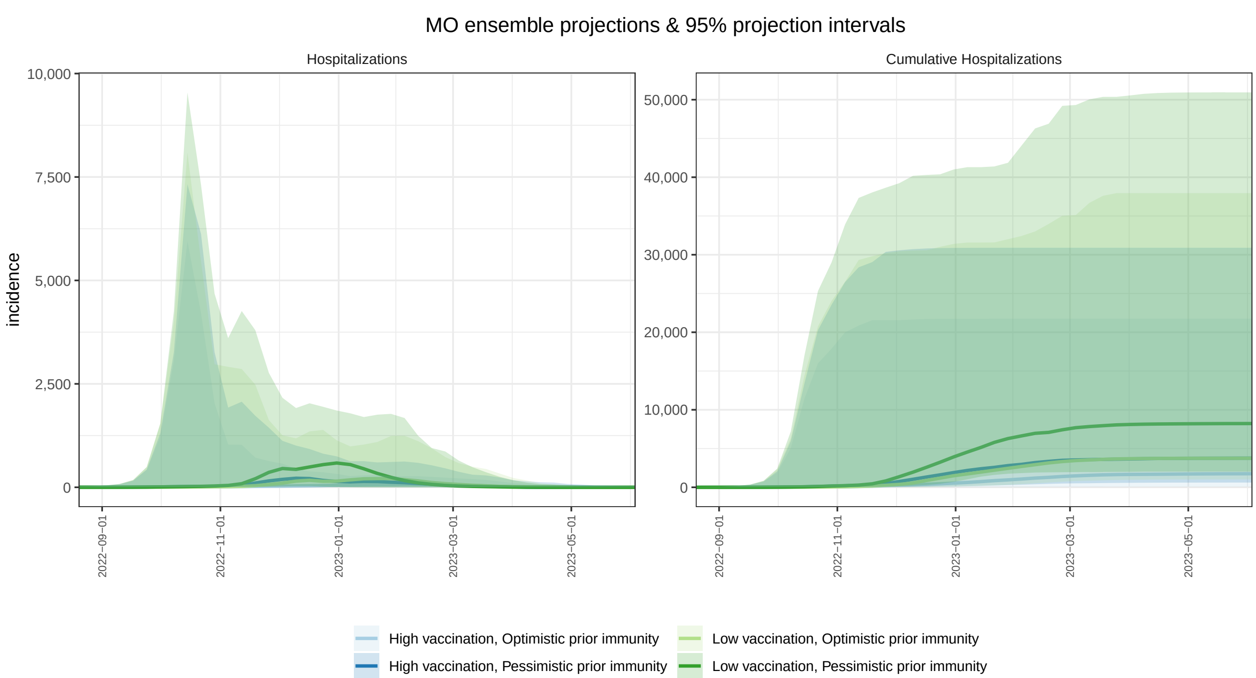


MI ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
3,000
2,000
1,000
0
20,000
15,000
10,000
5,000
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

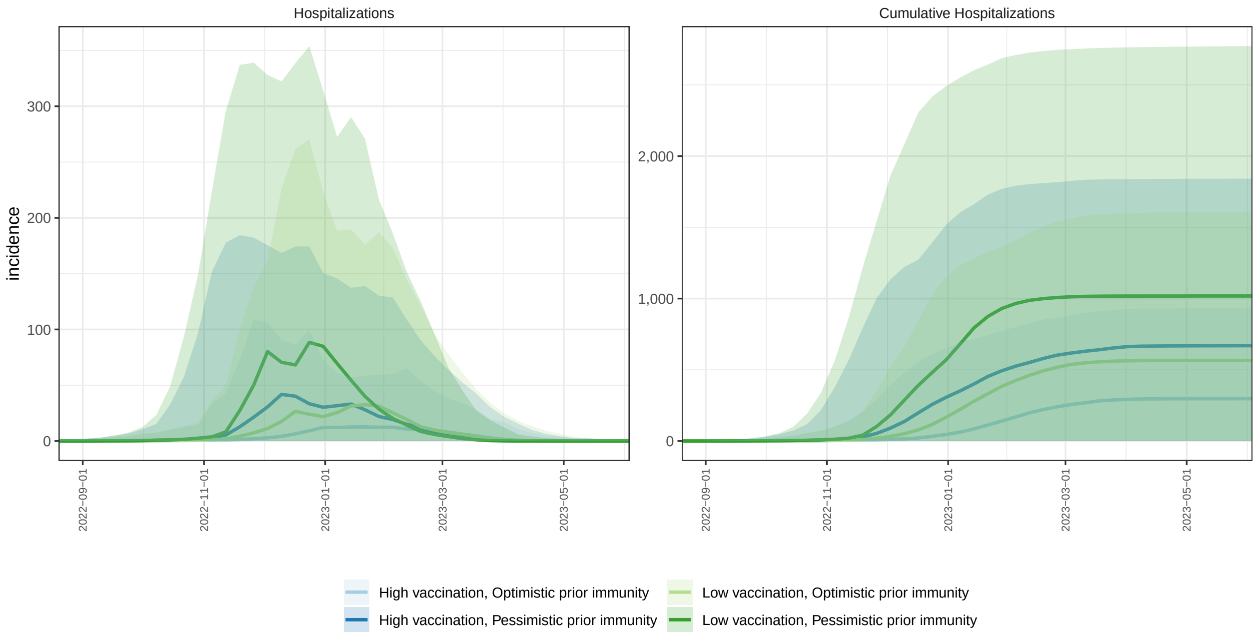


MN ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
6,000
4,000
2,000
0
40,000
30,000
20,000
10,000
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

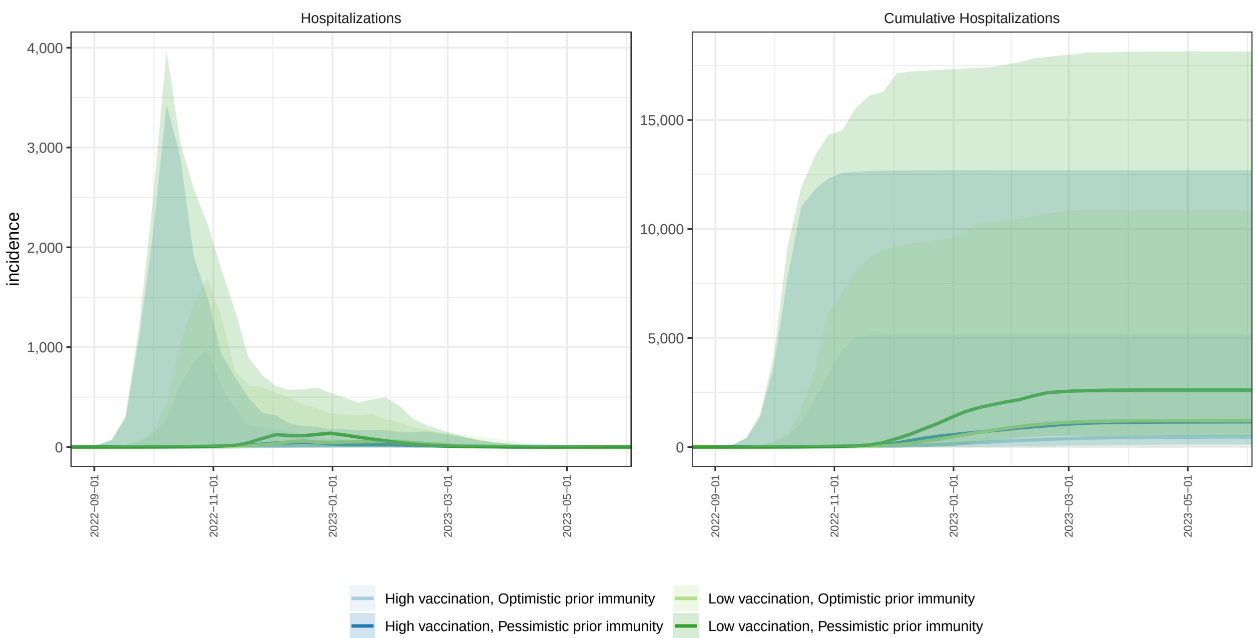

MS ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
5,000
4,000
3,000
2,000
1,000
0
20,000
10,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity


MO ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
10,000
7,500
5,000
2,500
0
50,000
40,000
30,000
20,000
10,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

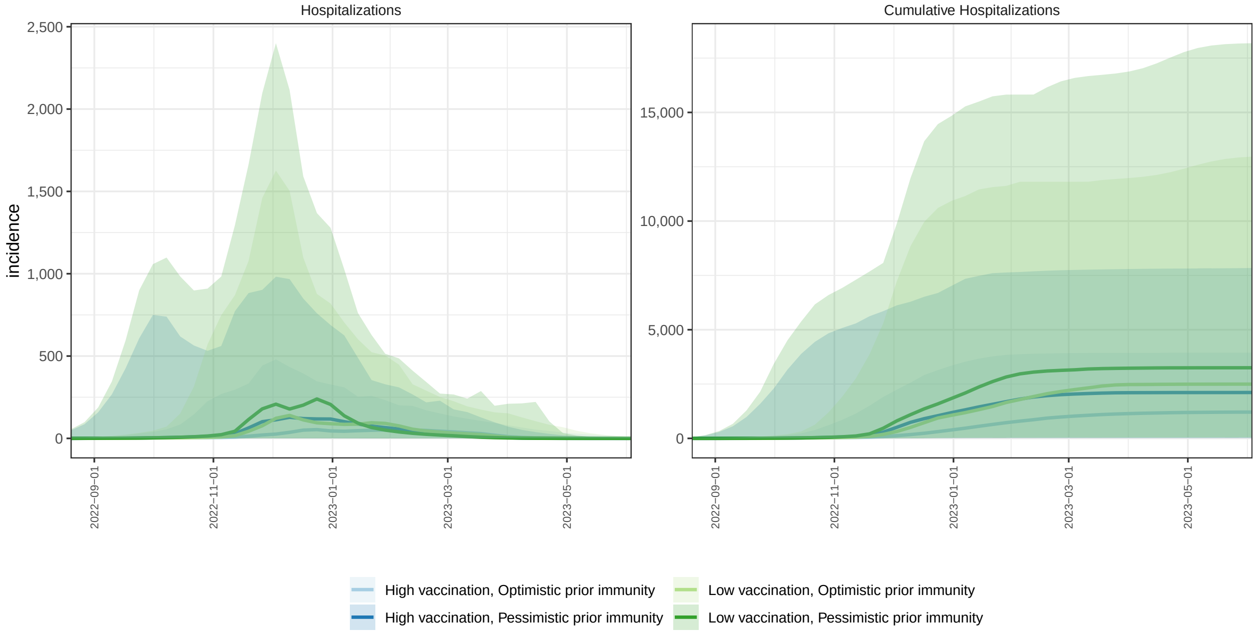
MT ensemble projections & 95% projection intervals



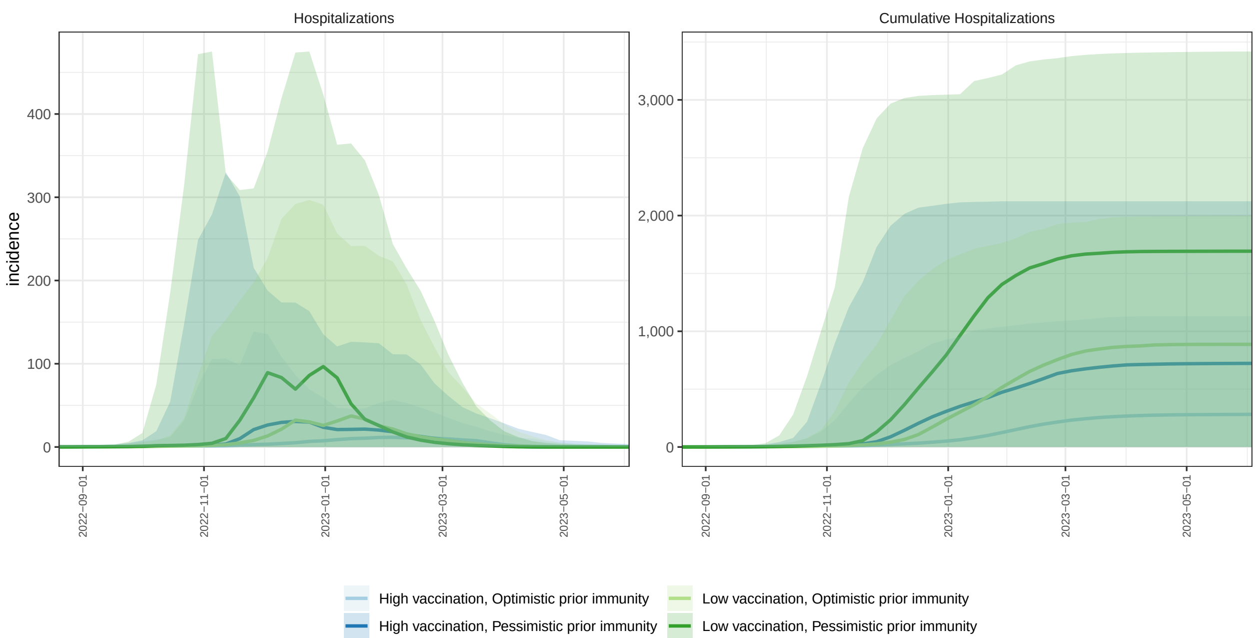
NE ensemble projections & 95% projection intervals



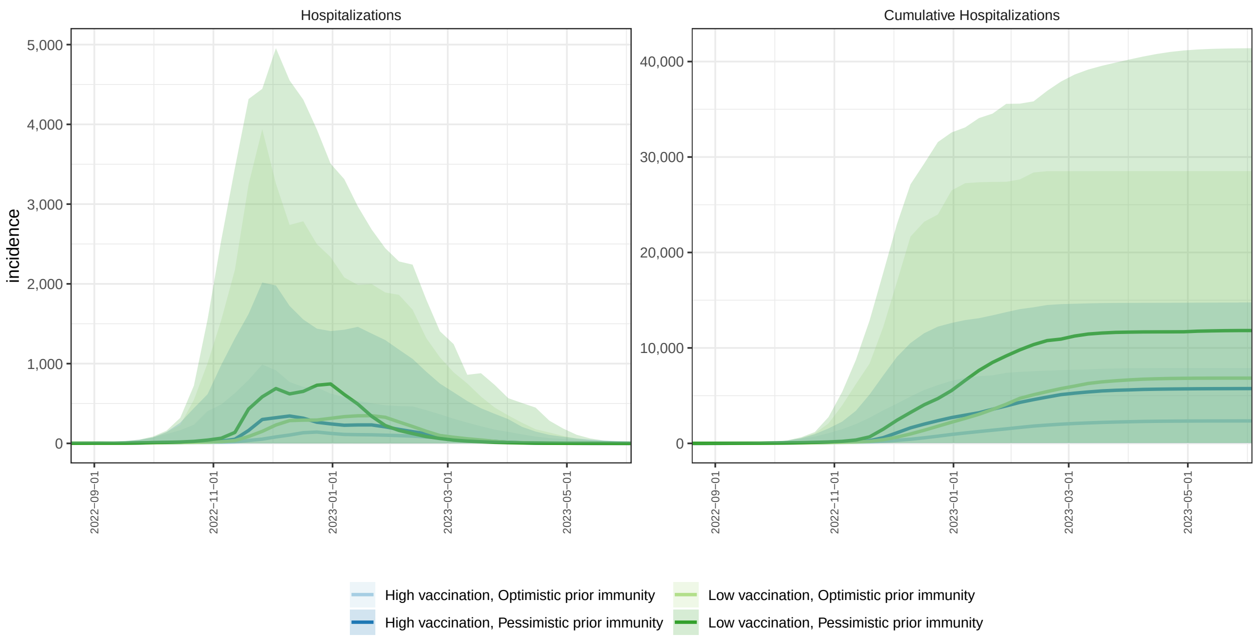
NV ensemble projections & 95% projection intervals



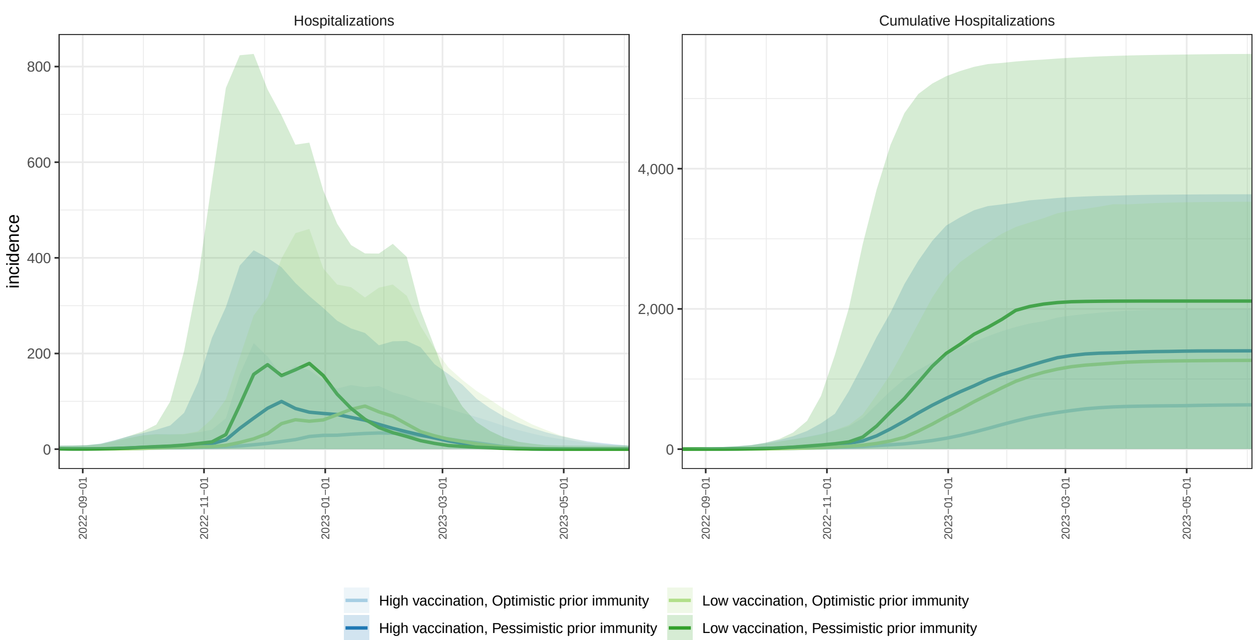
NH ensemble projections & 95% projection intervals

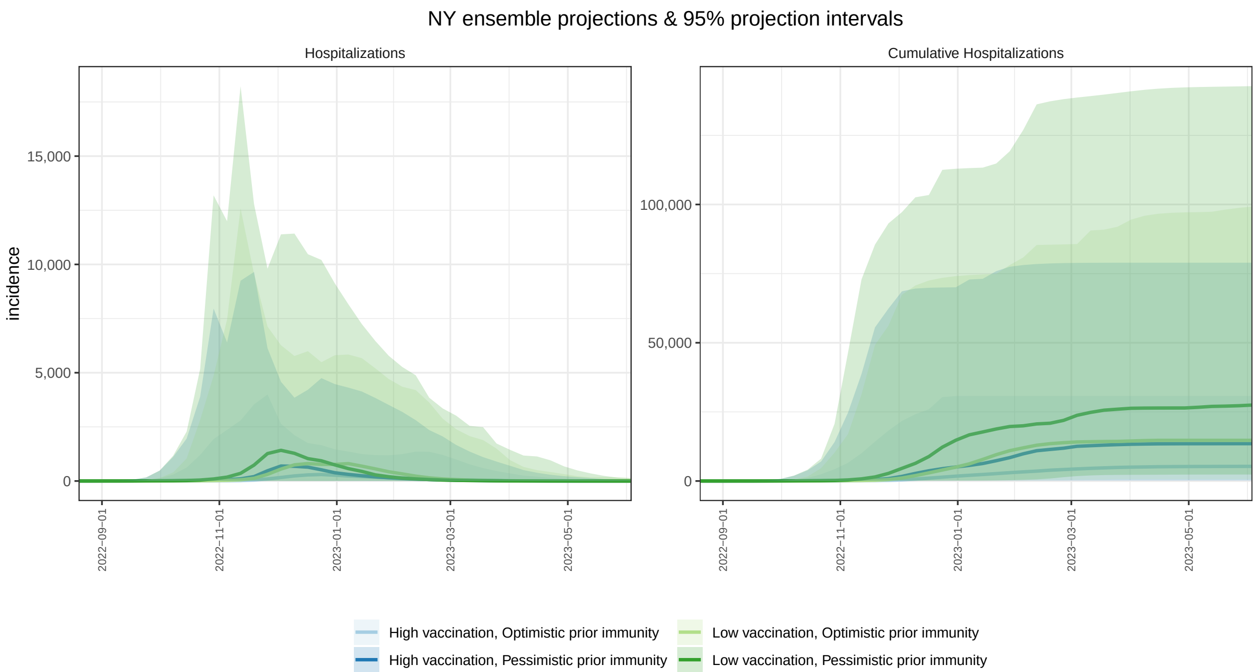


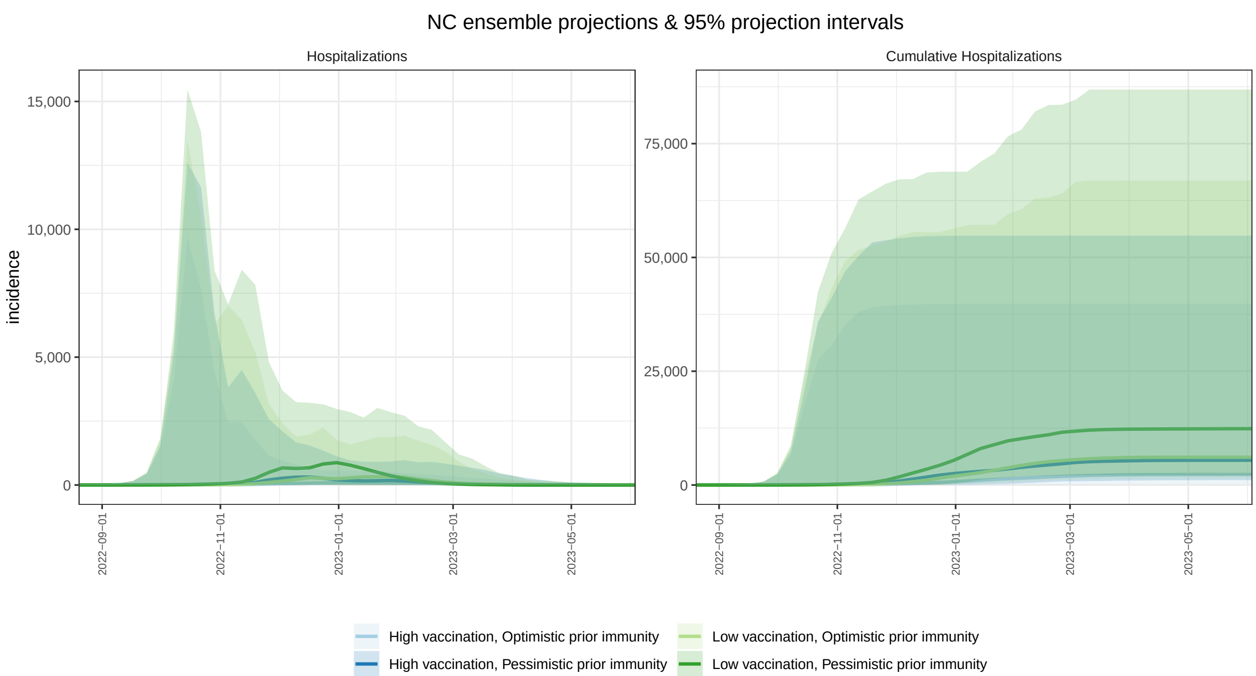
NJ ensemble projections & 95% projection intervals

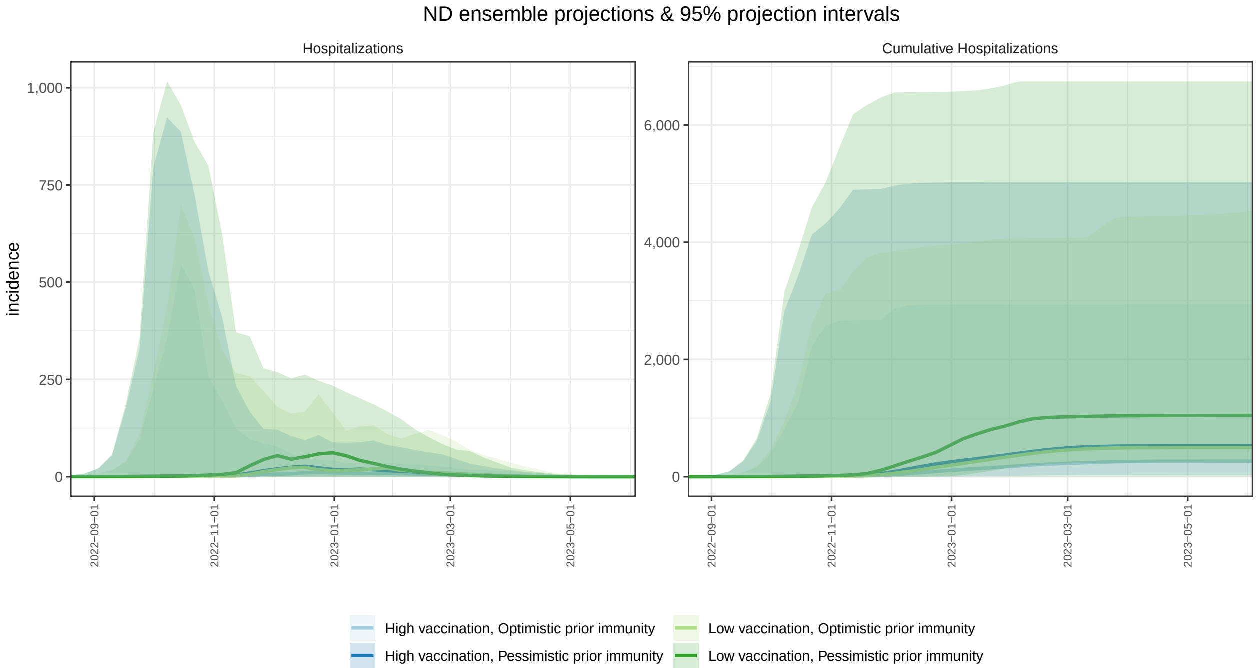


NM ensemble projections & 95% projection intervals

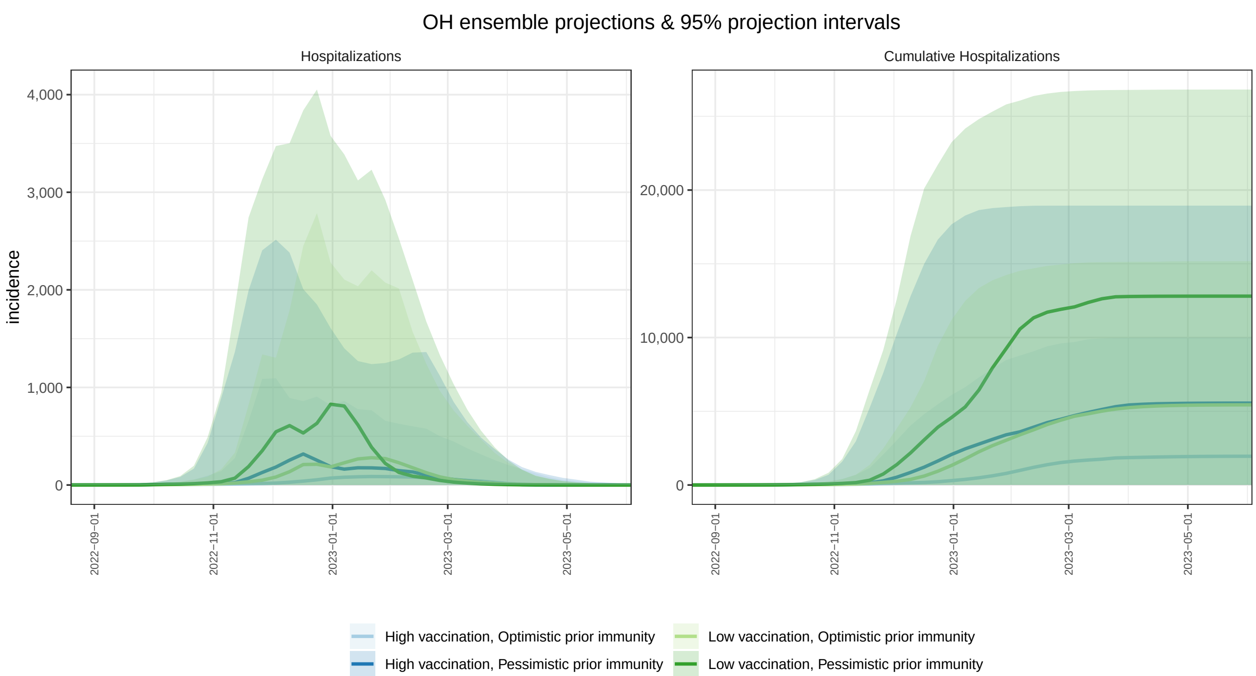



NY ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
15,000
10,000
5,000
0
100,000
50,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

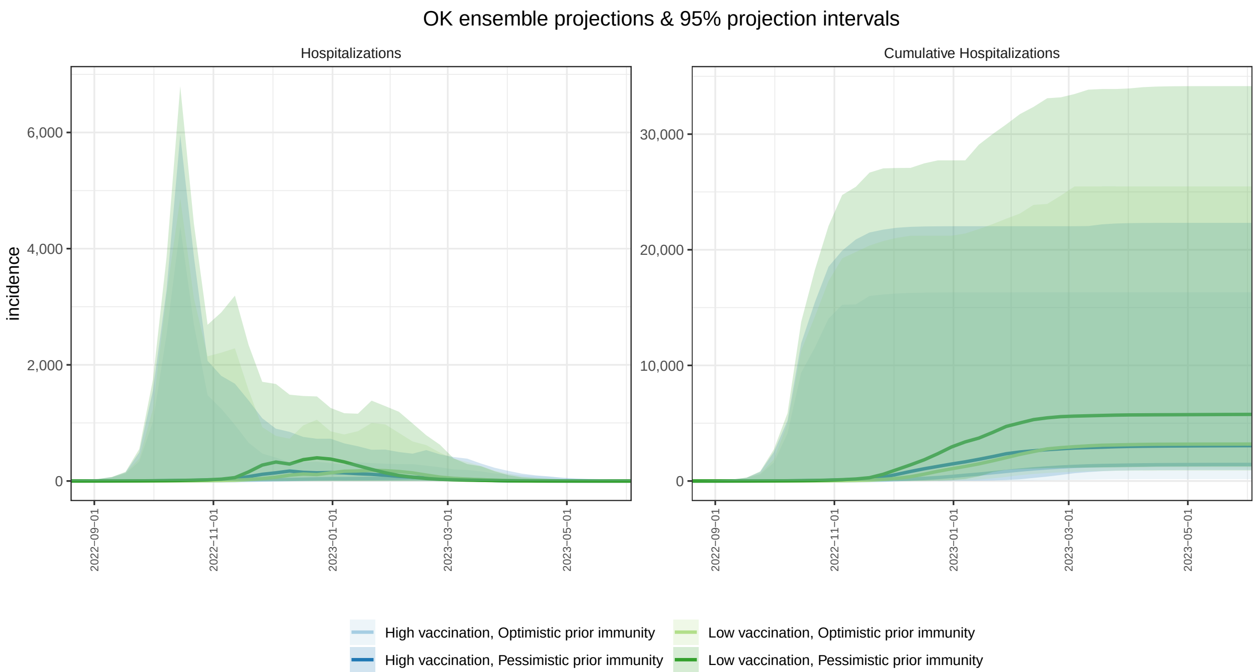

NC ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
15,000
10,000
5,000
0
75,000
50,000
25,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

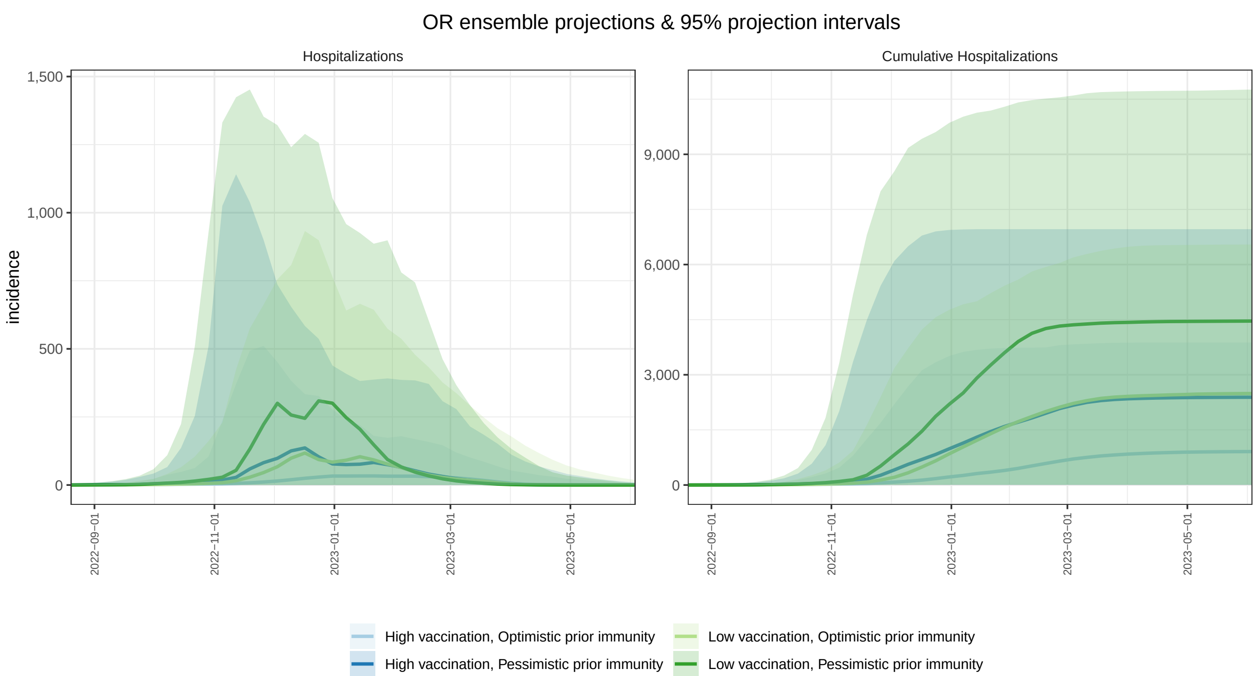


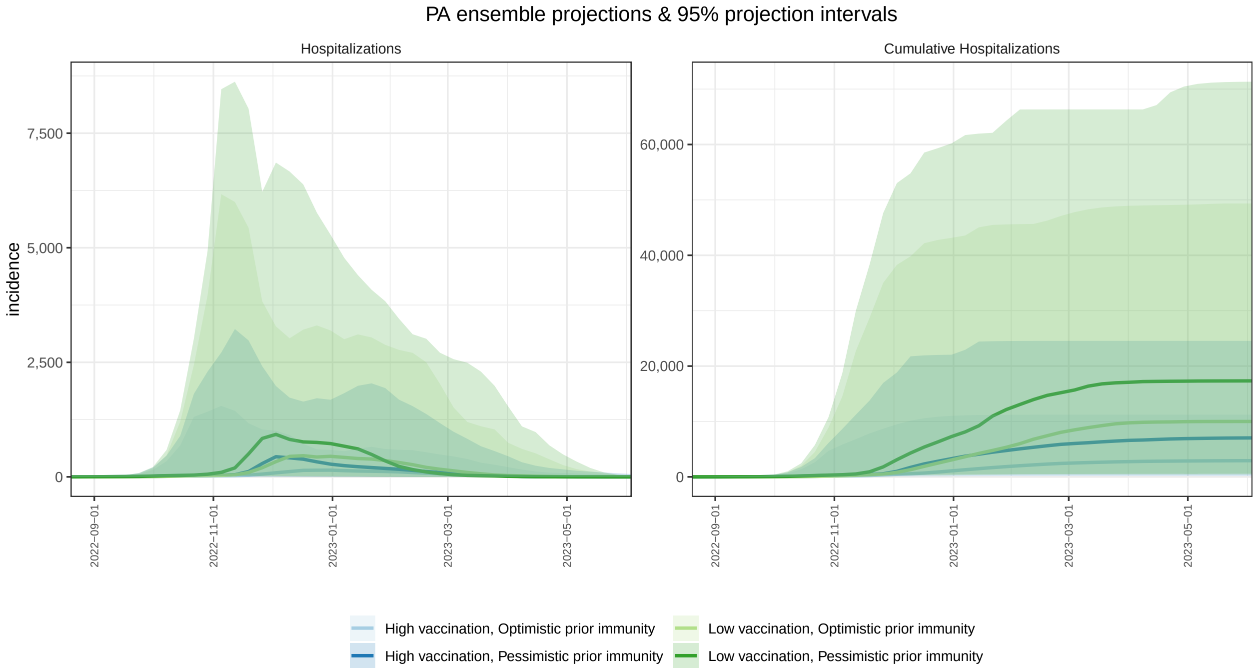
ND ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
1,000
750
500
250
0
6,000
4,000
2,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity



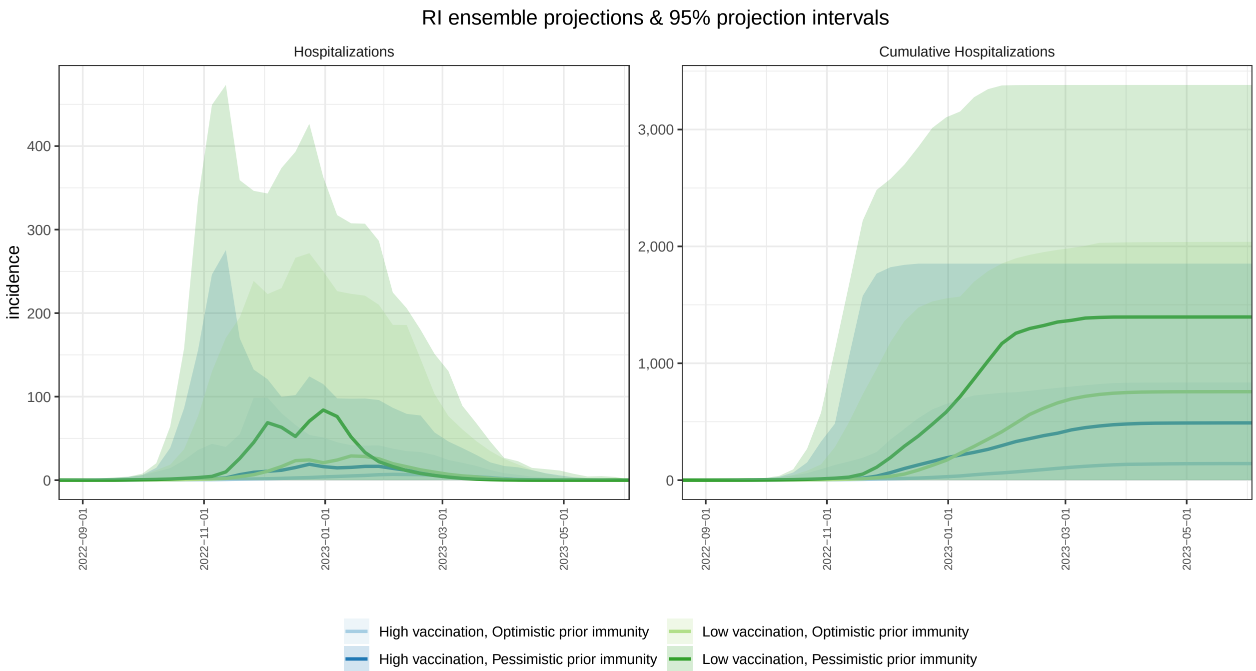
OH ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
4,000
3,000
2,000
1,000
0
20,000
10,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity


OK ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
6,000
4,000
2,000
0
30,000
20,000
10,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity


OR ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
1,500
1,000
500
0
9,000
6,000
3,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

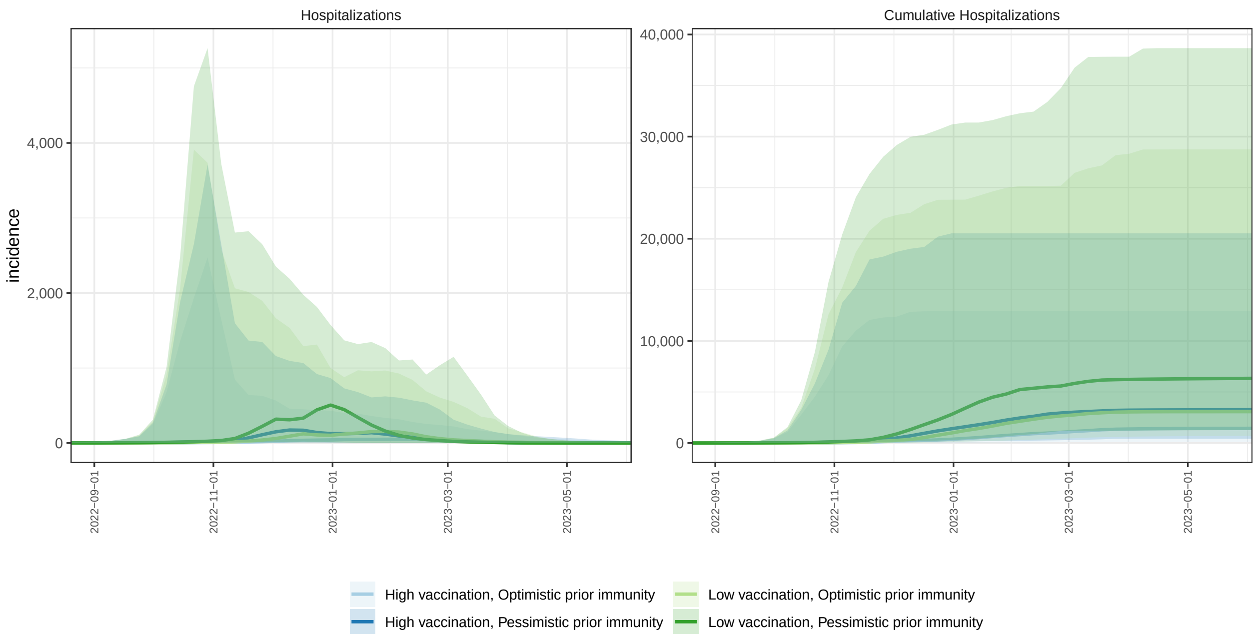


PA ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
7,500
5,000
2,500
0
60,000
40,000
20,000
2022-09-01
2022-11-01
2023-01-01
2023-03-01
2023-05-01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

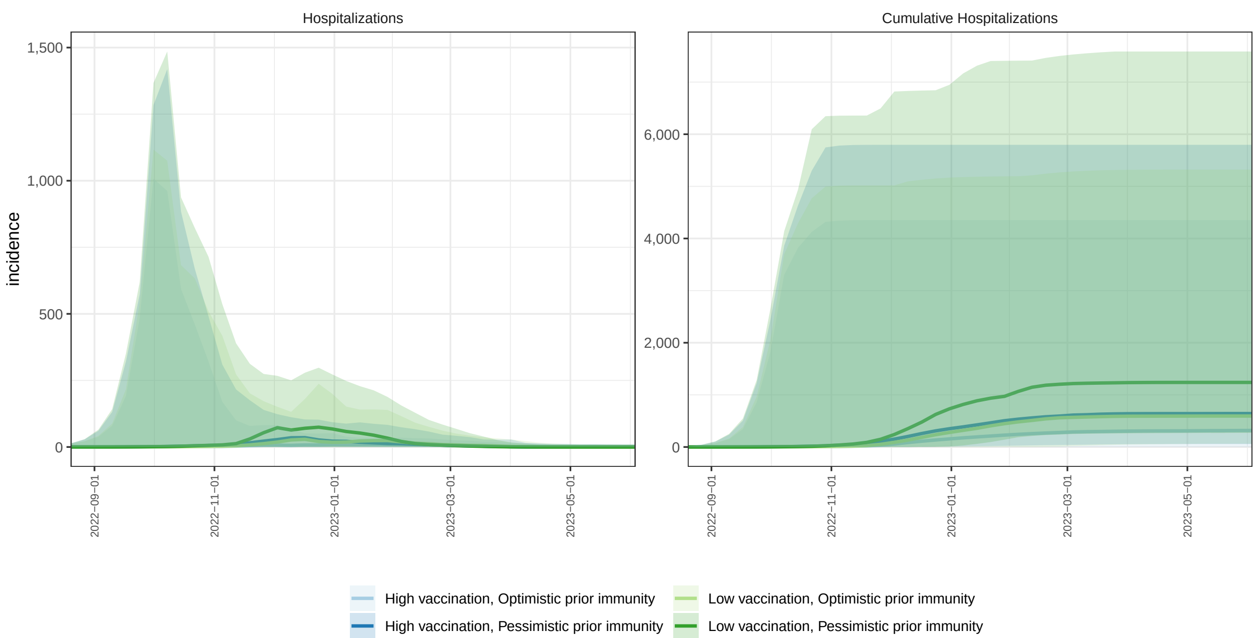


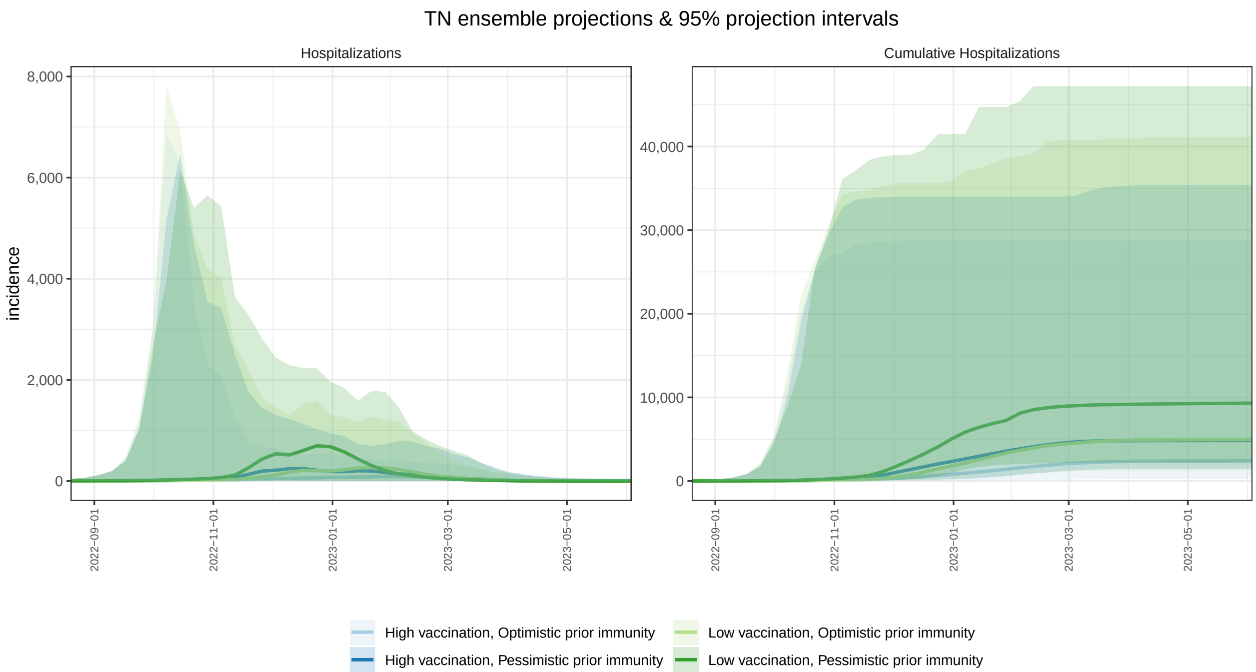
RI ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
400
300
200
100
0
3,000
2,000
1,000
2022-09-01
2022-11-01
2023-01-01
2023-03-01
2023-05-01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

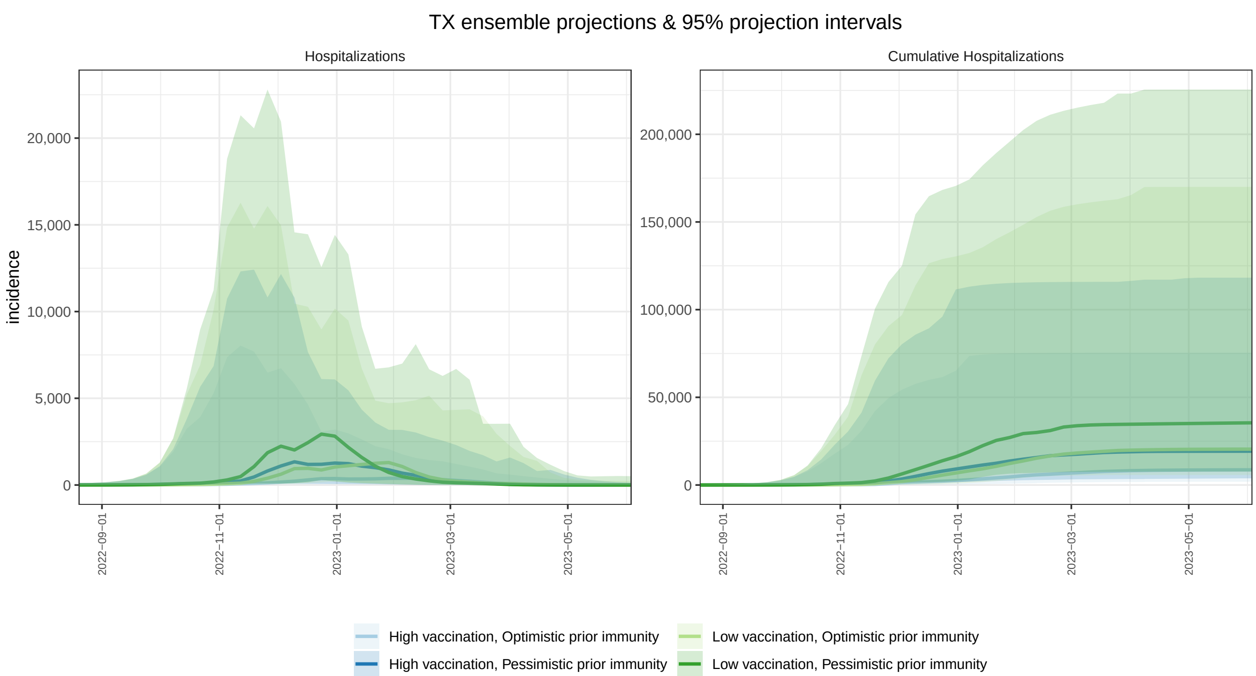
SC ensemble projections & 95% projection intervals

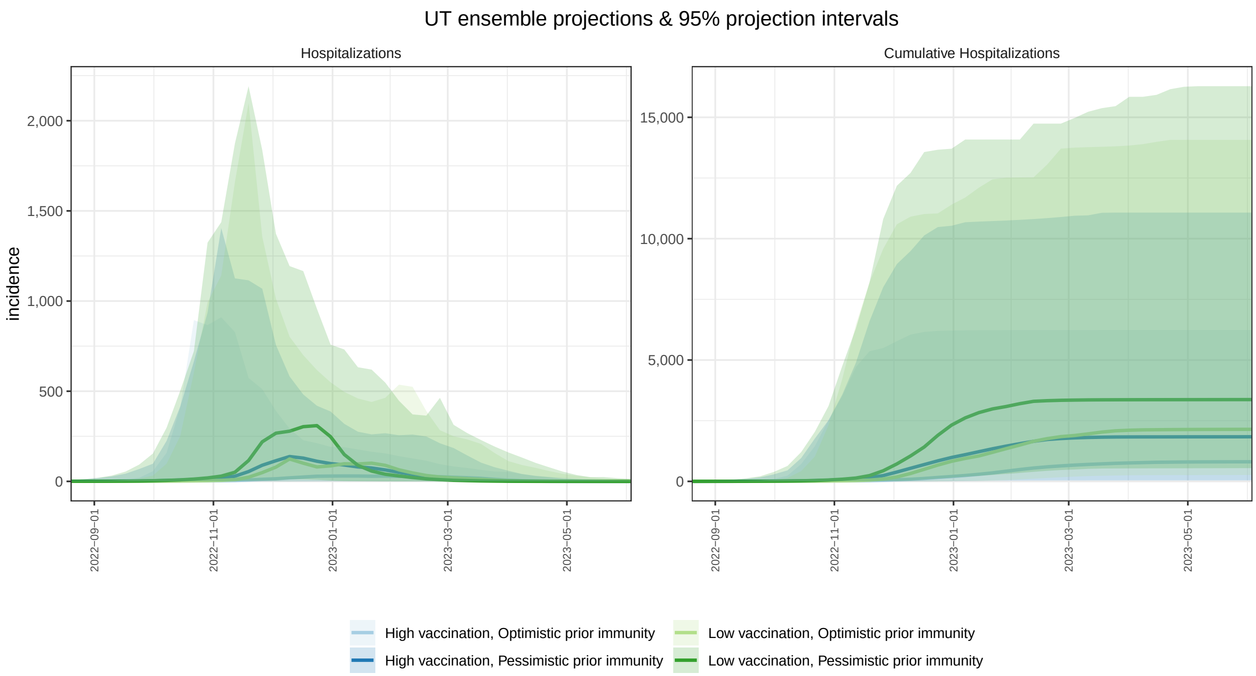


SD ensemble projections & 95% projection intervals

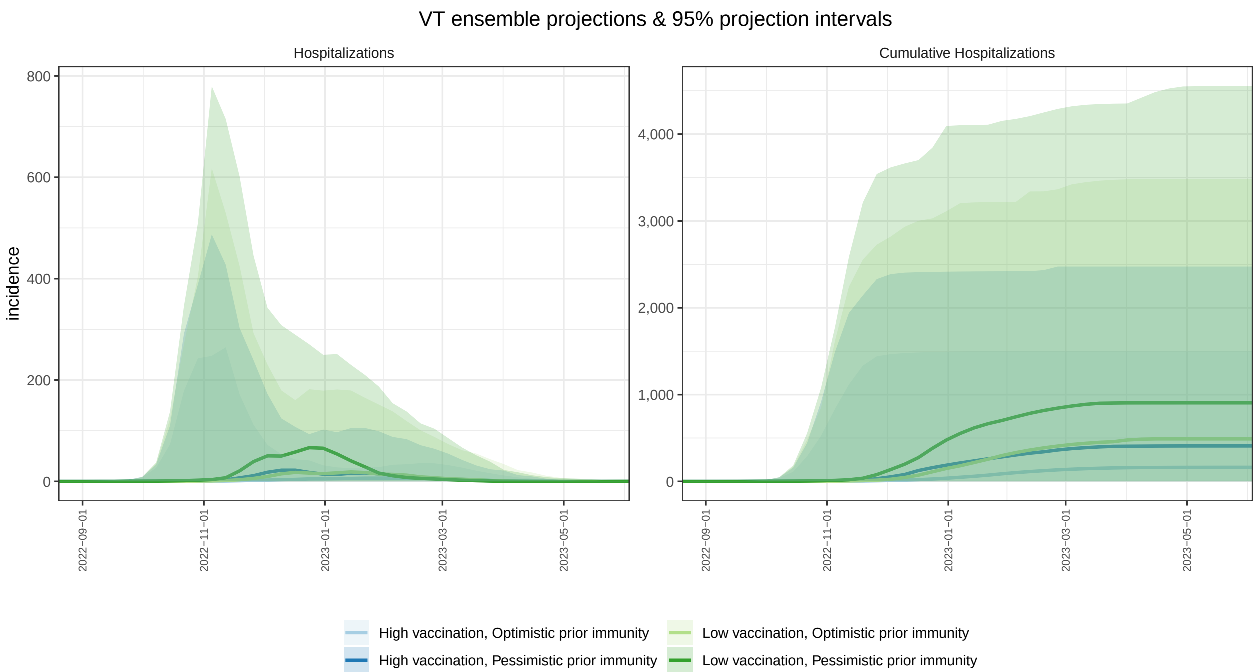



TN ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
8,000
6,000
4,000
2,000
0
40,000
30,000
20,000
10,000
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

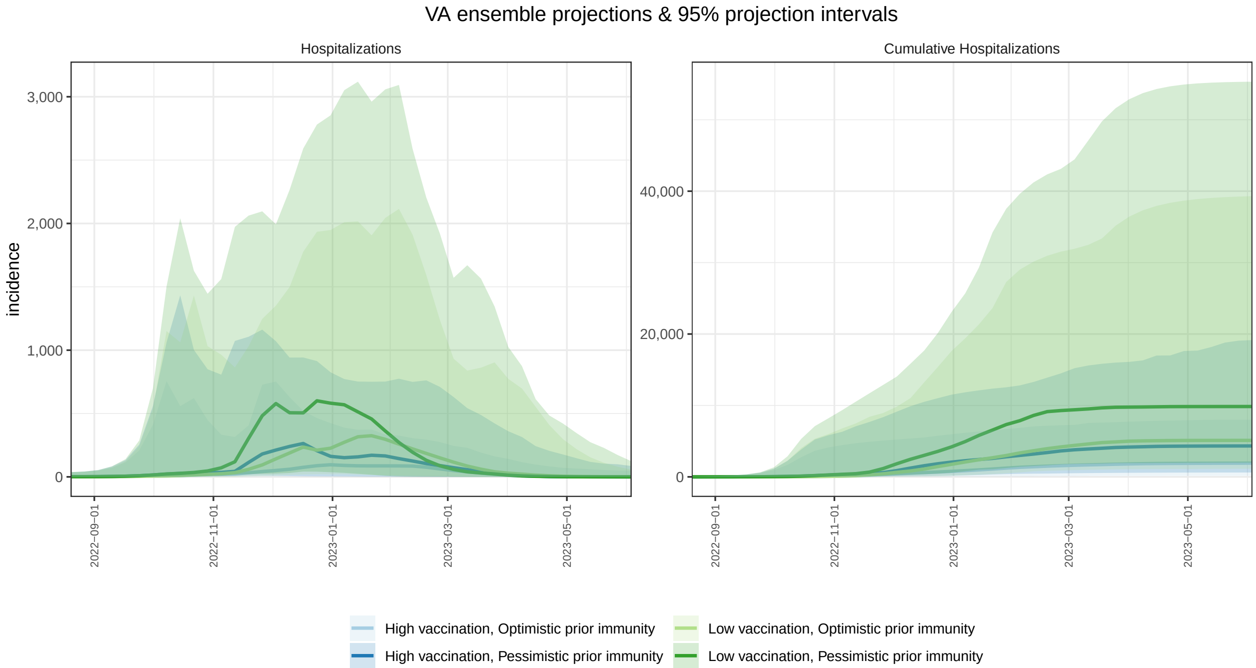

TX ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
20,000
15,000
10,000
5,000
0
200,000
150,000
100,000
50,000
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

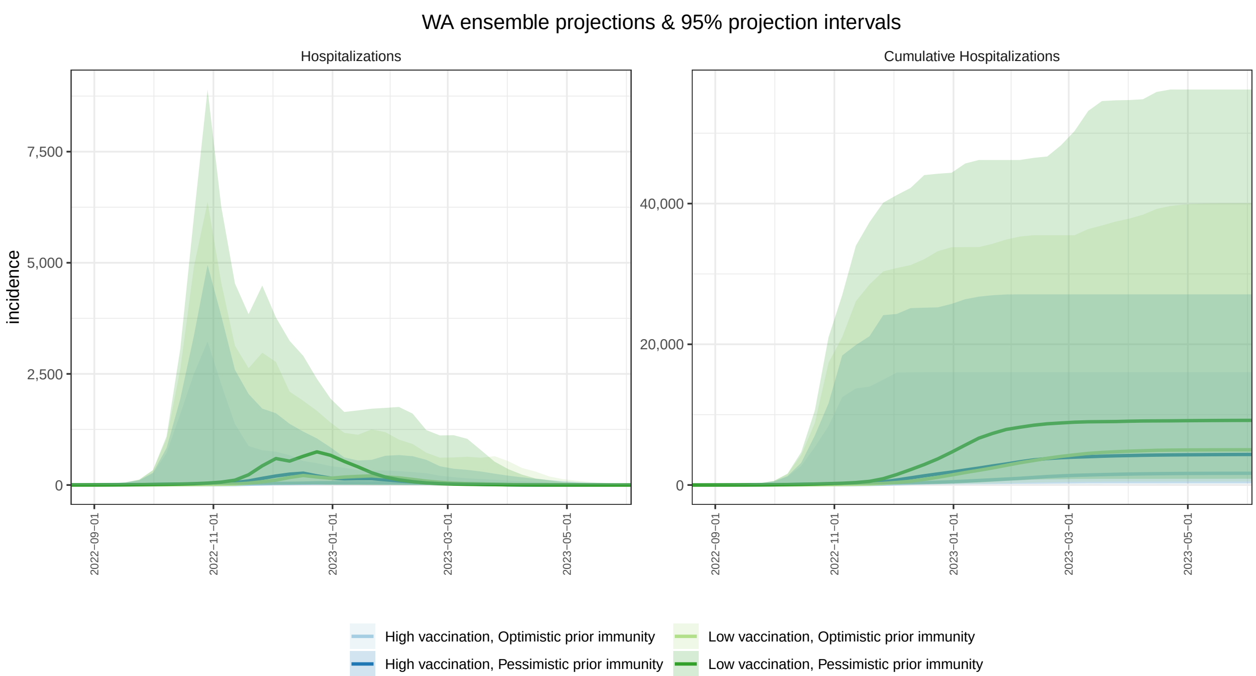


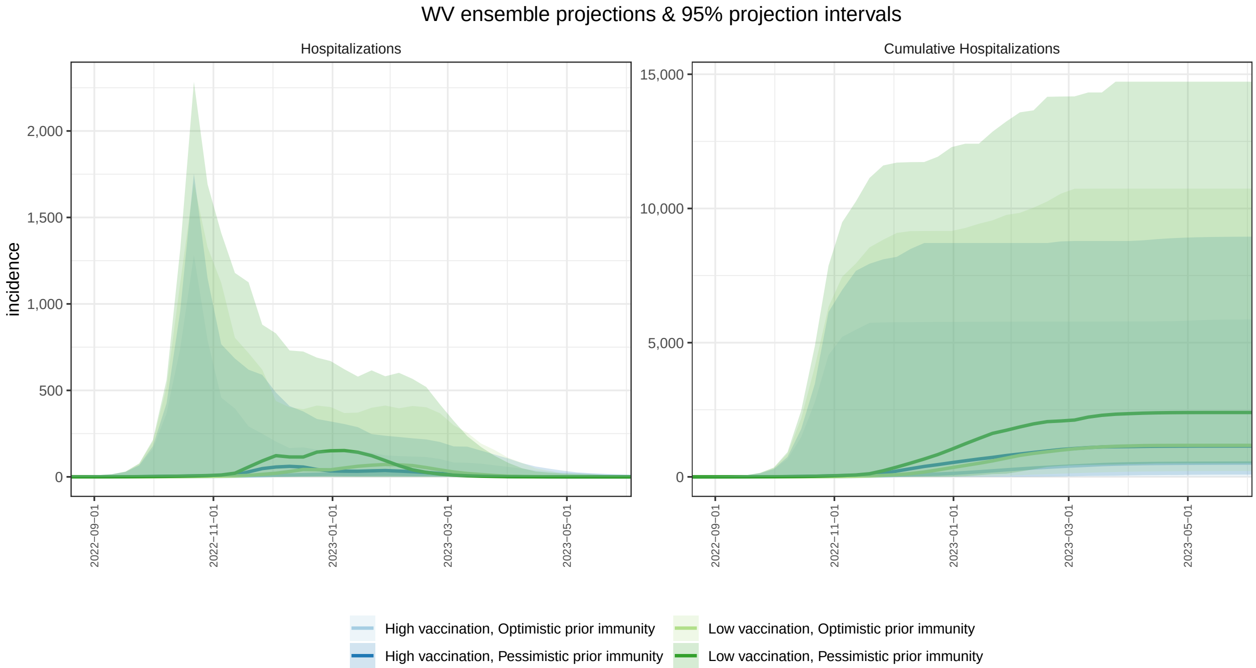
UT ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

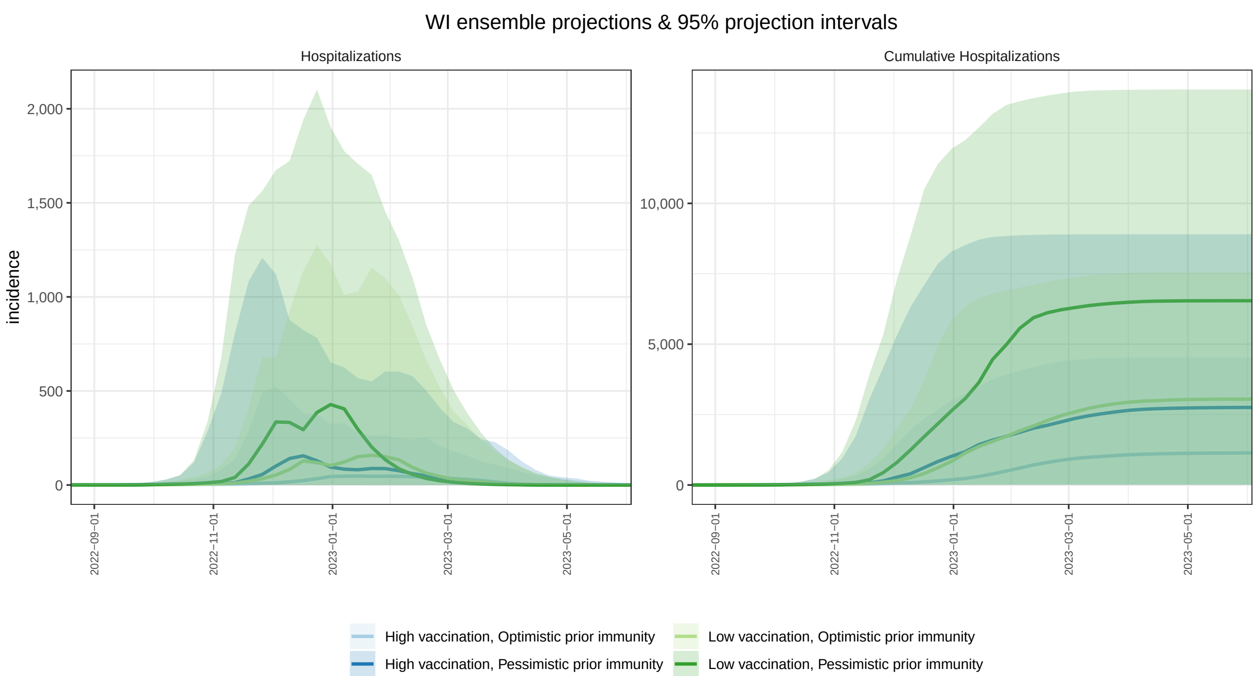


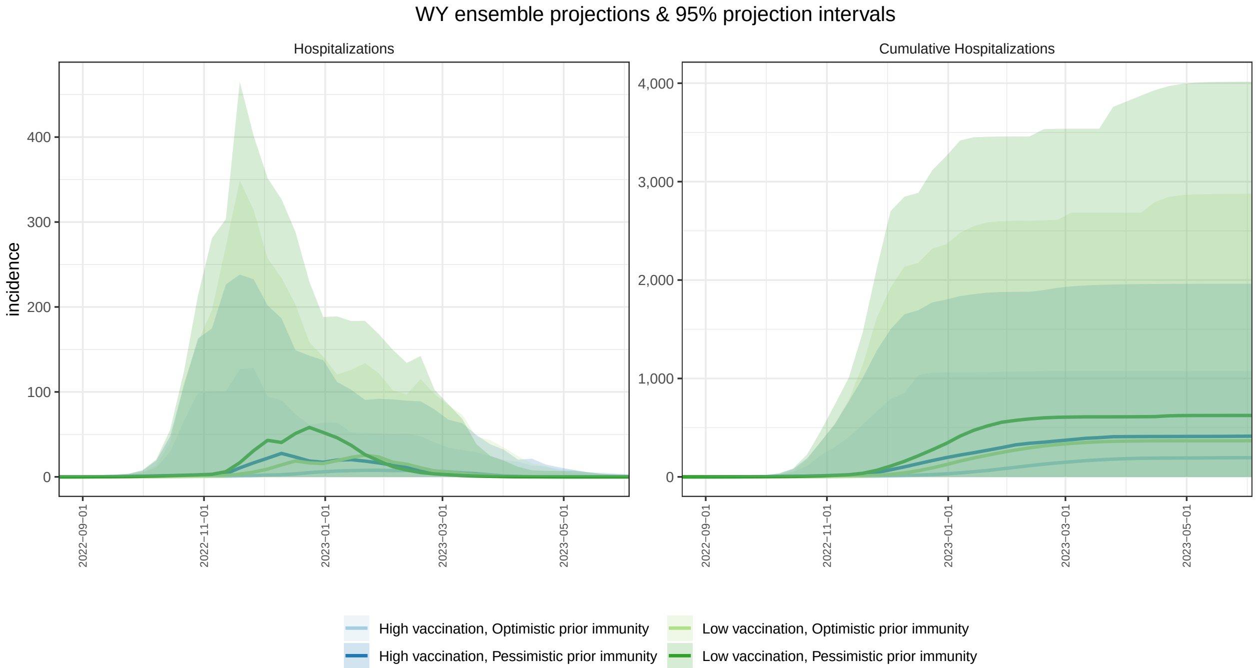
VT ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

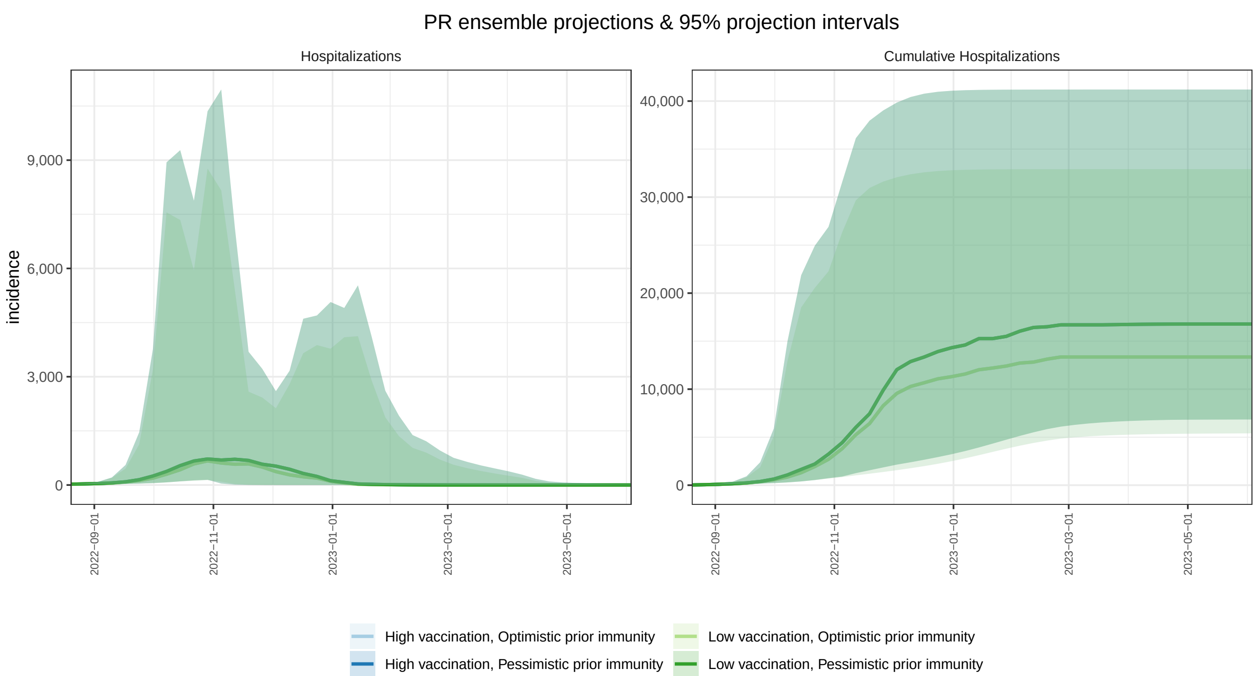

VA ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
3,000
2,000
1,000
0
40,000
20,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity


WA ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
7,500
5,000
2,500
0
40,000
20,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity


WV ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
2,000
1,500
1,000
500
0
15,000
10,000
5,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

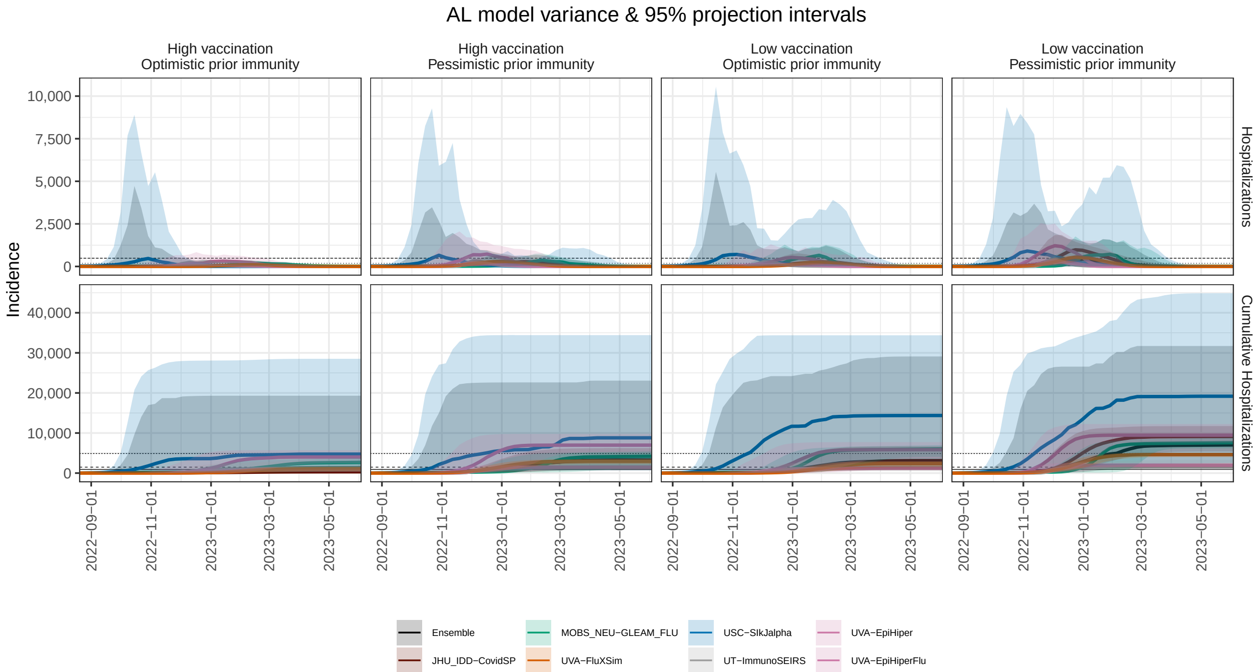

WI ensemble projections & 95% projection intervals
Hospitalizations
Cumulative Hospitalizations
incidence
2,000
1,500
1,000
500
0
10,000
5,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
High vaccination, Optimistic prior immunity
High vaccination, Pessimistic prior immunity
Low vaccination, Optimistic prior immunity
Low vaccination, Pessimistic prior immunity

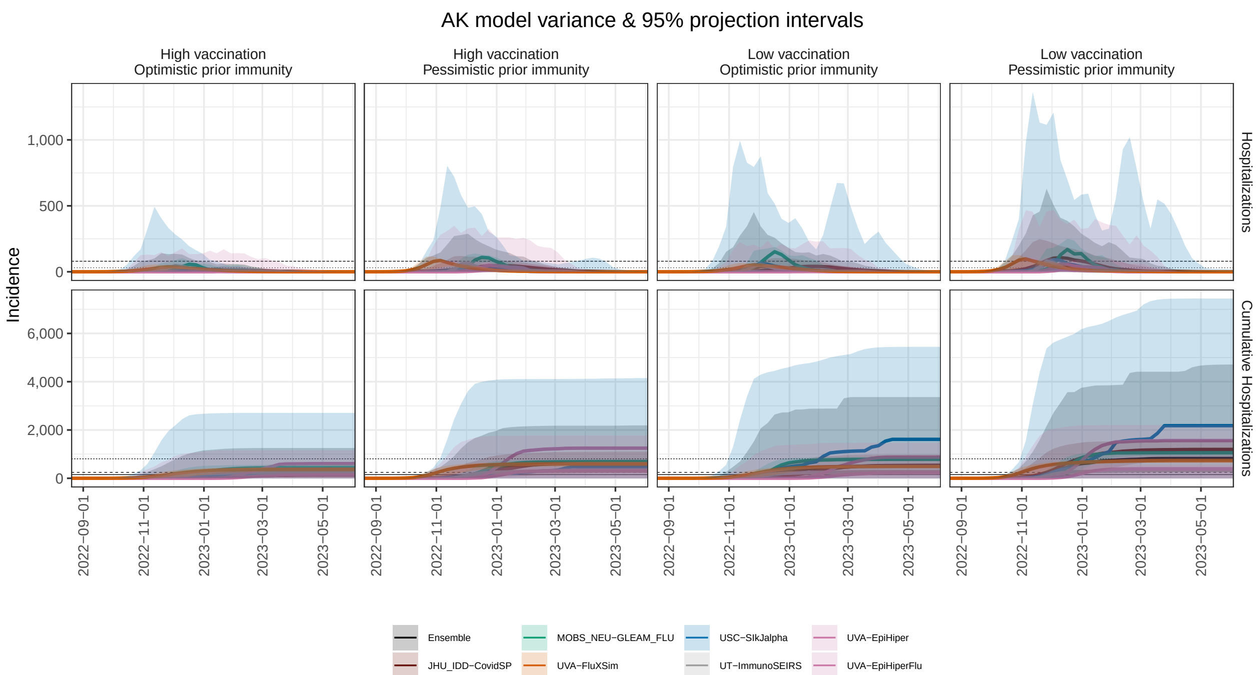


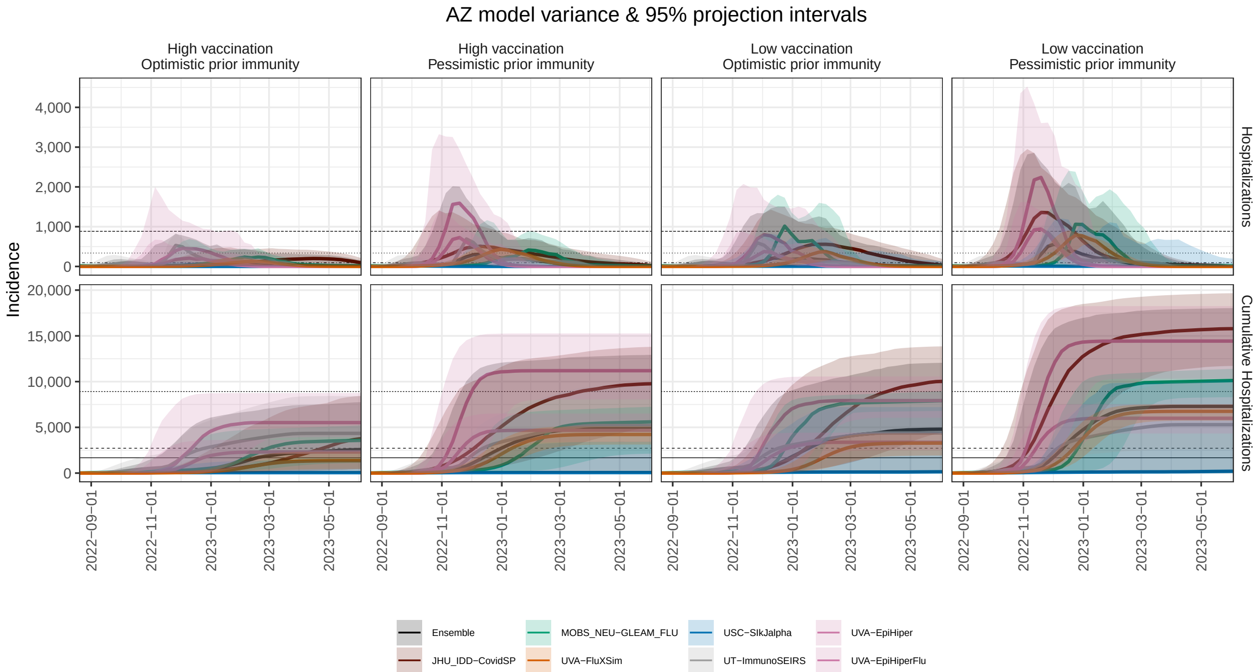


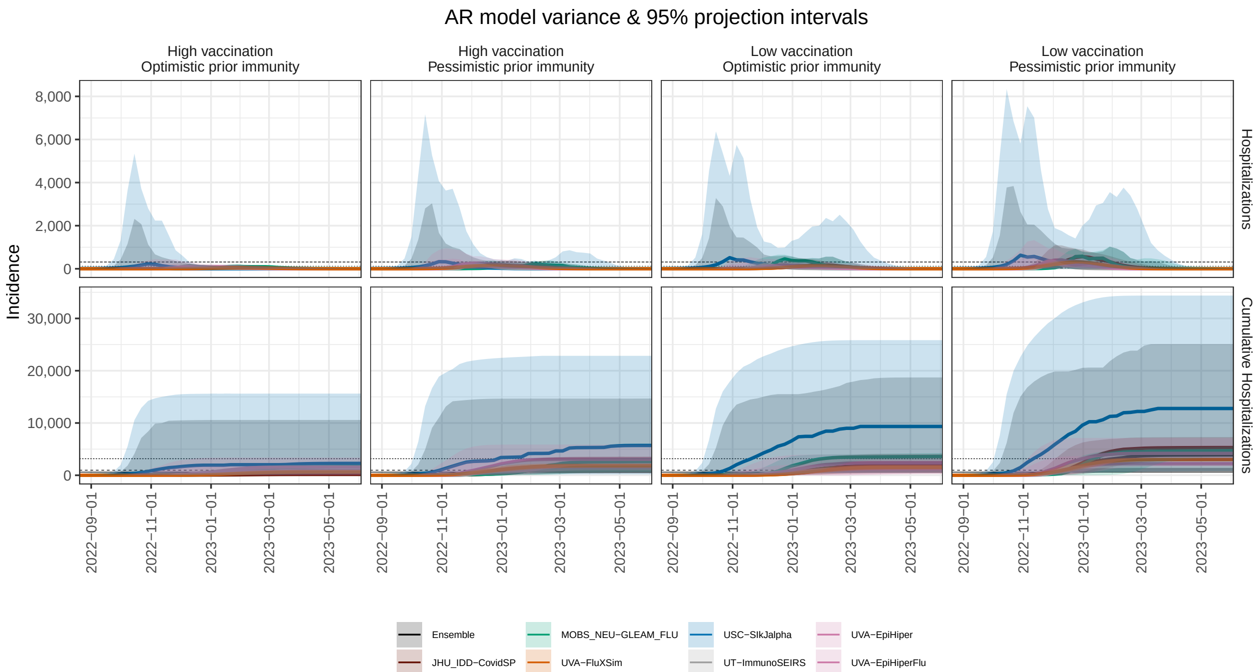
State-level model variation

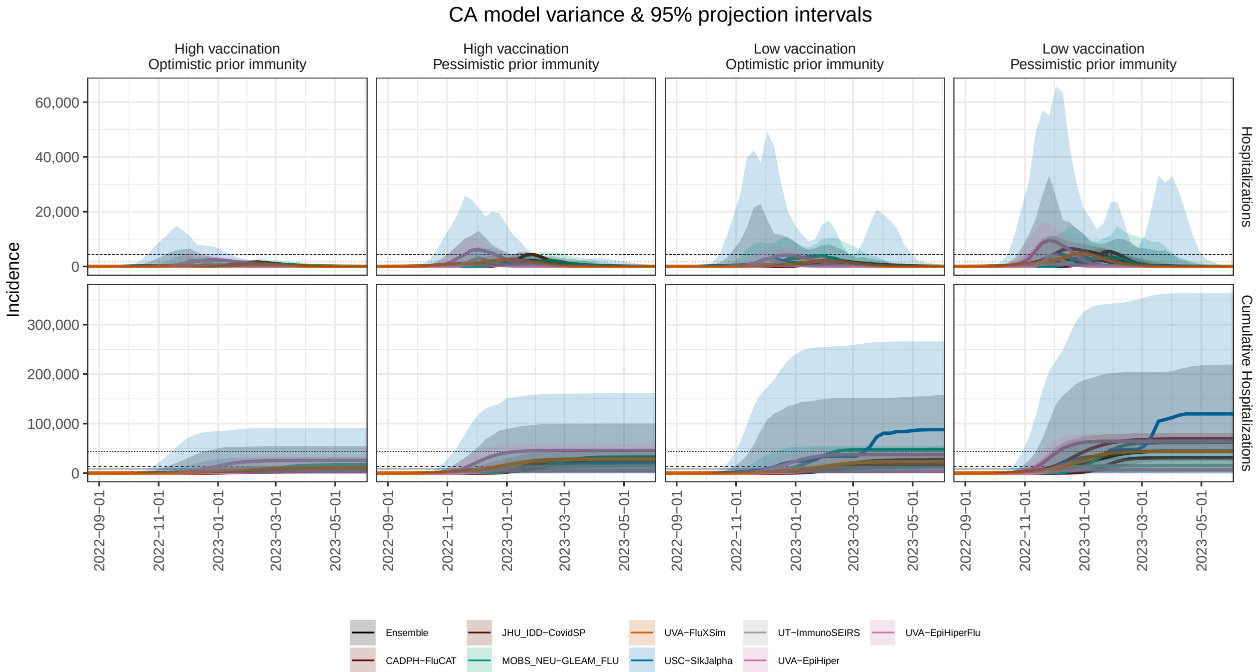
National model variation for all scenarios.

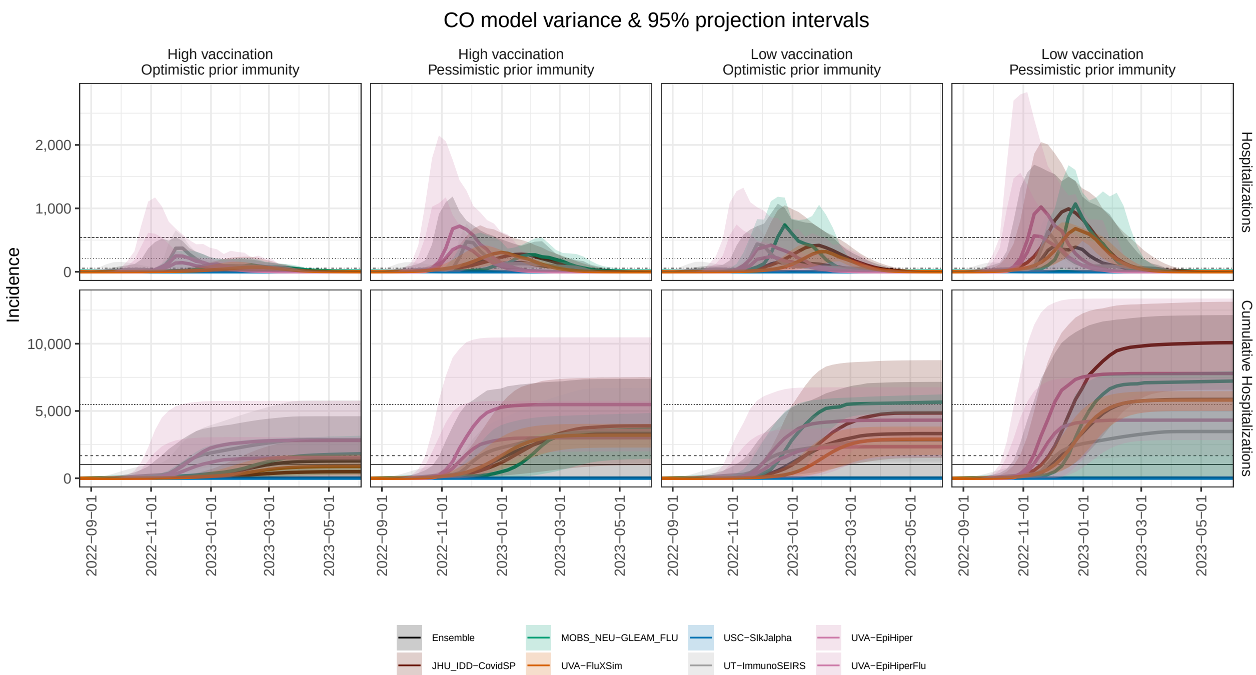

AL model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
10,000
7,500
5,000
2,500
0
40,000
30,000
20,000
10,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

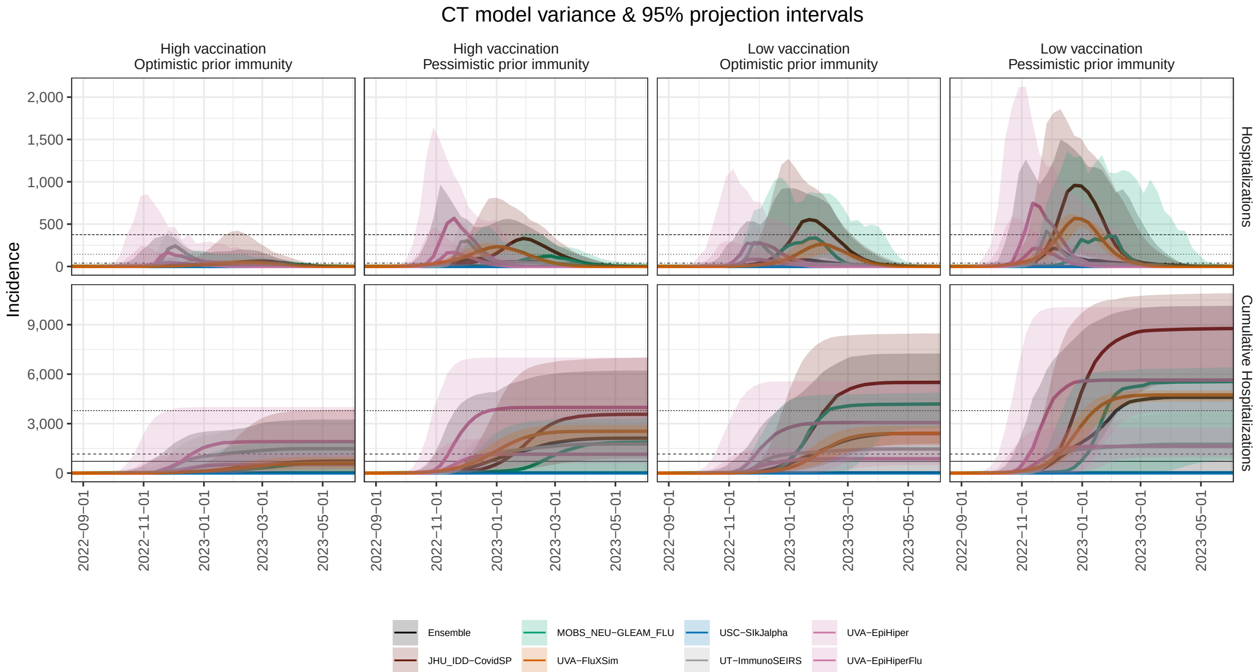

AK model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
1,000
500
0
6,000
4,000
2,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

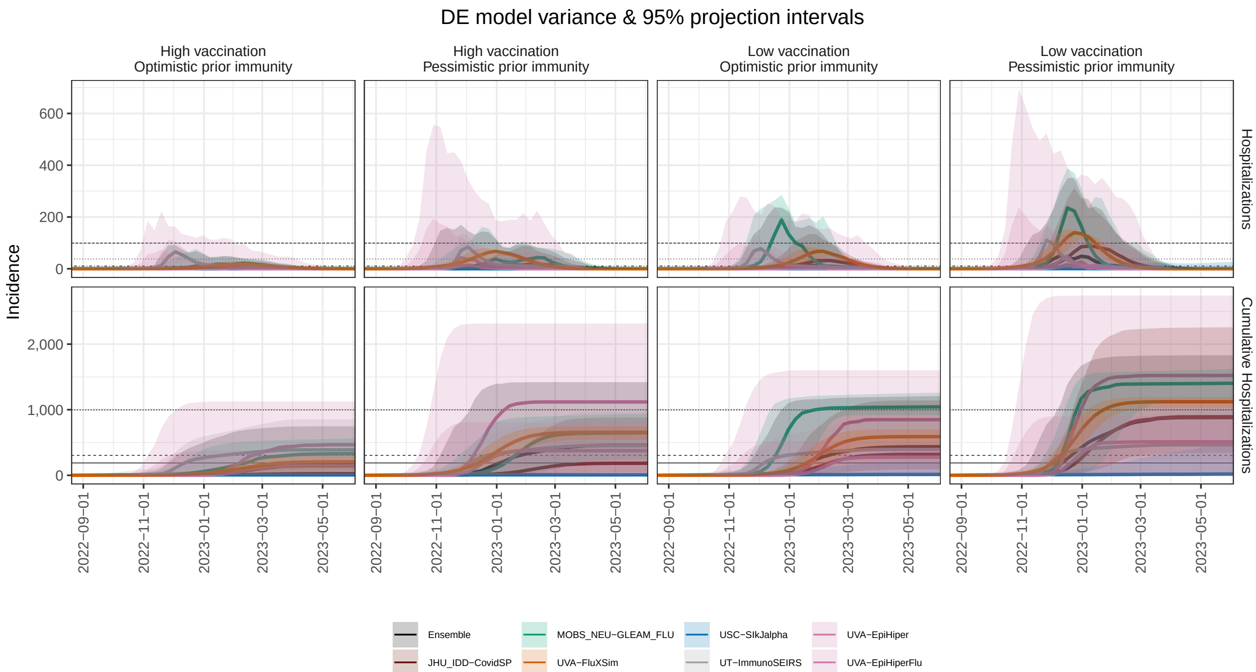

AZ model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Incidence
Hospitalizations
Cumulative Hospitalizations
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

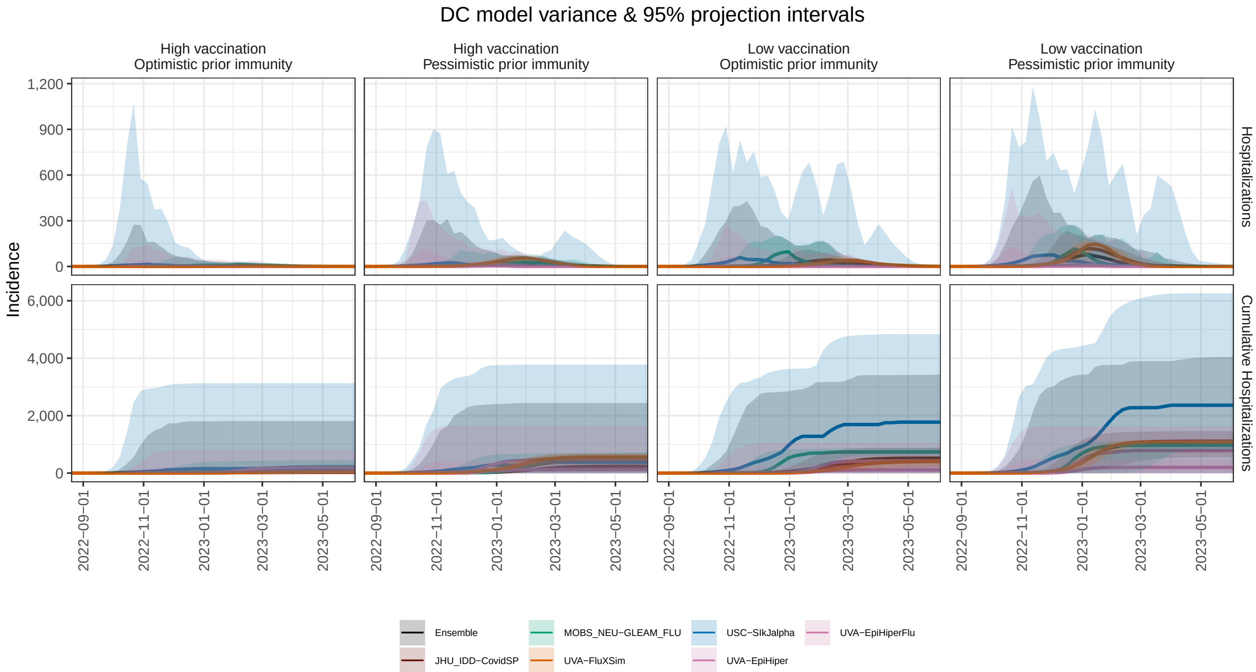

AR model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Incidence
Hospitalizations
Cumulative Hospitalizations
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

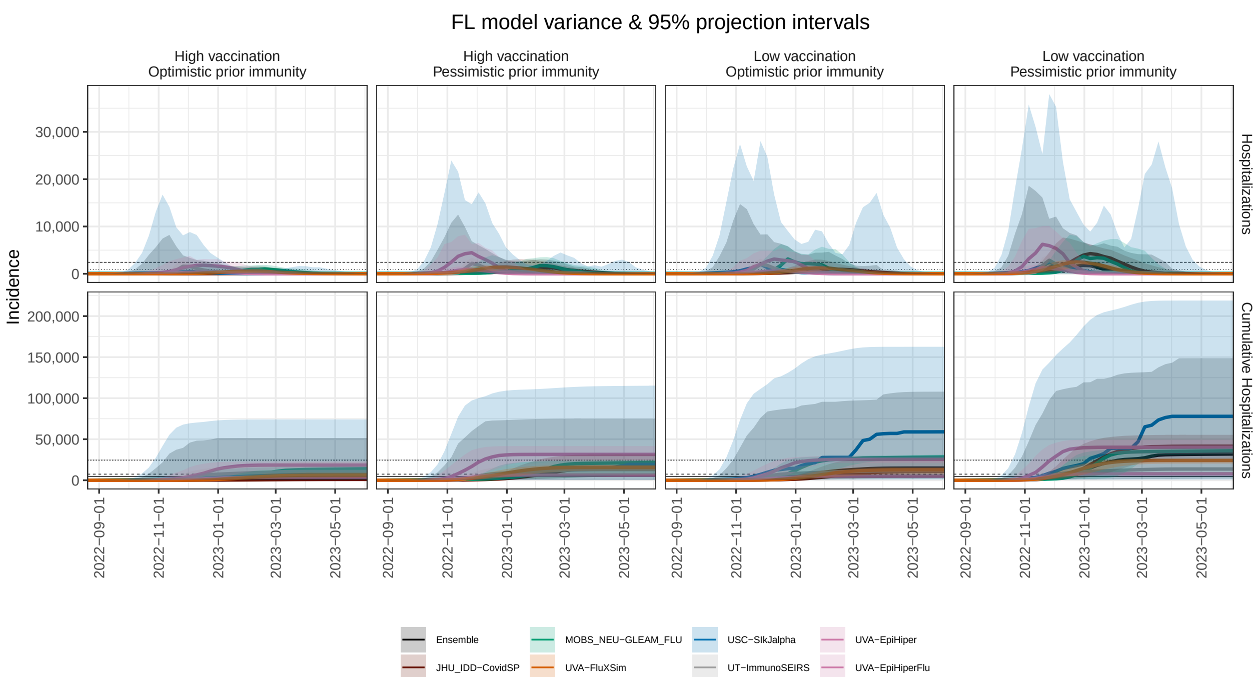

CA model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
60,000
40,000
20,000
0
300,000
200,000
100,000
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
CADPH−FluCAT
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

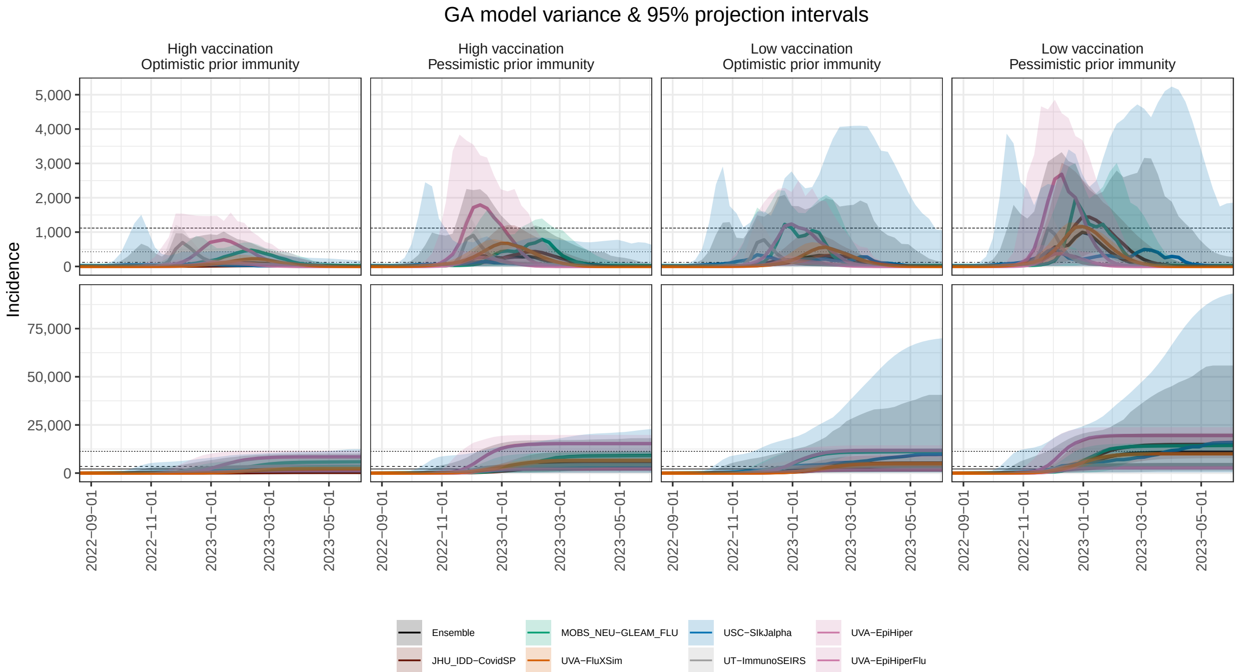

CO model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
2,000
1,000
0
10,000
5,000
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu


CT model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
2,000
1,500
1,000
500
0
9,000
6,000
3,000
0
2022-09-01
2022-11-01
2023-01-01
2023-03-01
2023-05-01
Ensemble
JHU_IDD-CovidSP
MOBS_NEU-GLEAM_FLU
UVA-FluXSim
USC-SIkJalpha
UT-ImmunoSEIRS
UVA-EpiHiper
UVA-EpiHiperFlu

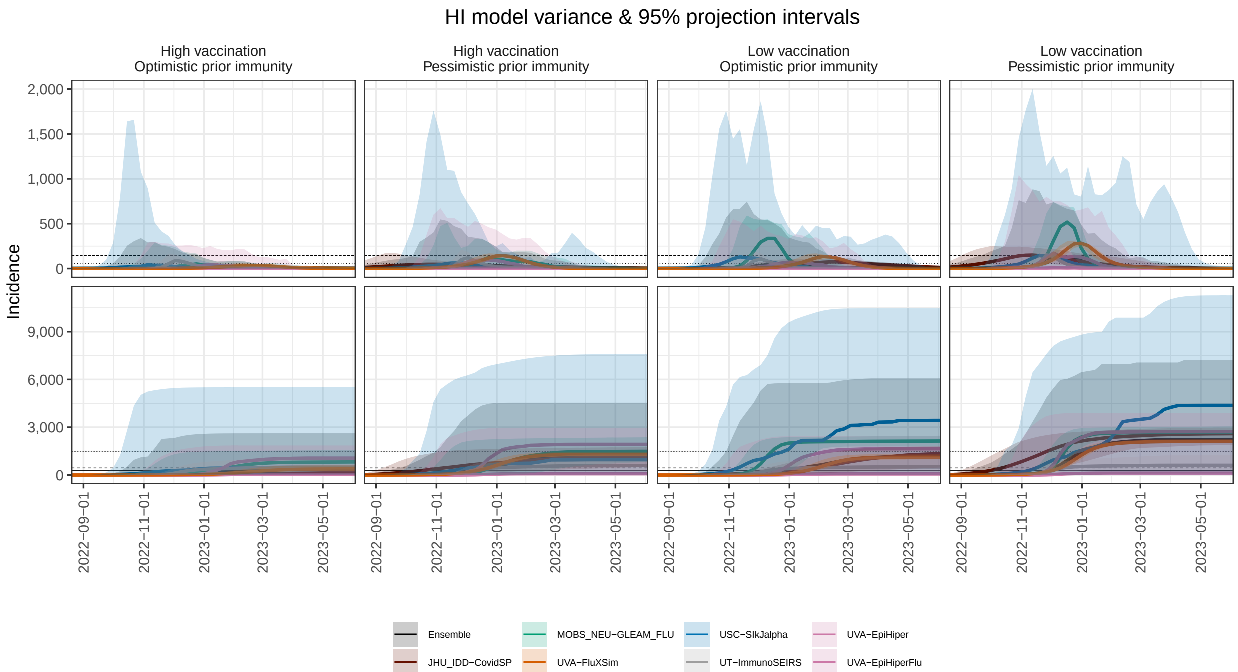

DE model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
600
400
200
0
2,000
1,000
0
2022-09-01
2022-11-01
2023-01-01
2023-03-01
2023-05-01
Ensemble
JHU_IDD-CovidSP
MOBS_NEU-GLEAM_FLU
UVA-FluXSim
USC-SIkJalpha
UT-ImmunoSEIRS
UVA-EpiHiper
UVA-EpiHiperFlu


DC model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Incidence
Hospitalizations
Cumulative Hospitalizations
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UVA−EpiHiper
UVA−EpiHiperFlu

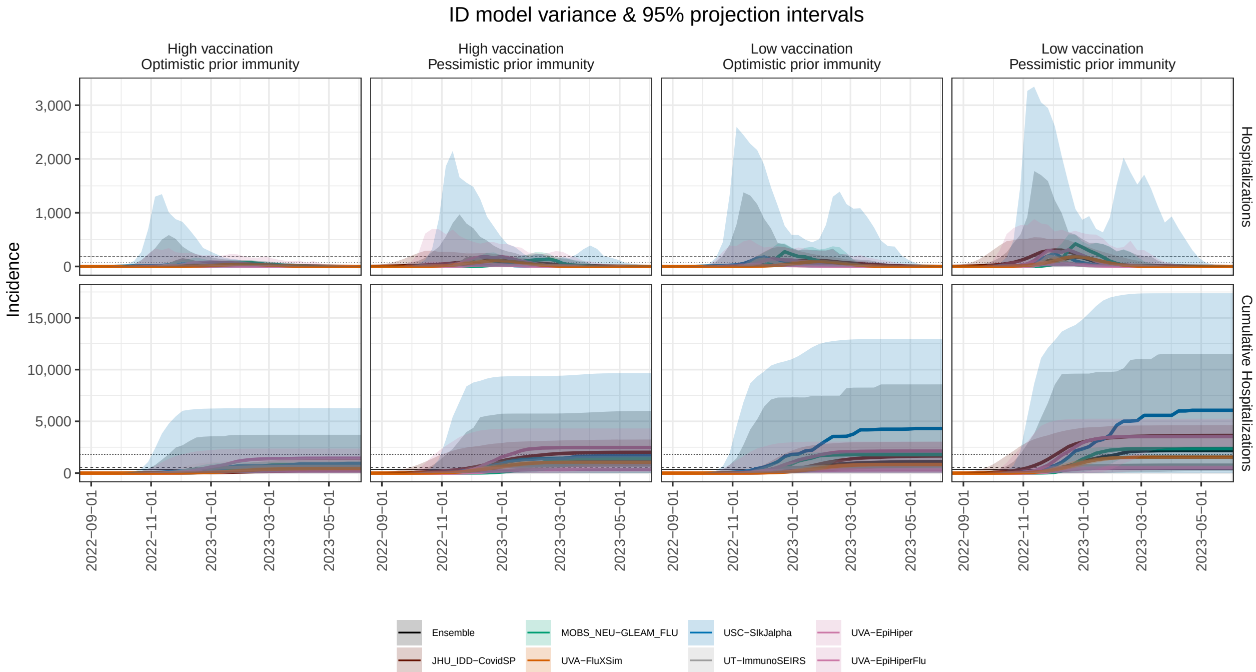

FL model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Incidence
Hospitalizations
Cumulative Hospitalizations
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

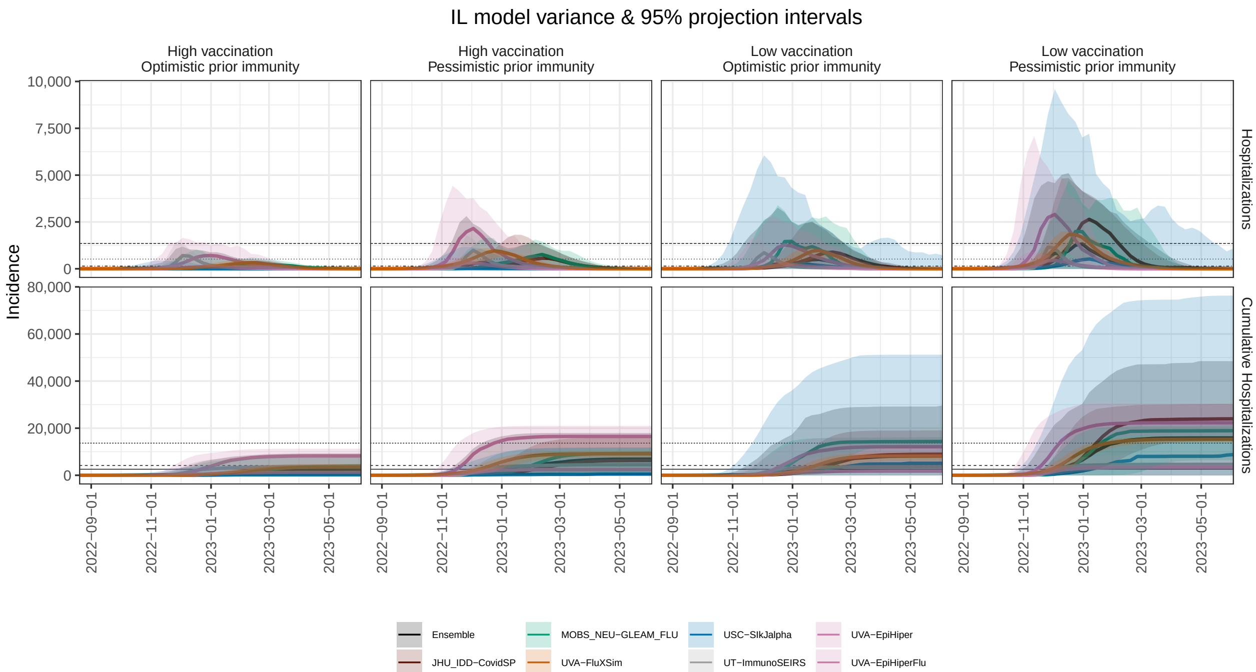


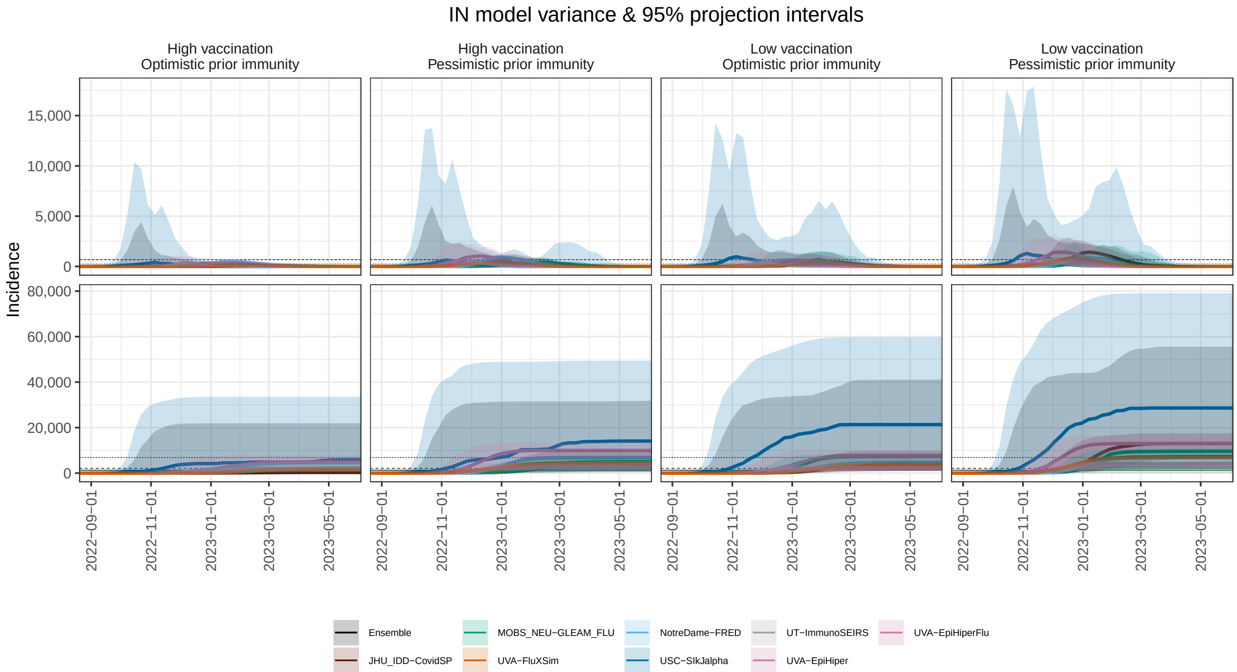
GA model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
5,000
4,000
3,000
2,000
1,000
0
75,000
50,000
25,000
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu



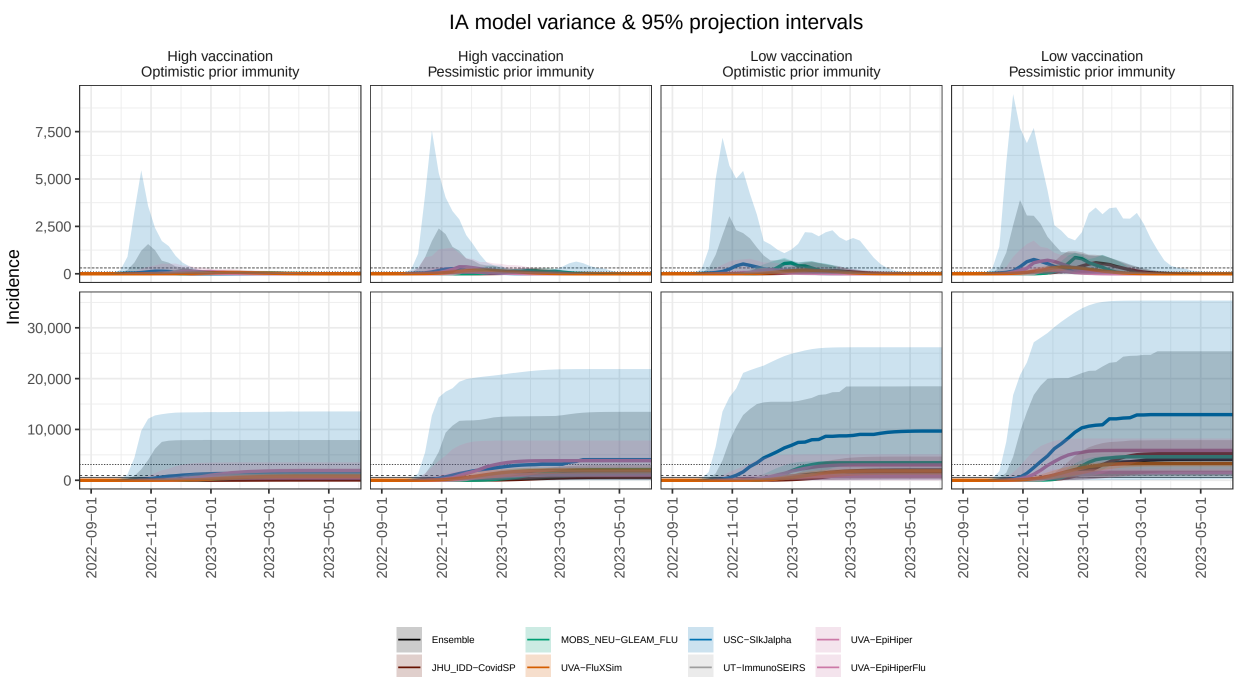
HI model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
2,000
1,500
1,000
500
0
9,000
6,000
3,000
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu


ID model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

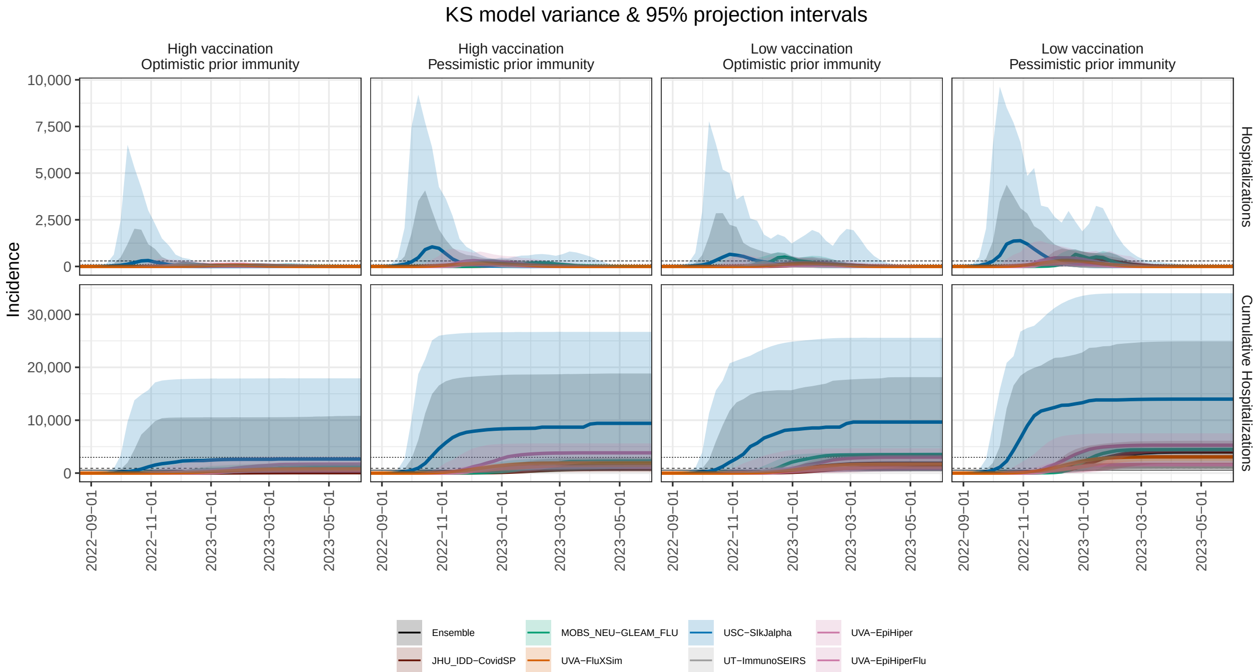

IL model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

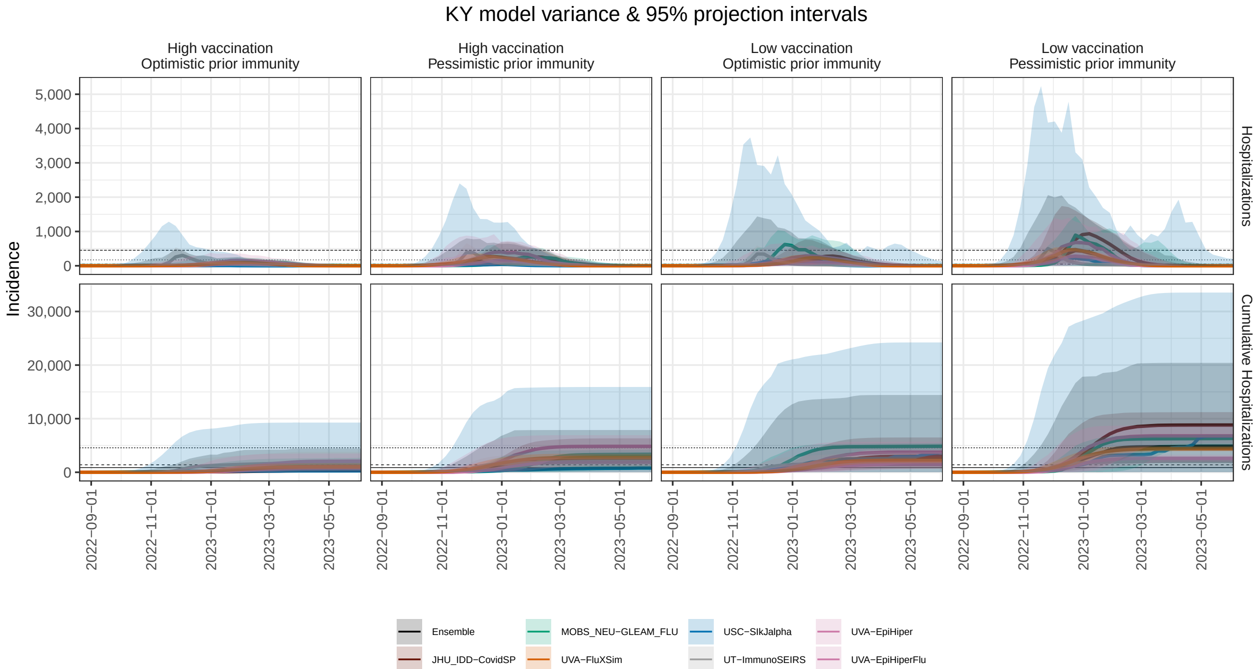


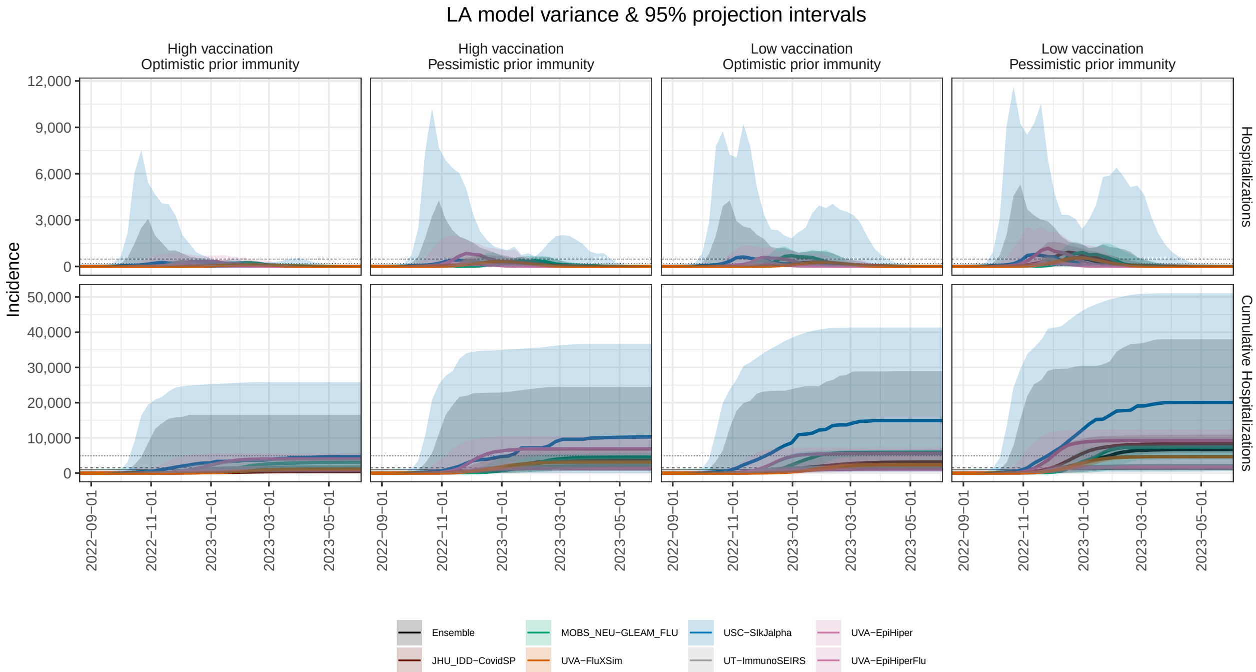
IN model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Incidence
Hospitalizations
Cumulative Hospitalizations
15,000
10,000
5,000
0
80,000
60,000
40,000
20,000
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
NotreDame−FRED
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

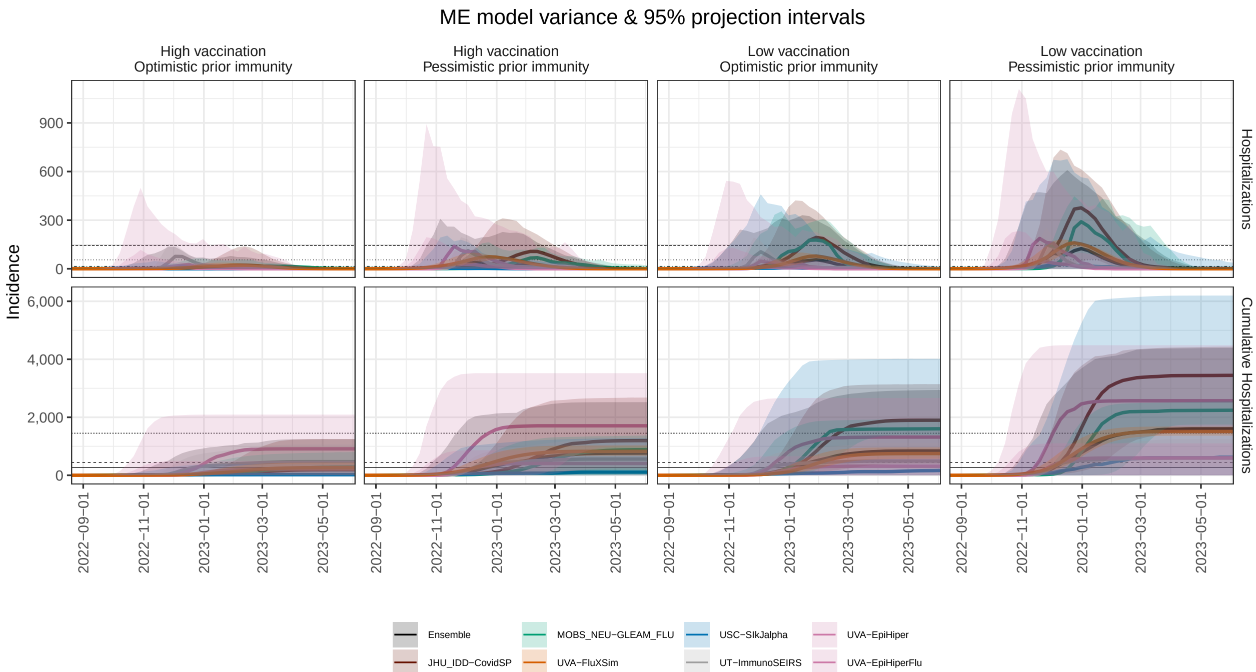


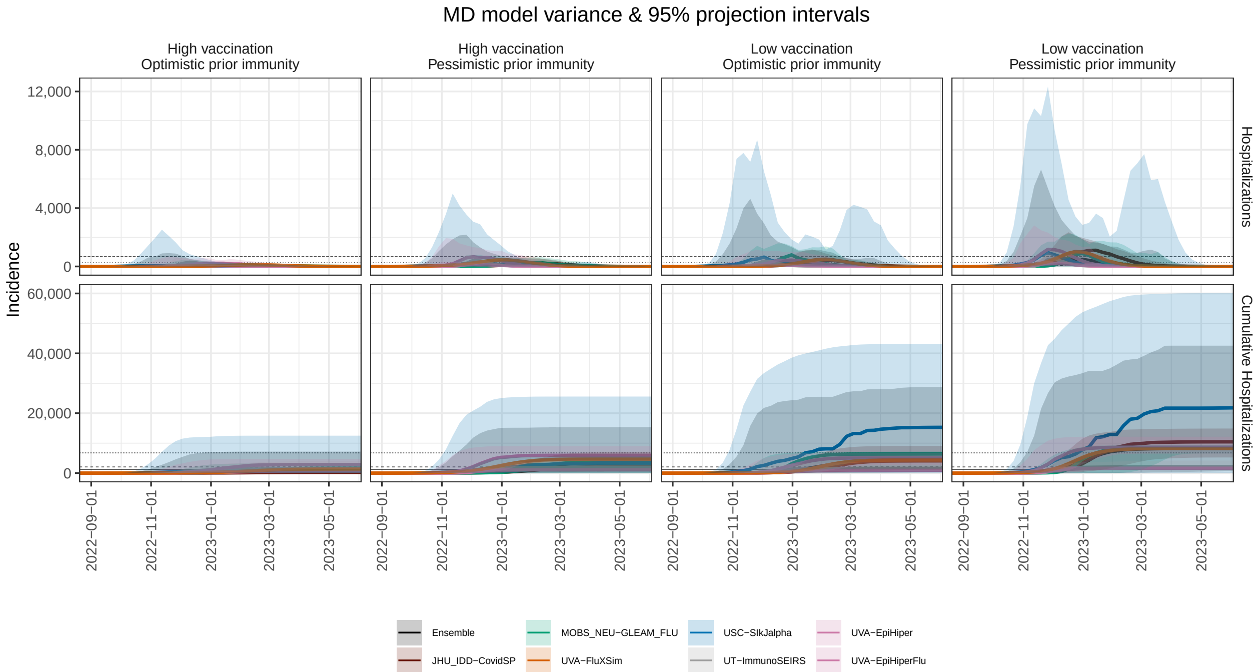
IA model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Incidence
Hospitalizations
Cumulative Hospitalizations
7,500
5,000
2,500
0
30,000
20,000
10,000
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

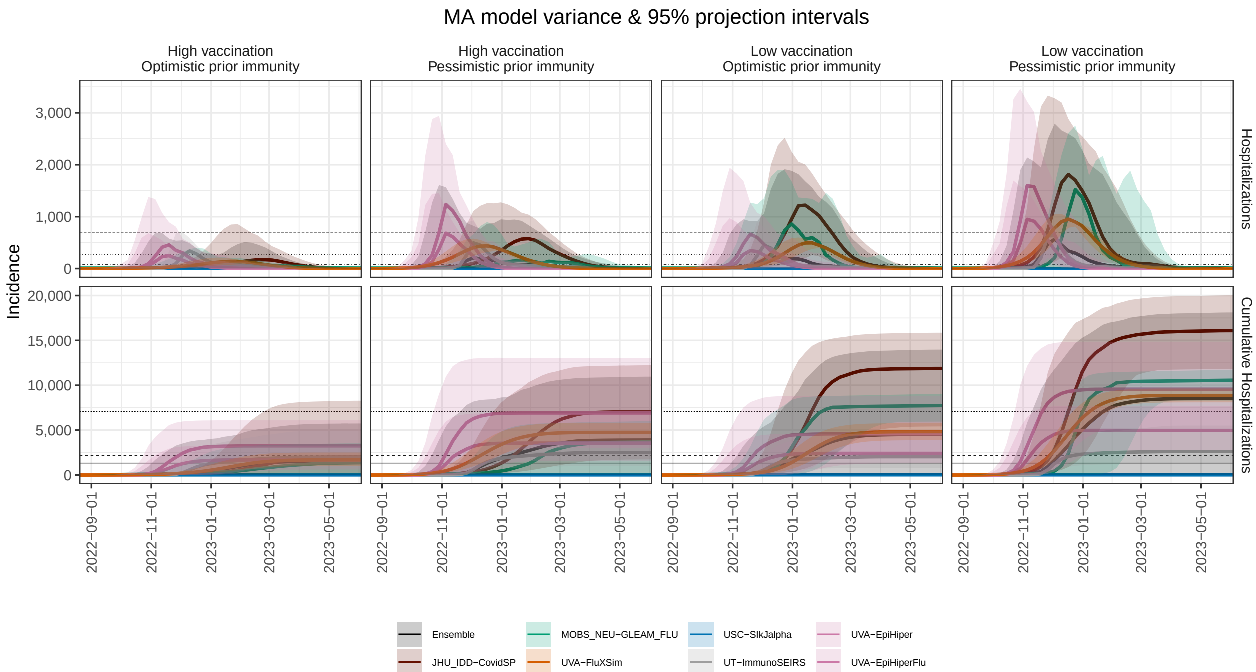

KS model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
Ensemble
JHU_IDD-CovidSP
MOBS_NEU-GLEAM_FLU
UVA-FluXSim
USC-SIkJalpha
UT-ImmunoSEIRS
UVA-EpiHiper
UVA-EpiHiperFlu


KY model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
Ensemble
JHU_IDD-CovidSP
MOBS_NEU-GLEAM_FLU
UVA-FluXSim
USC-SIkJalpha
UT-ImmunoSEIRS
UVA-EpiHiper
UVA-EpiHiperFlu

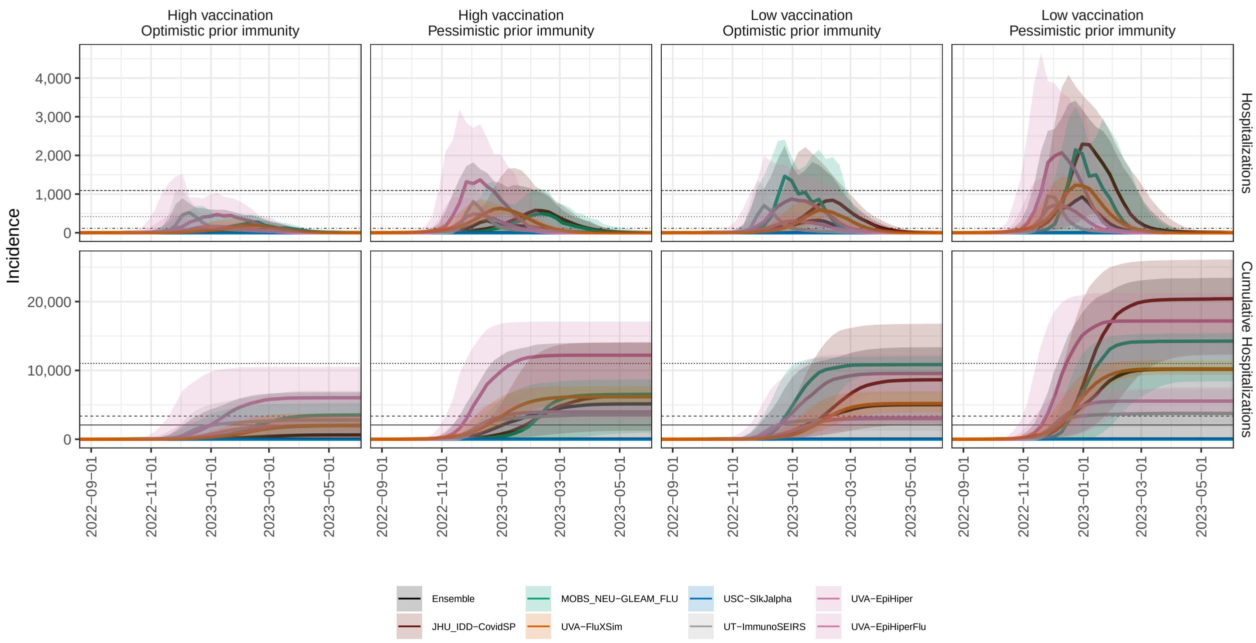

LA model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Incidence
Hospitalizations
Cumulative Hospitalizations
12,000
9,000
6,000
3,000
0
50,000
40,000
30,000
20,000
10,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu


ME model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Incidence
Hospitalizations
Cumulative Hospitalizations
900
600
300
0
6,000
4,000
2,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

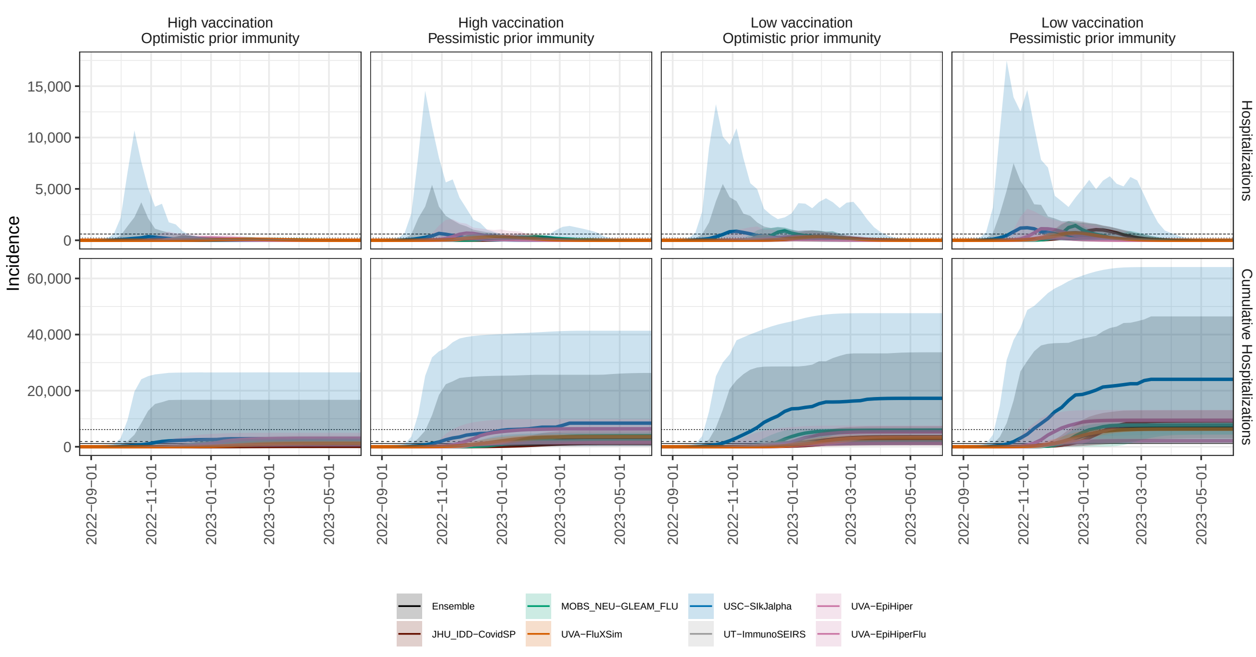

MD model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Incidence
Hospitalizations
Cumulative Hospitalizations
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

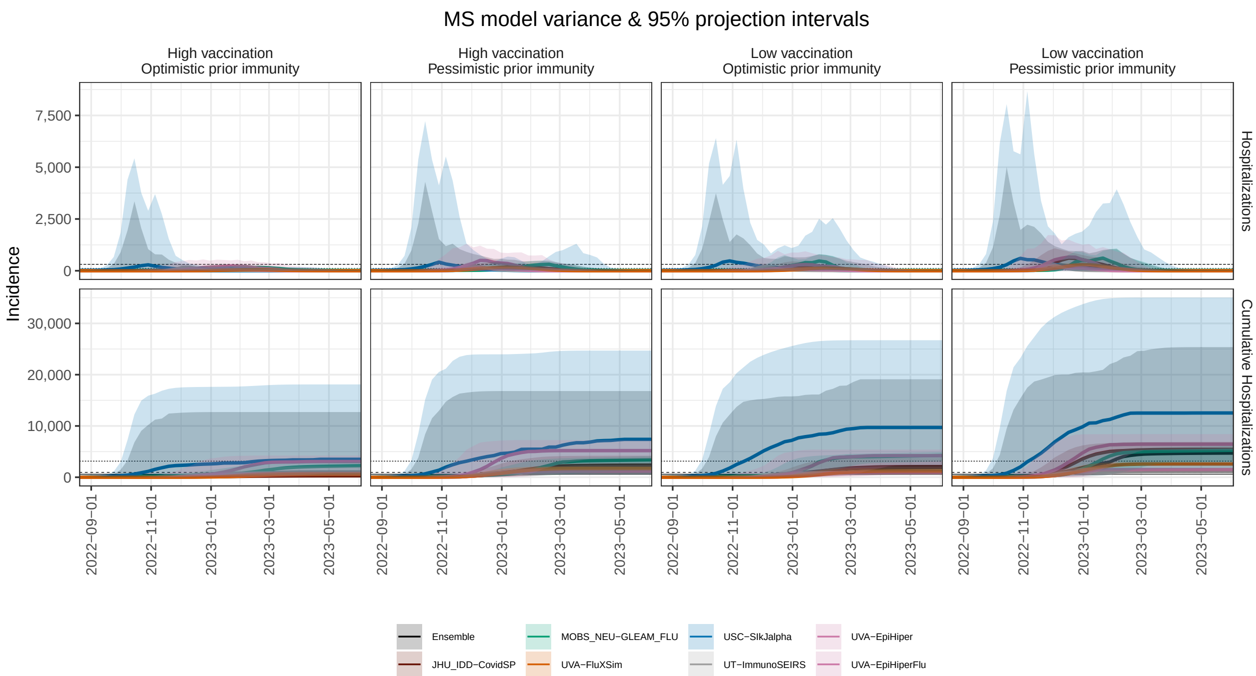

MA model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Incidence
Hospitalizations
Cumulative Hospitalizations
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

MI model variance & 95% projection intervals

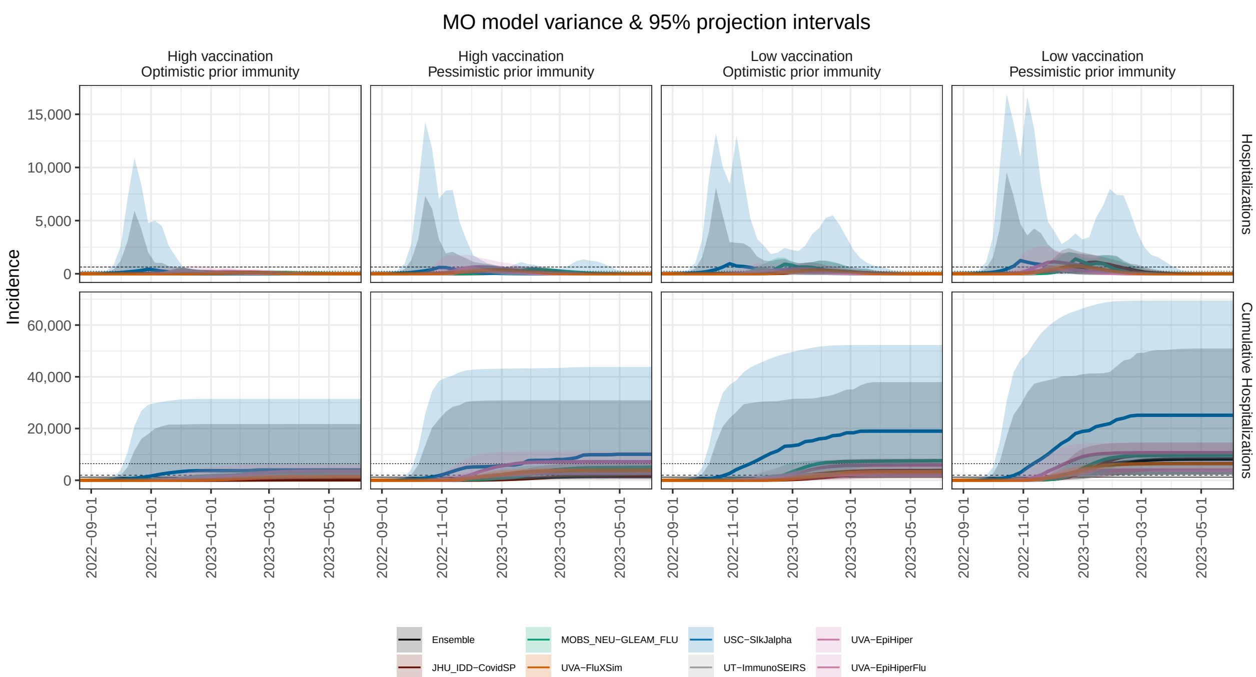


MN model variance & 95% projection intervals

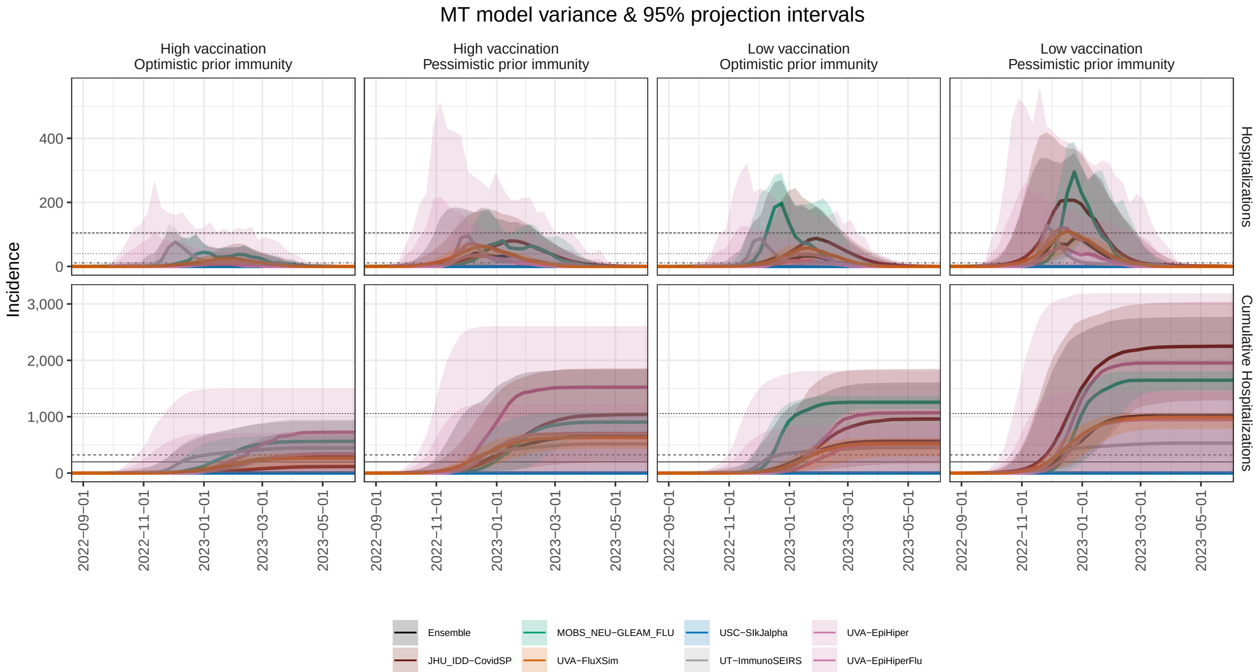




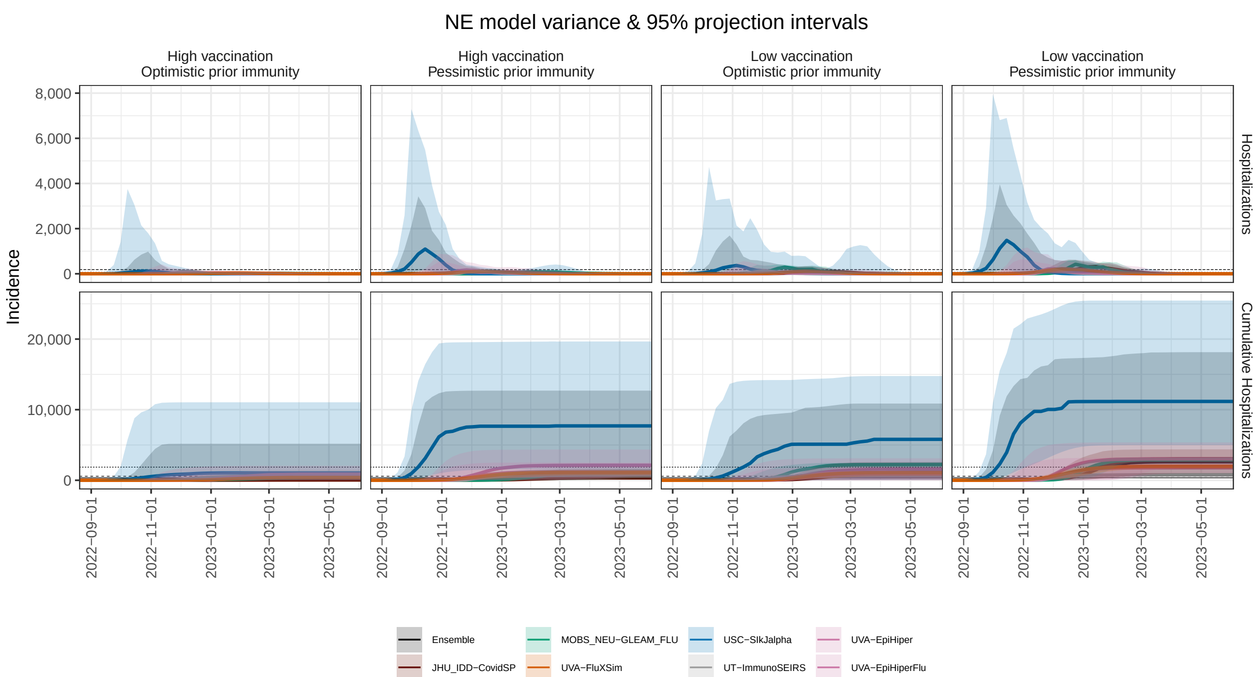
MS model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Incidence
Hospitalizations
Cumulative Hospitalizations
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu



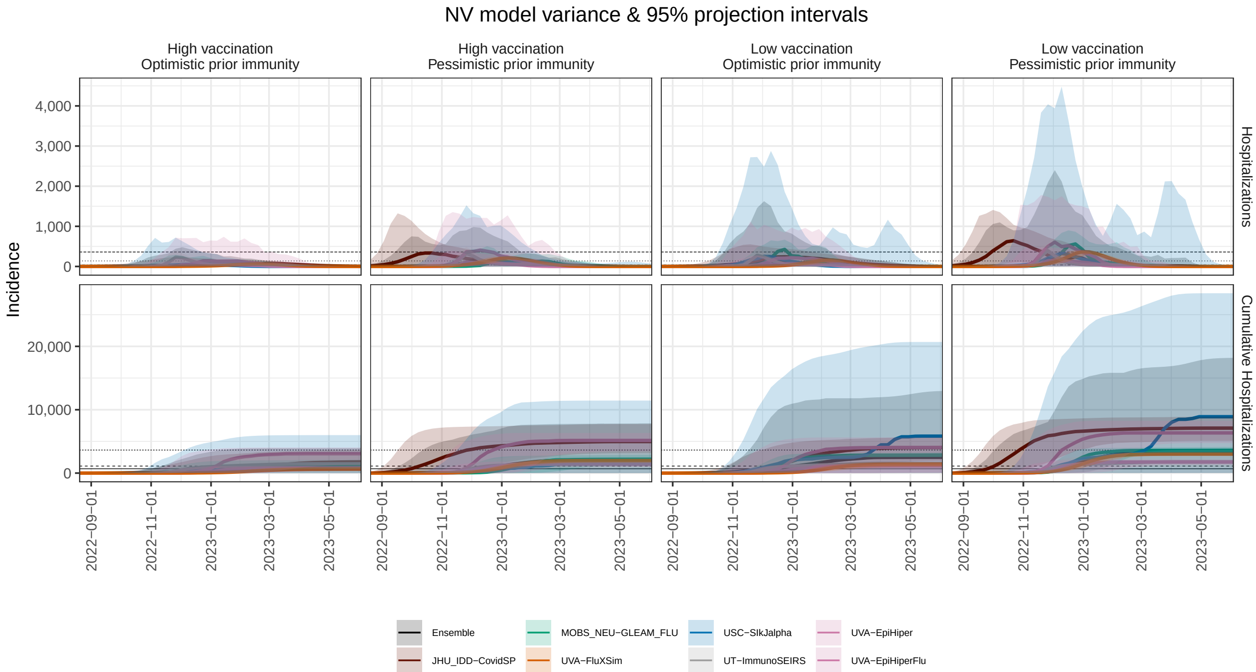
MO model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Incidence
Hospitalizations
Cumulative Hospitalizations
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

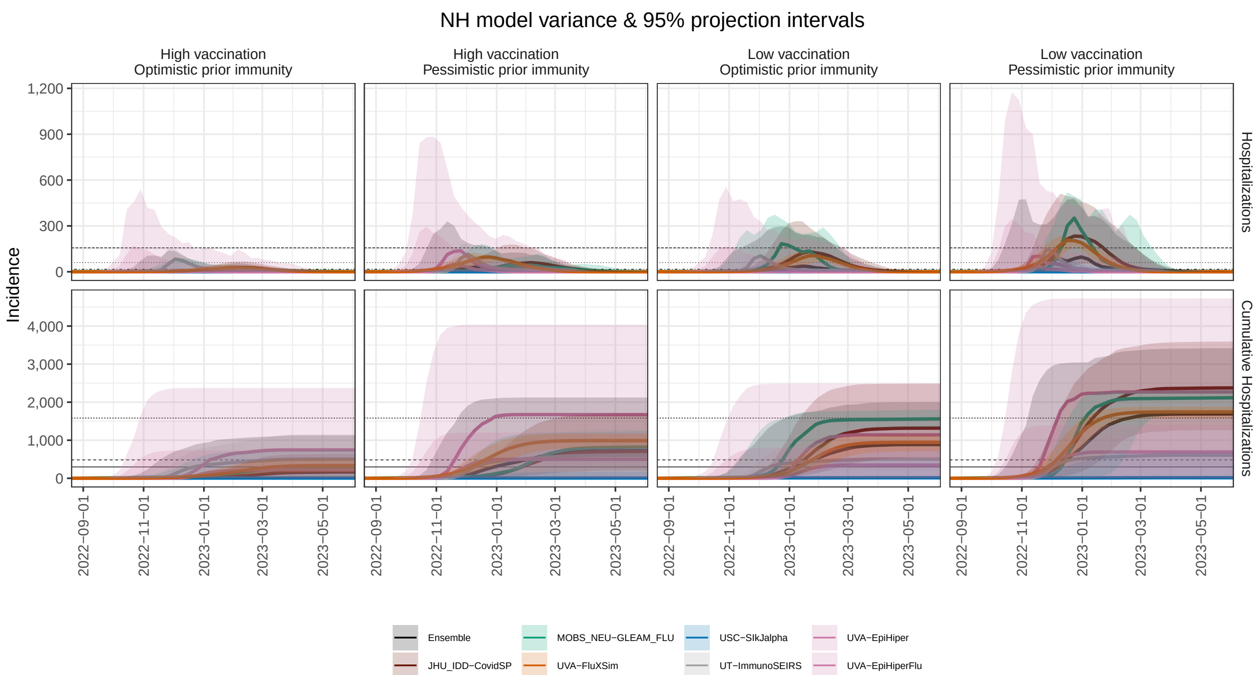


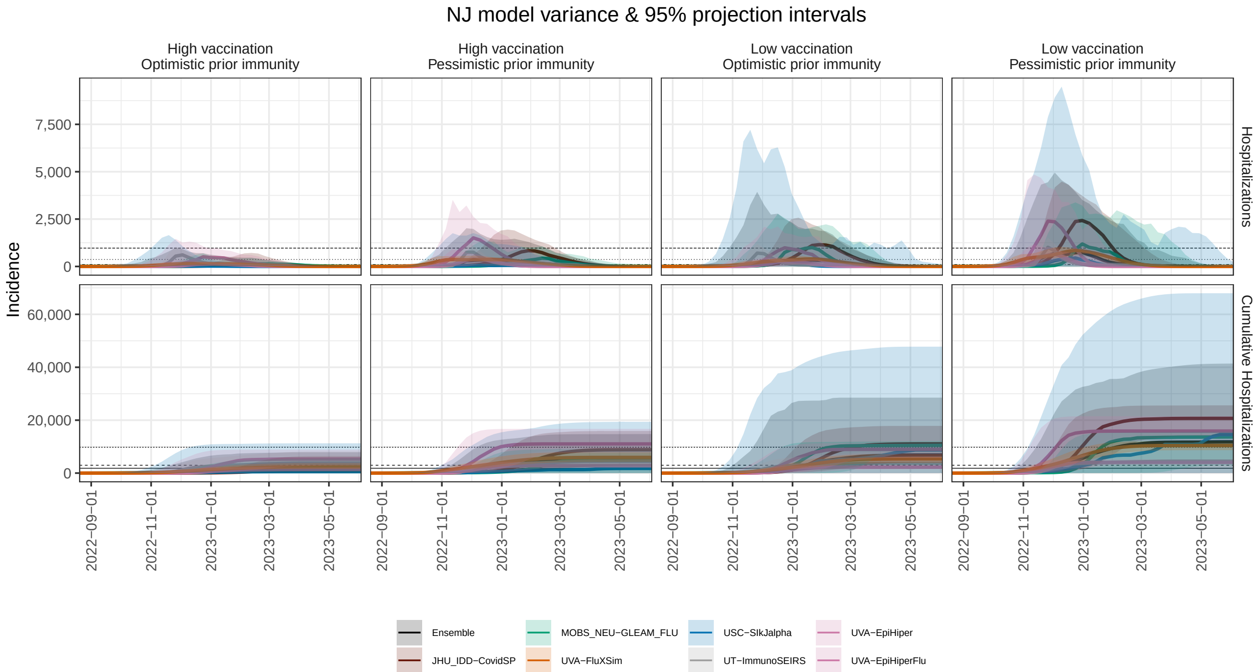
MT model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Incidence
Hospitalizations
Cumulative Hospitalizations
400
200
0
3,000
2,000
1,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

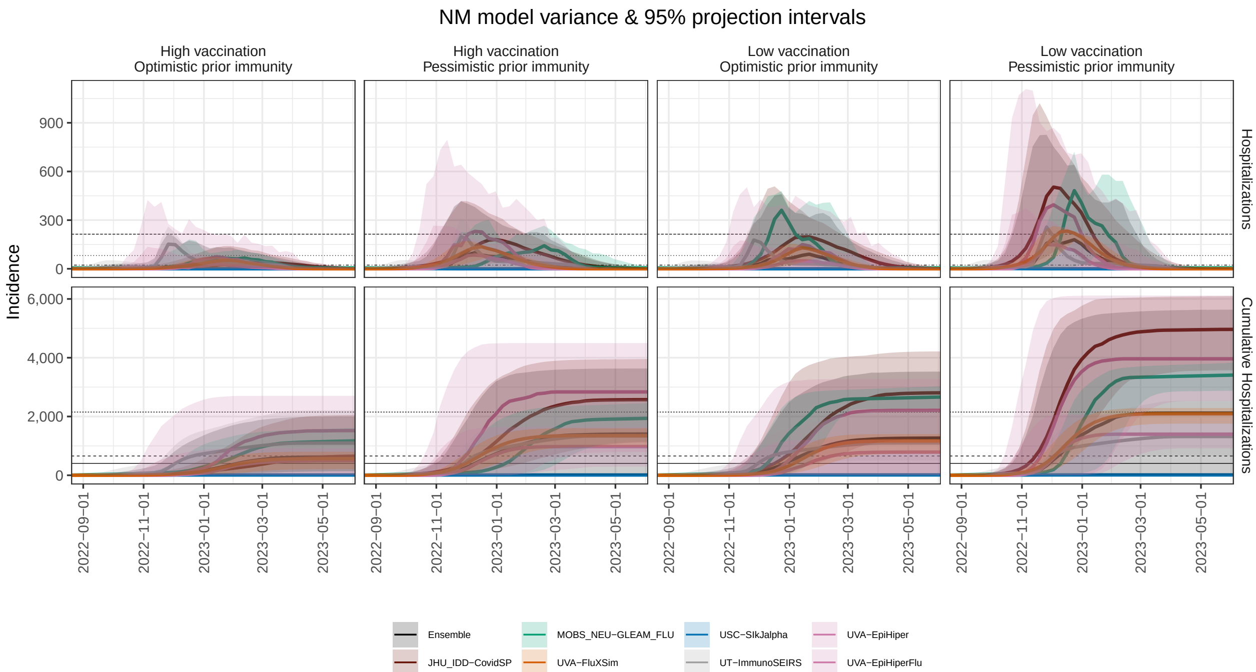


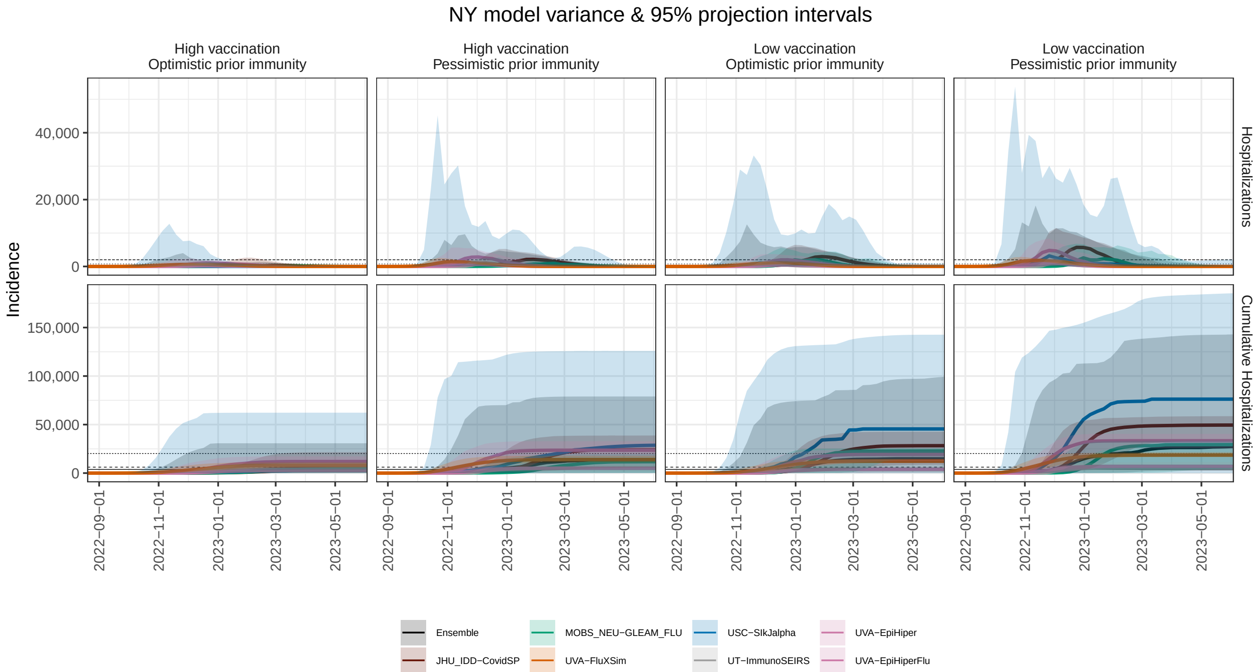
NE model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Incidence
Hospitalizations
Cumulative Hospitalizations
8,000
6,000
4,000
2,000
0
20,000
10,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu


NV model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
4,000
3,000
2,000
1,000
0
20,000
10,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

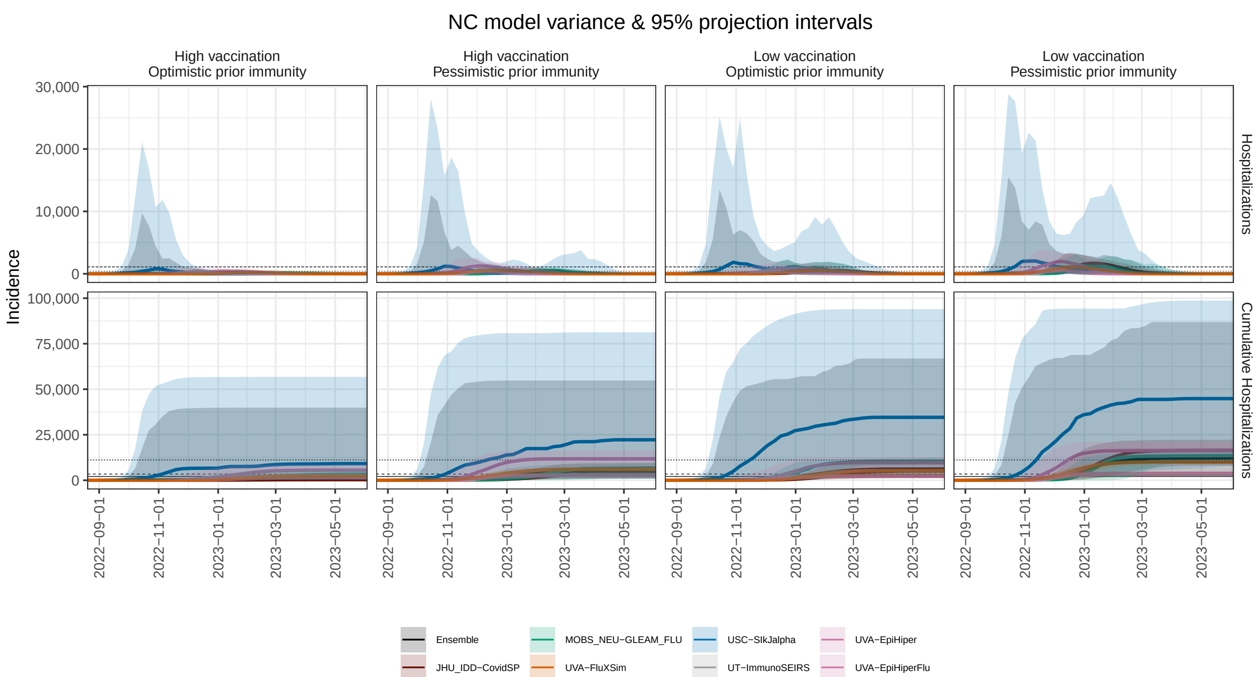

NH model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
1,200
900
600
300
0
4,000
3,000
2,000
1,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu


NJ model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
7,500
5,000
2,500
0
60,000
40,000
20,000
0
2022-09-01
2022-11-01
2023-01-01
2023-03-01
2023-05-01
Ensemble
JHU_IDD-CovidSP
MOBS_NEU-GLEAM_FLU
UVA-FluXSim
USC-SIkJalpha
UT-ImmunoSEIRS
UVA-EpiHiper
UVA-EpiHiperFlu

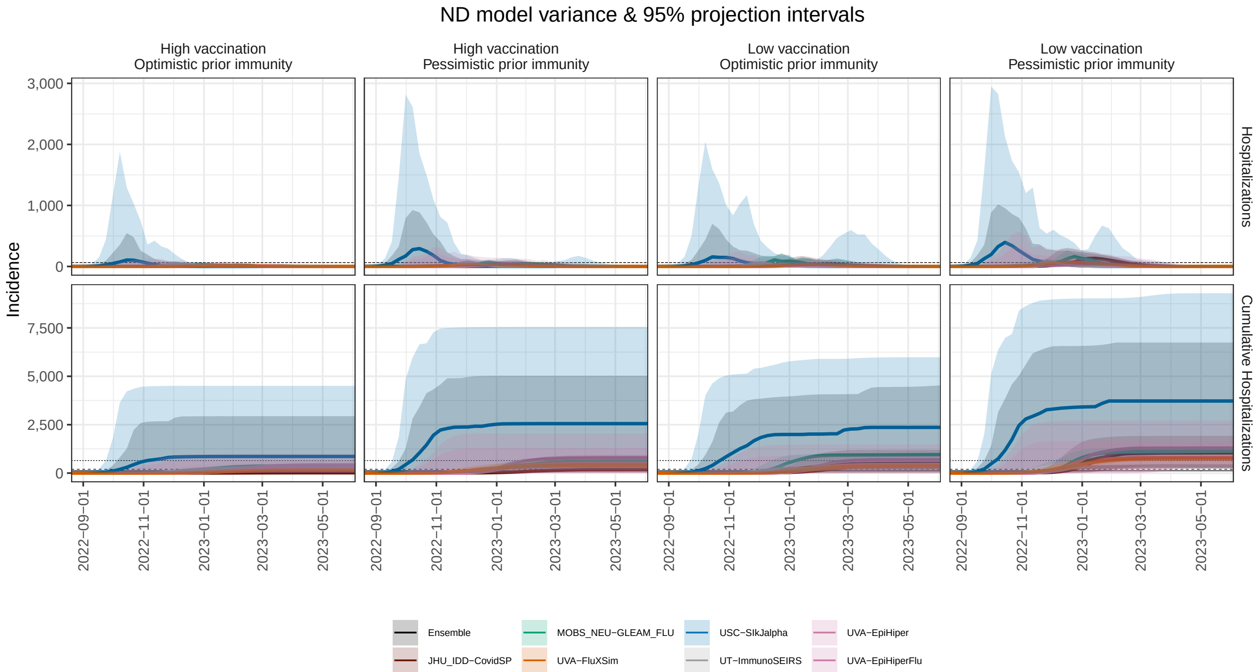

NM model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
900
600
300
0
6,000
4,000
2,000
0
2022-09-01
2022-11-01
2023-01-01
2023-03-01
2023-05-01
Ensemble
JHU_IDD-CovidSP
MOBS_NEU-GLEAM_FLU
UVA-FluXSim
USC-SIkJalpha
UT-ImmunoSEIRS
UVA-EpiHiper
UVA-EpiHiperFlu

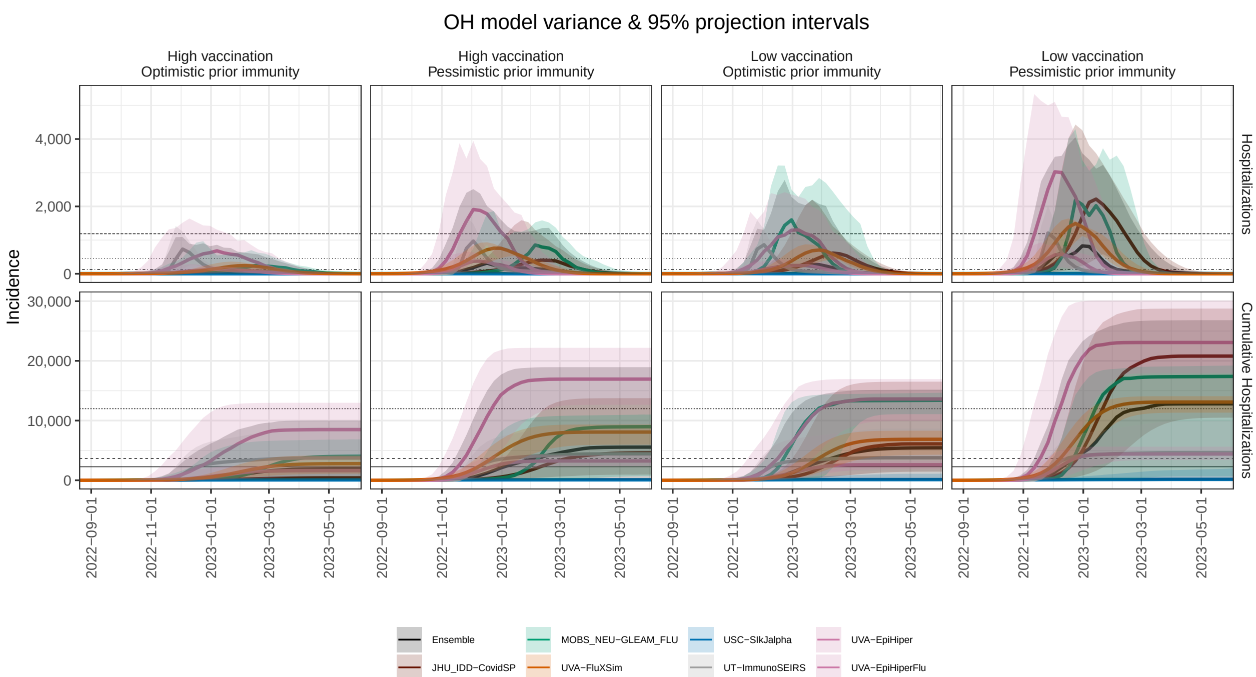


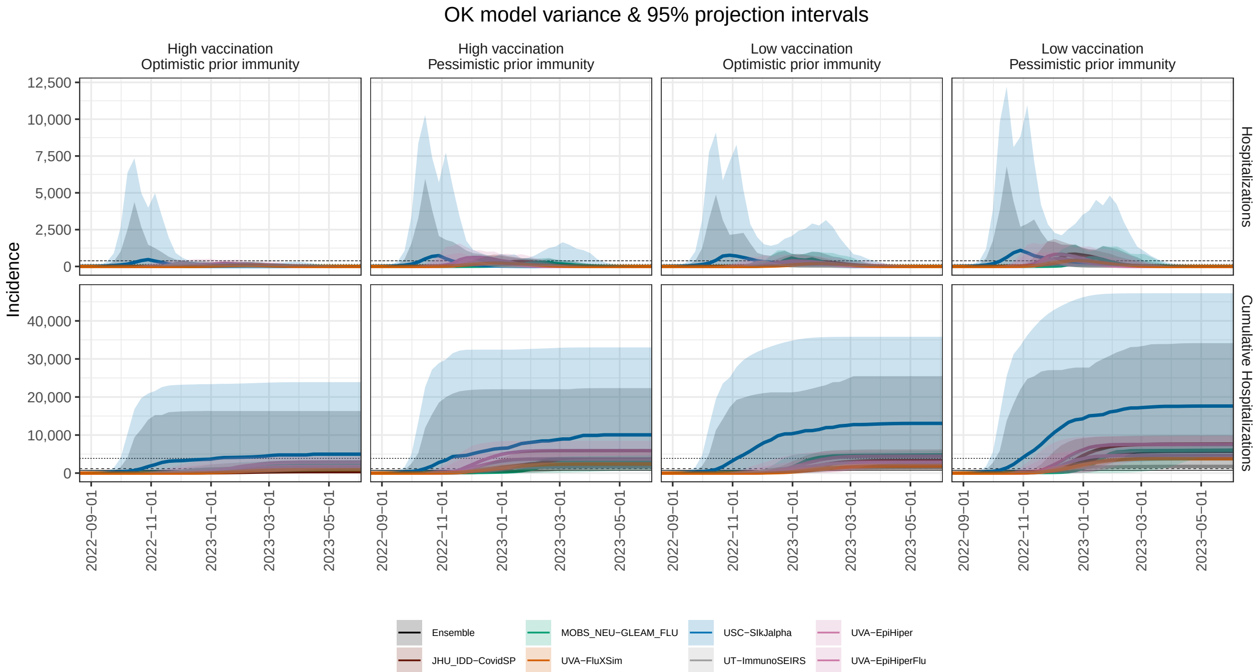
NY model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
40,000
20,000
0
150,000
100,000
50,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

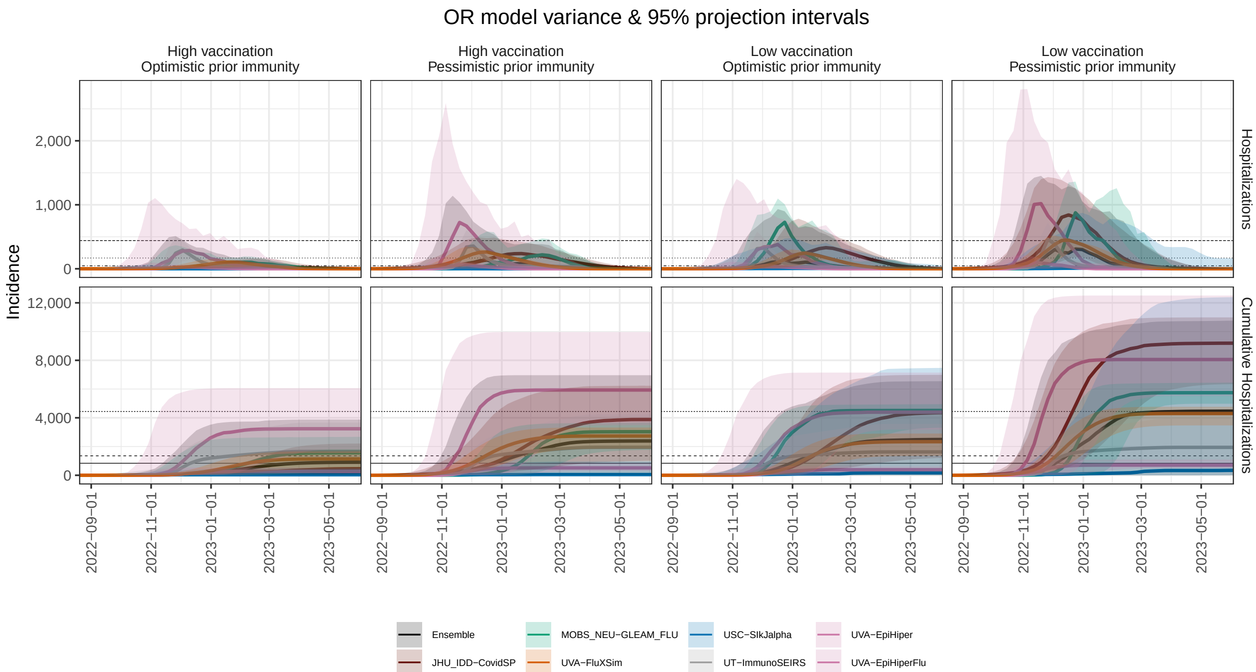


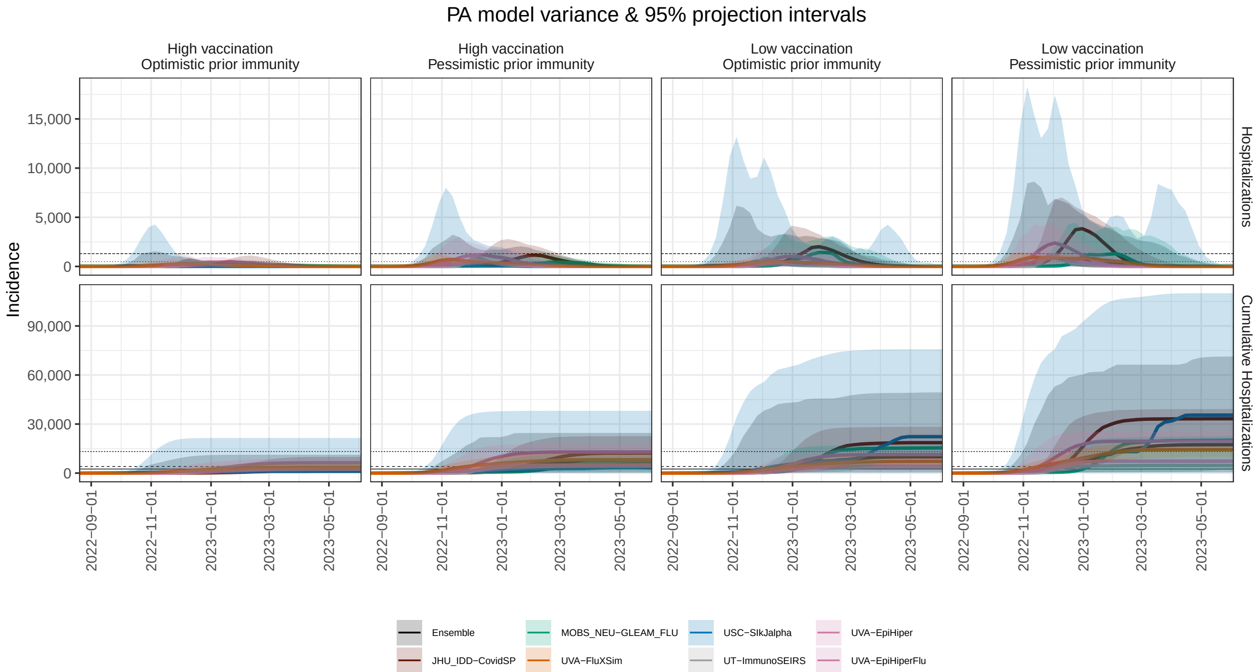
NC model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
30,000
20,000
10,000
0
100,000
75,000
50,000
25,000
0
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

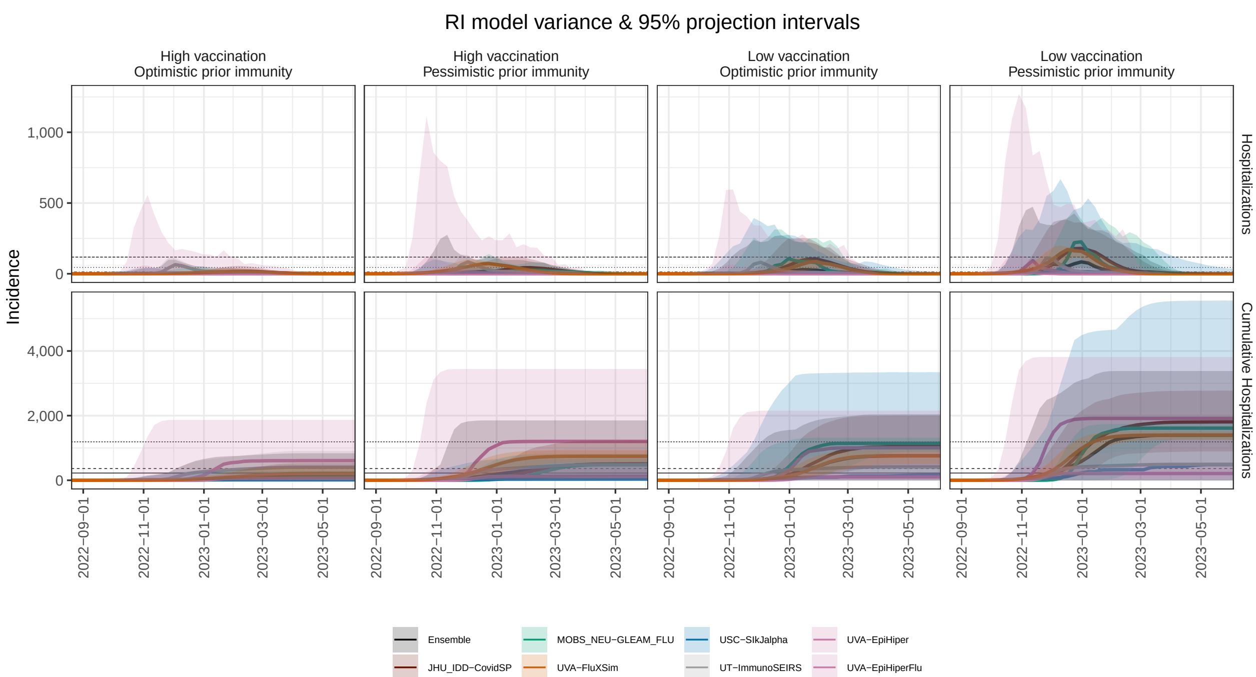

ND model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
Ensemble
JHU_IDD-CovidSP
MOBS_NEU-GLEAM_FLU
UVA-FluXSim
USC-SIkJalpha
UT-ImmunoSEIRS
UVA-EpiHiper
UVA-EpiHiperFlu

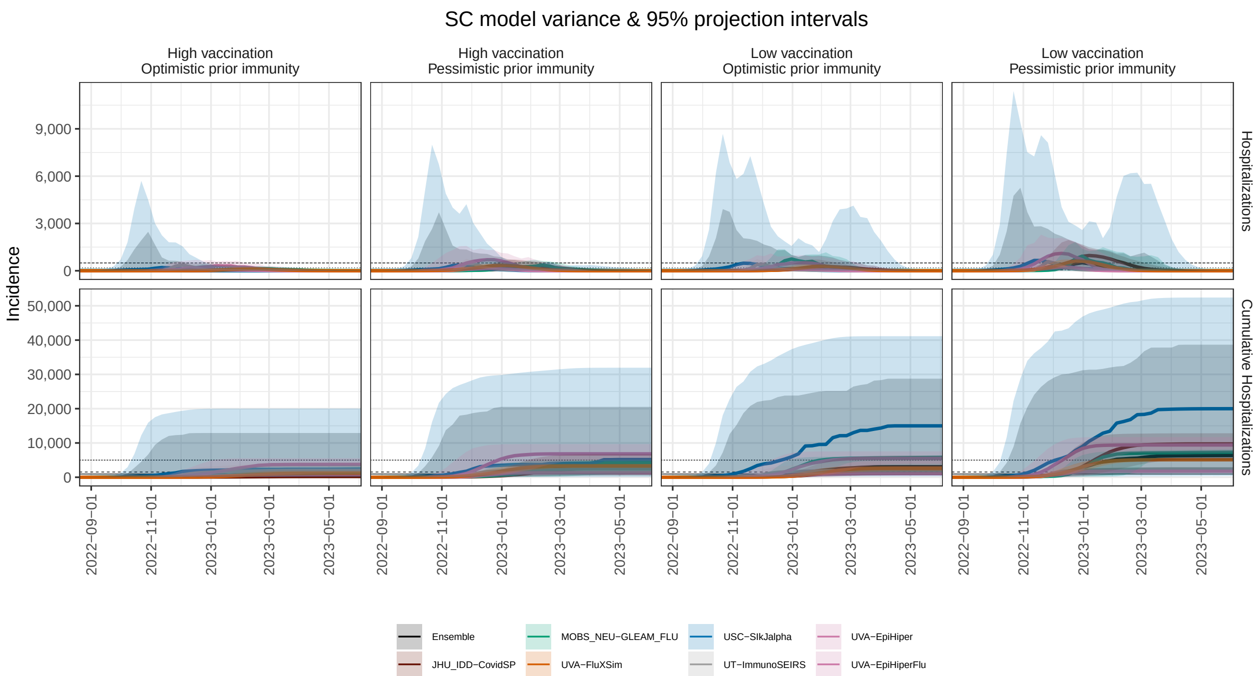

OH model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
Ensemble
JHU_IDD-CovidSP
MOBS_NEU-GLEAM_FLU
UVA-FluXSim
USC-SIkJalpha
UT-ImmunoSEIRS
UVA-EpiHiper
UVA-EpiHiperFlu


OK model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

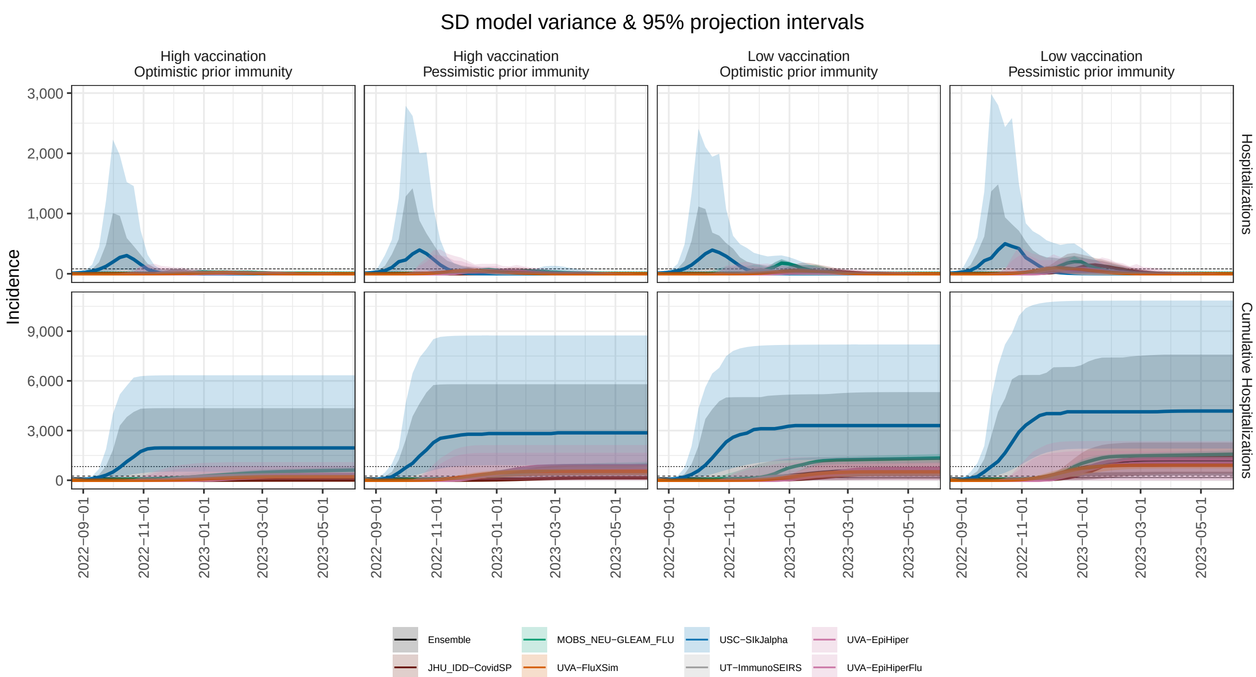

OR model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu


PA model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Incidence
Hospitalizations
Cumulative Hospitalizations
15,000
10,000
5,000
0
90,000
60,000
30,000
2022-09-01
2022-11-01
2023-01-01
2023-03-01
2023-05-01
Ensemble
JHU_IDD-CovidSP
MOBS_NEU-GLEAM_FLU
UVA-FluXSim
USC-SIkJalpha
UT-ImmunoSEIRS
UVA-EpiHiper
UVA-EpiHiperFlu

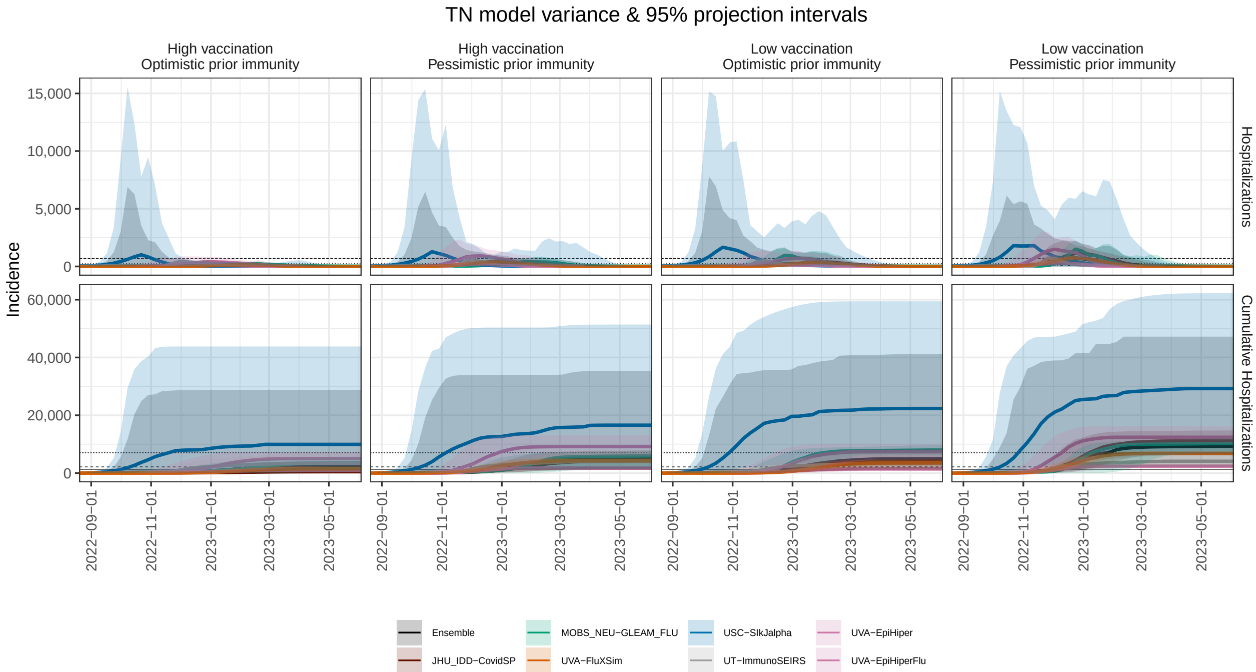

RI model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Incidence
Hospitalizations
Cumulative Hospitalizations
1,000
500
0
4,000
2,000
2022-09-01
2022-11-01
2023-01-01
2023-03-01
2023-05-01
Ensemble
JHU_IDD-CovidSP
MOBS_NEU-GLEAM_FLU
UVA-FluXSim
USC-SIkJalpha
UT-ImmunoSEIRS
UVA-EpiHiper
UVA-EpiHiperFlu

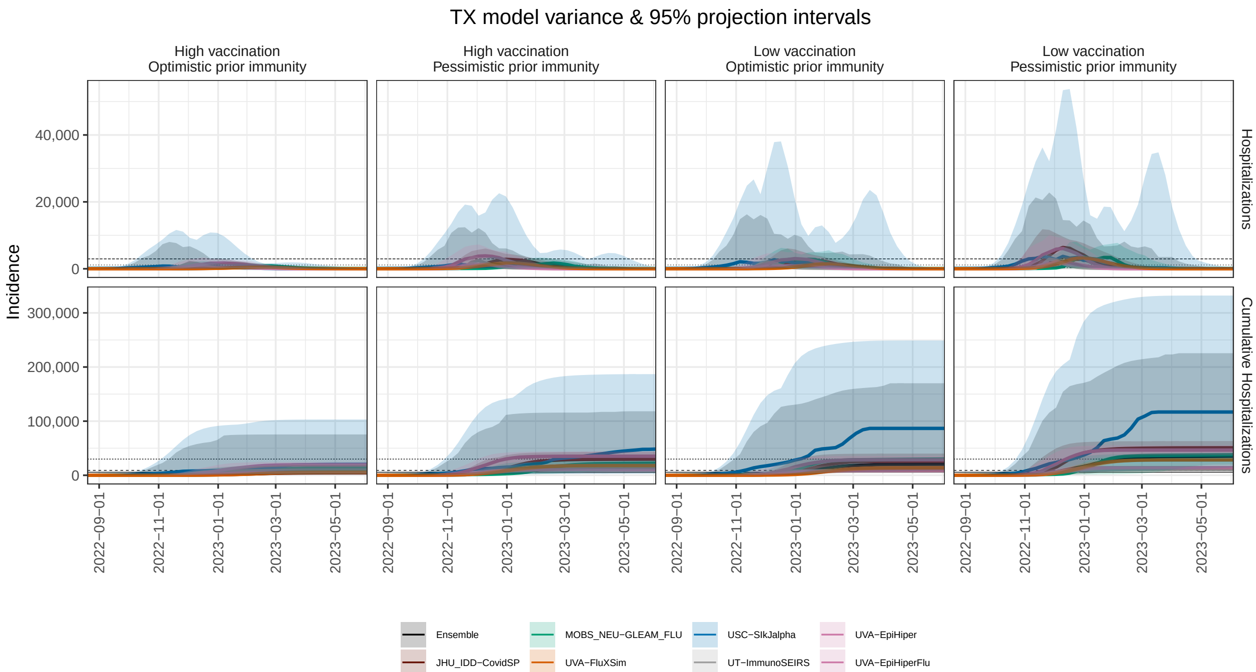


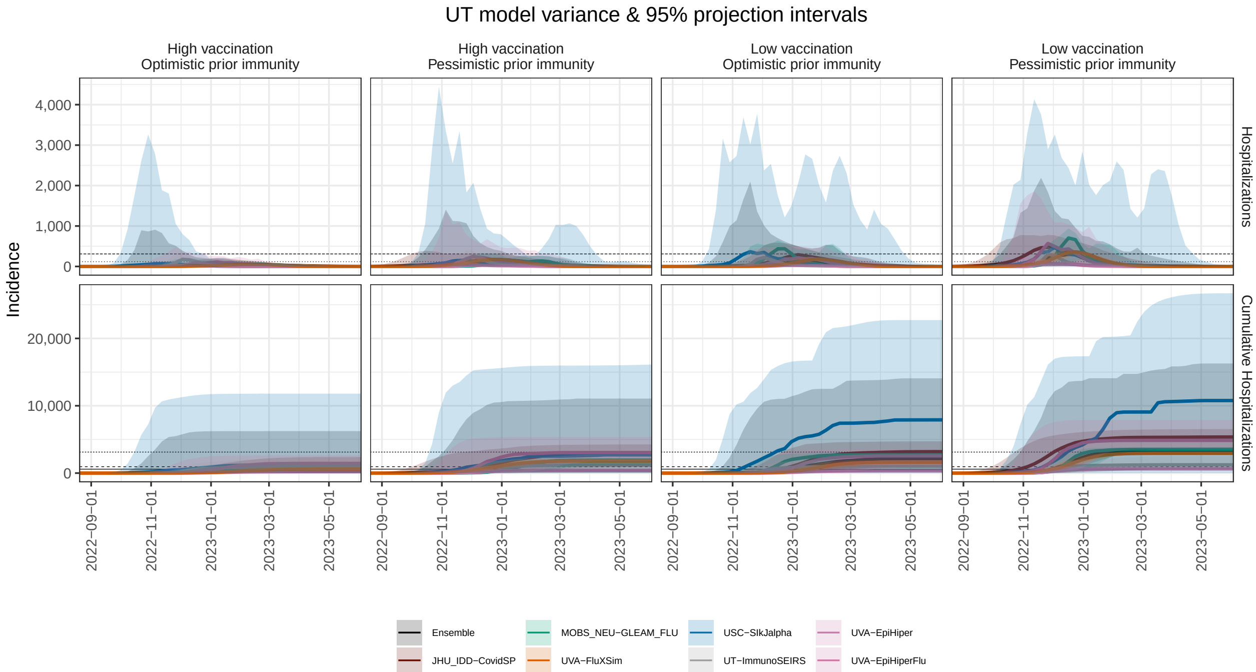
SC model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Incidence
Hospitalizations
Cumulative Hospitalizations
9,000
6,000
3,000
0
50,000
40,000
30,000
20,000
10,000
2022-09-01
2022-11-01
2023-01-01
2023-03-01
2023-05-01
Ensemble
JHU_IDD-CovidSP
MOBS_NEU-GLEAM_FLU
UVA-FluXSim
USC-SIkJalpha
UT-ImmunoSEIRS
UVA-EpiHiper
UVA-EpiHiperFlu

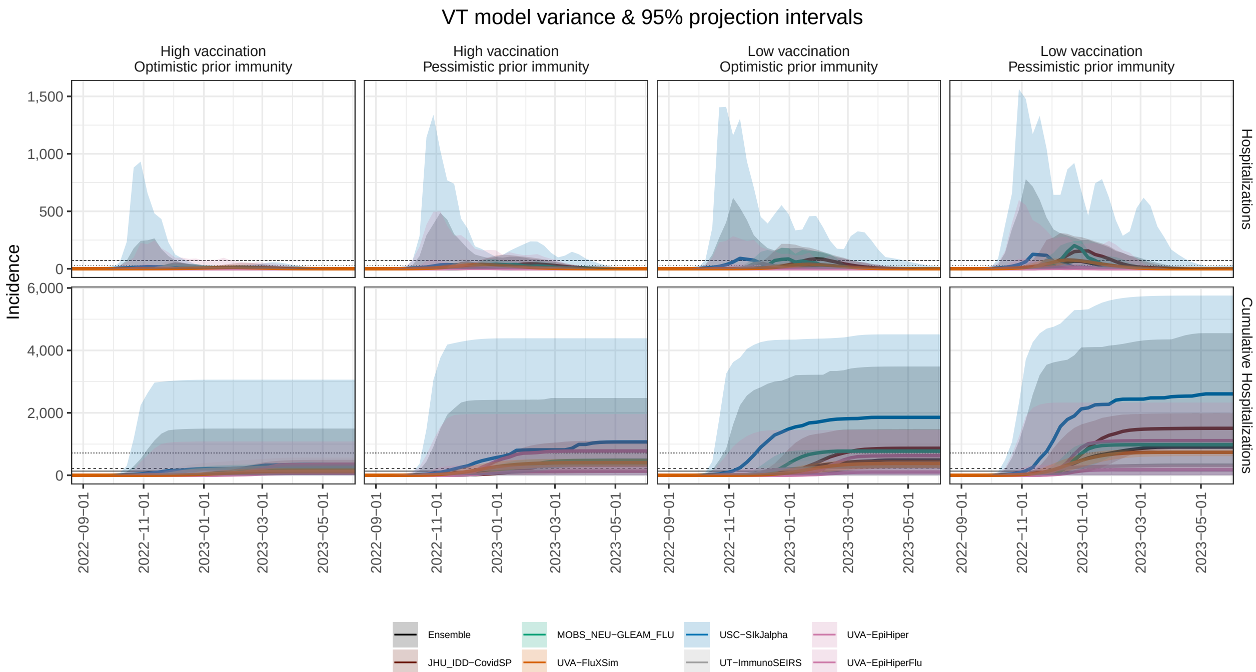


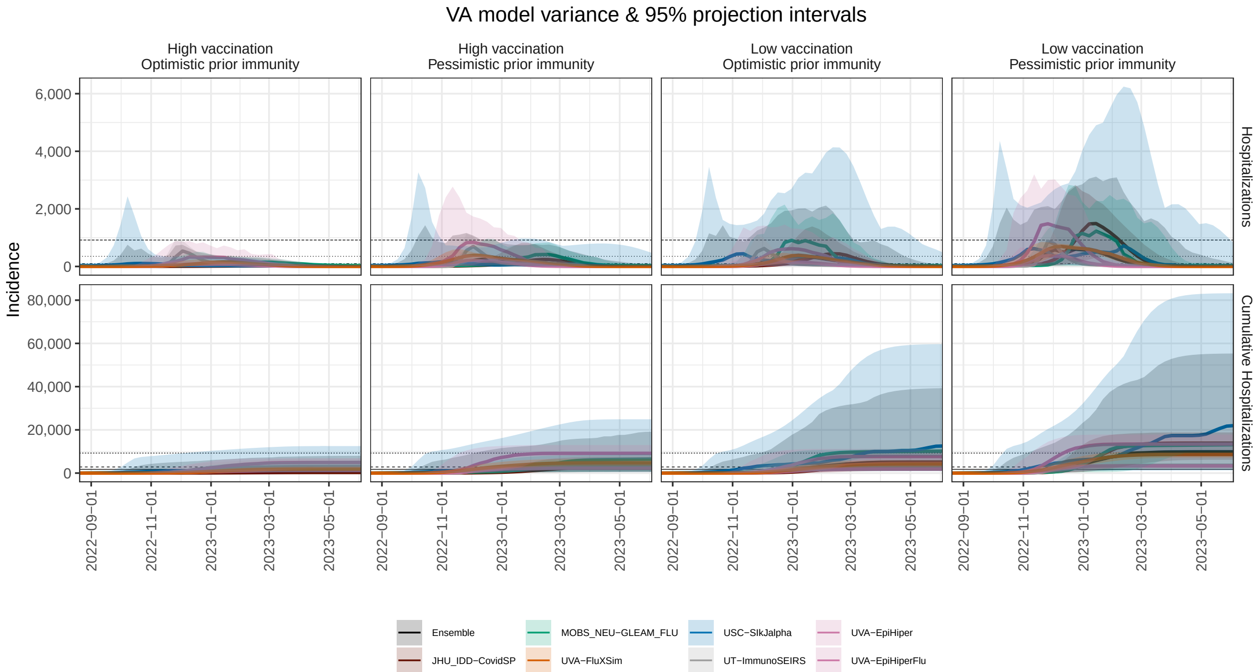
SD model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Incidence
Hospitalizations
Cumulative Hospitalizations
3,000
2,000
1,000
0
9,000
6,000
3,000
2022-09-01
2022-11-01
2023-01-01
2023-03-01
2023-05-01
Ensemble
JHU_IDD-CovidSP
MOBS_NEU-GLEAM_FLU
UVA-FluXSim
USC-SIkJalpha
UT-ImmunoSEIRS
UVA-EpiHiper
UVA-EpiHiperFlu

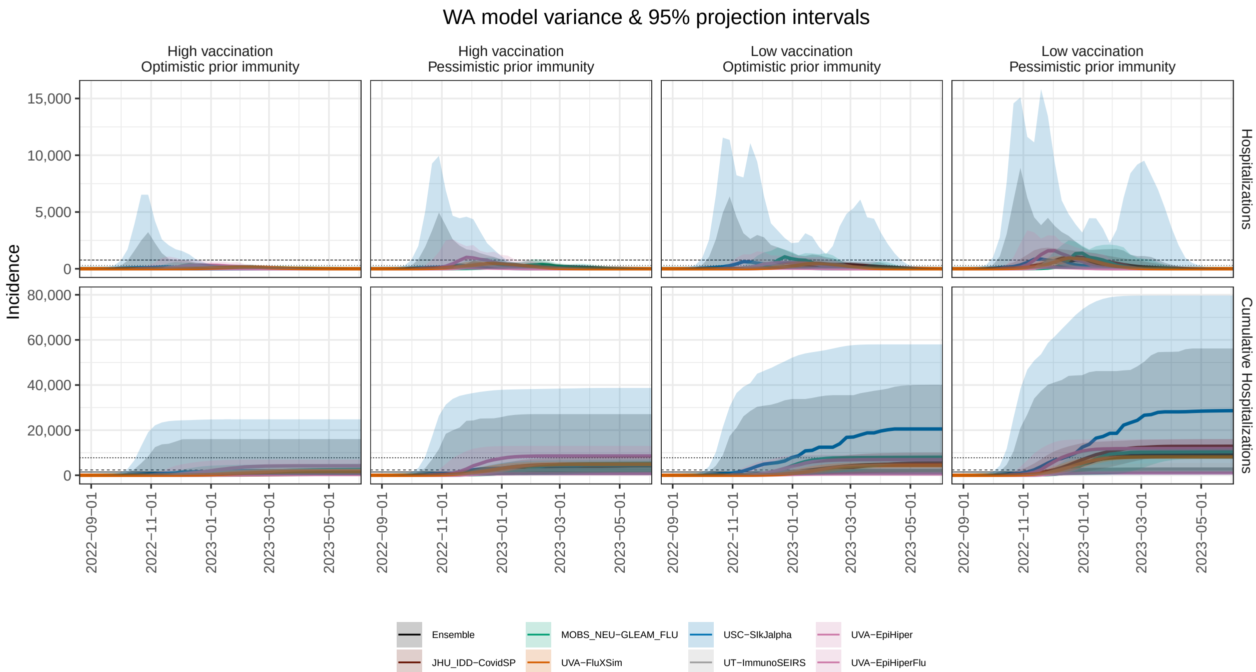

TN model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

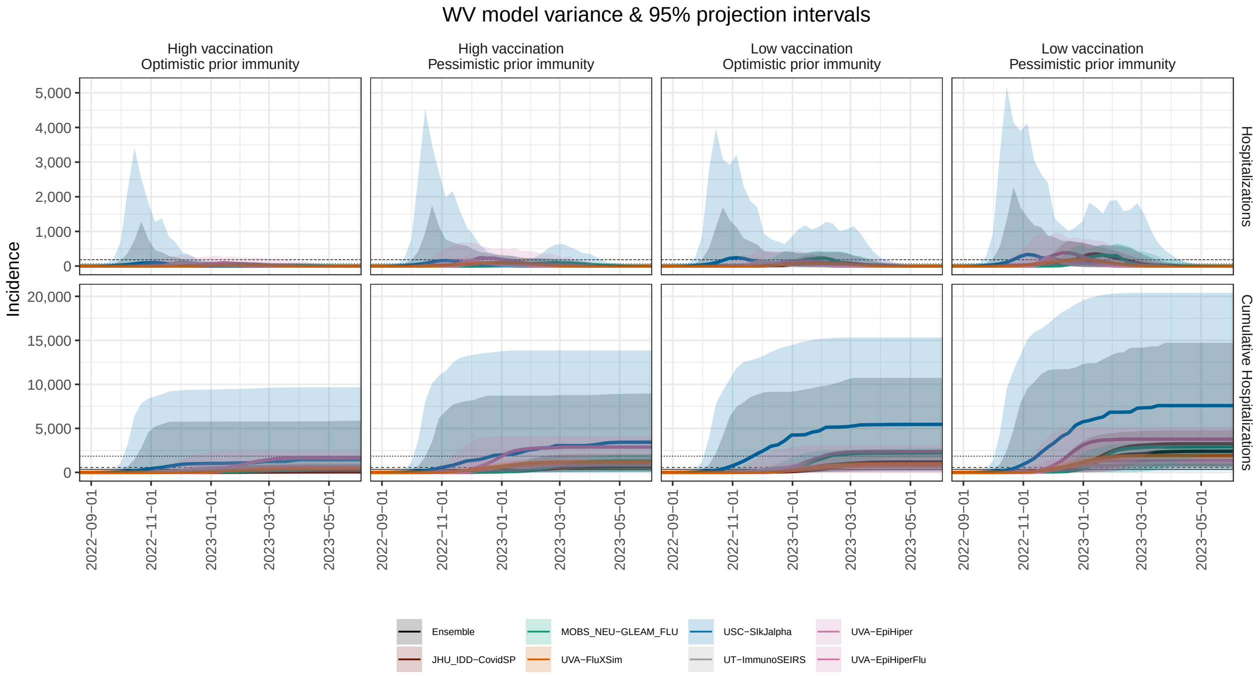

TX model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

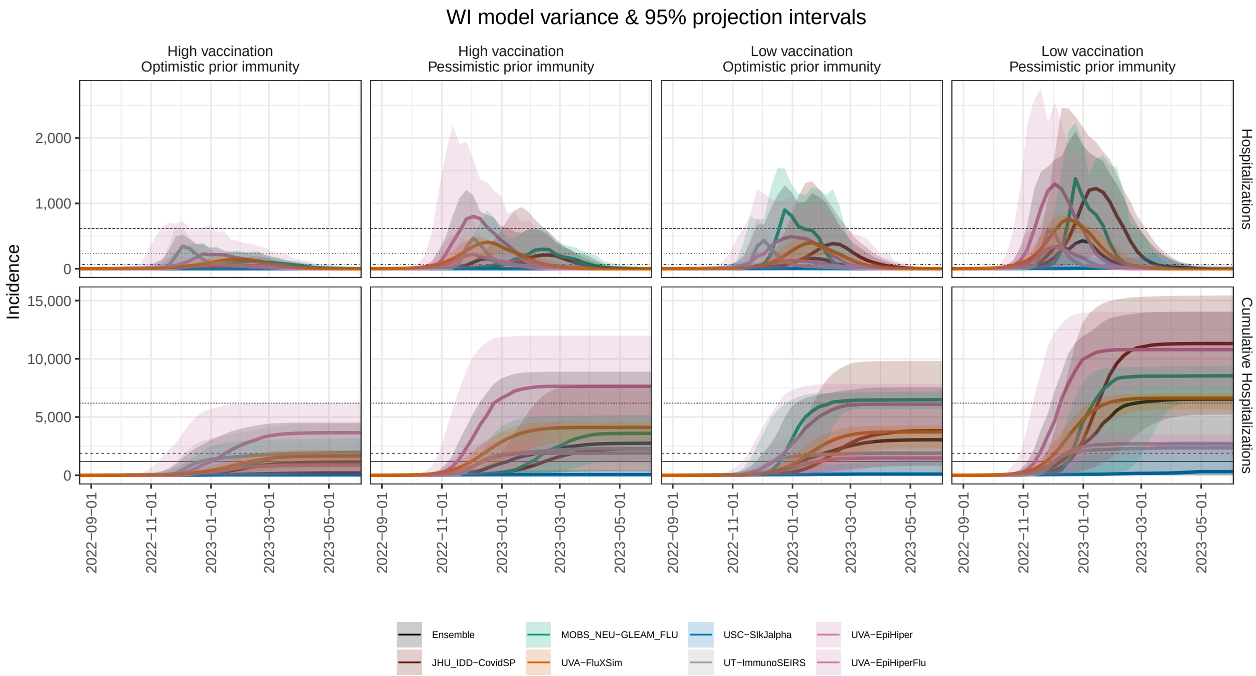

UT model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
4,000
3,000
2,000
1,000
0
20,000
10,000
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

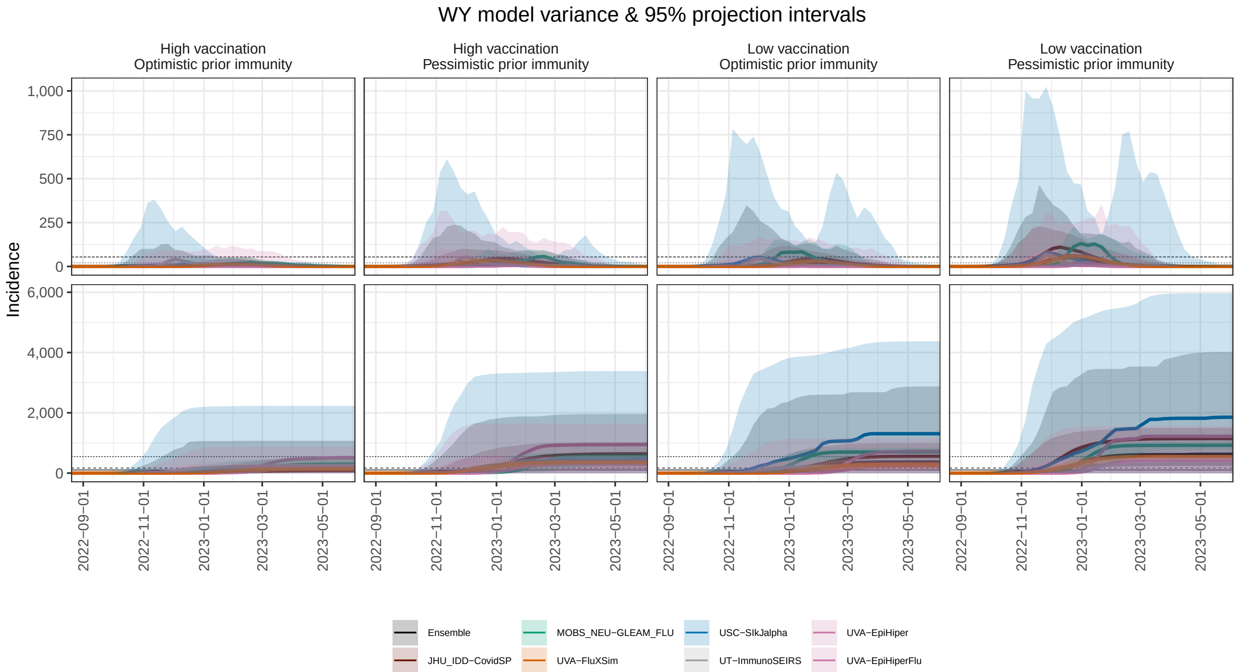

VT model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
1,500
1,000
500
0
6,000
4,000
2,000
2022−09−01
2022−11−01
2023−01−01
2023−03−01
2023−05−01
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu

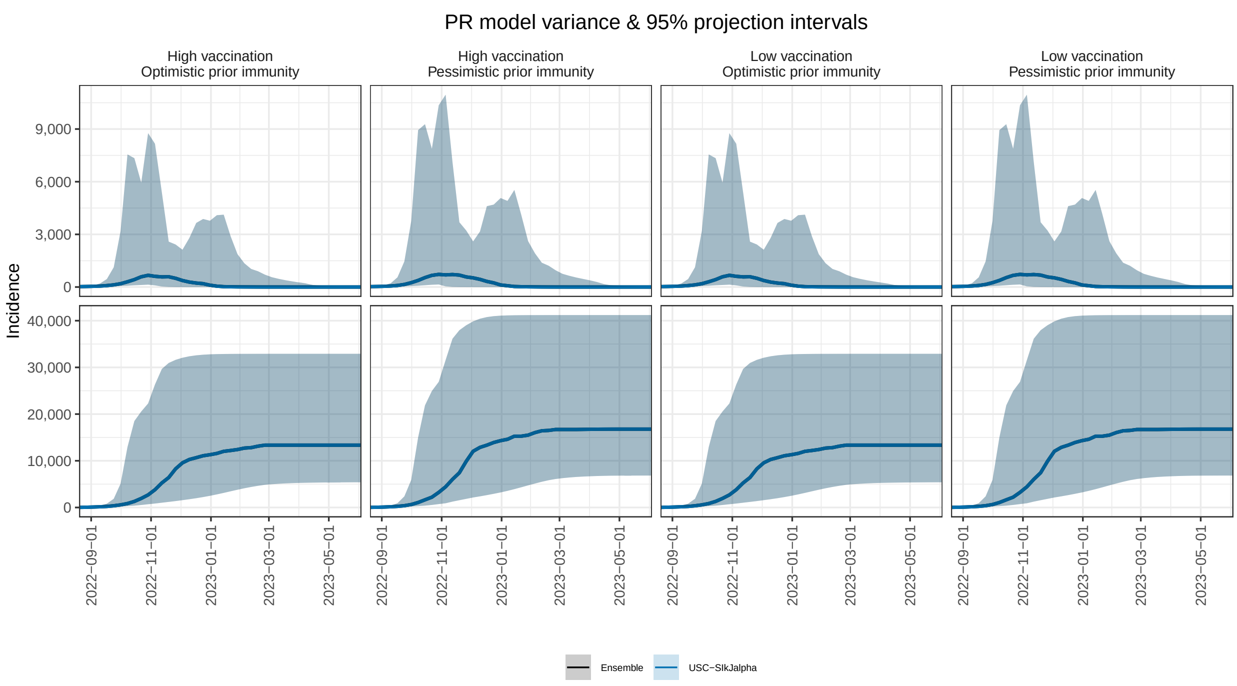

VA model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Incidence
Hospitalizations
Cumulative Hospitalizations
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu


WA model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Incidence
Hospitalizations
Cumulative Hospitalizations
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu


WV model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu


WI model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
Ensemble
JHU_IDD−CovidSP
MOBS_NEU−GLEAM_FLU
UVA−FluXSim
USC−SIkJalpha
UT−ImmunoSEIRS
UVA−EpiHiper
UVA−EpiHiperFlu


WY model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
1,000
750
500
250
0
6,000
4,000
2,000
2022-09-01
2022-11-01
2023-01-01
2023-03-01
2023-05-01
Ensemble
JHU_IDD-CovidSP
MOBS_NEU-GLEAM_FLU
UVA-FluXSim
USC-SIkJalpha
UT-ImmunoSEIRS
UVA-EpiHiper
UVA-EpiHiperFlu


PR model variance & 95% projection intervals
High vaccination
Optimistic prior immunity
High vaccination
Pessimistic prior immunity
Low vaccination
Optimistic prior immunity
Low vaccination
Pessimistic prior immunity
Hospitalizations
Cumulative Hospitalizations
Incidence
9,000
6,000
3,000
0
40,000
30,000
20,000
10,000
2022-09-01
2022-11-01
2023-01-01
2023-03-01
2023-05-01
Ensemble
USC-SIkJalpha

Teams and models

- California Department of Public Health — FluCAT
  - White, L.A. (CADPH), Murray, E. (CADPH), Leon, T.M. (CADPH)
- Center For Disease Dynamics, Economics & Policy — FluCompModel
  - Fardad Haghpanah, Eili Klein
- Johns Hopkins ID Dynamics — COVID Scenario Pipeline
  - Joseph C. Lemaitre (EPFL), Joshua Kaminsky (Johns Hopkins Infectious Disease Dynamics), Clif McKee (Johns Hopkins Infectious Disease Dynamics), Claire P. Smith (Johns Hopkins Infectious Disease Dynamics), Sung-mok Jung (University of North Carolina), Heramb Gupta (Johns Hopkins Infectious Disease Dynamics), Sara L. Loo (Johns Hopkins Infectious Disease Dynamics), Elizabeth C. Lee (Johns Hopkins Infectious Disease Dynamics), Alison Hill (Johns Hopkins Infectious Disease Dynamics), Justin Lessler (University of North Carolina), Shaun A. Truelove (Johns Hopkins Infectious Disease Dynamics)
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  - Matteo Chinazzi (Northeastern University, Boston, MA), Jessica T. Davis (Northeastern University, Boston, MA), Kunpeng Mu (Northeastern University, Boston, MA), Alessandro Vespignani (Northeastern University, Boston, MA)
- Fogarty International Center, National Institutes of Health (NIH) — Flu_TS
  - Amanda Perofsky (NIH), Cécile Viboud (NIH)
- University of Notre Dame — FRED
  - Guido Espana, Sean Moore, Alex Perkins
- University of Southern California — SIkJalpha
  - Ajitesh Srivastava, Majd Al Aawar
- University of Texas — ImmunoSEIRS
  - Kaiming Bi (The University of Texas at Austin), Anass Bouchnita (The University of Texas at El Paso), Spencer J. Fox (The University of Georgia), Lauren Ancel Meyers (The University of Texas at Austin), UT COVID-19 Modeling Consortium.
- University of Virginia Biocomplexity Institute — EpiHiper
  - Jiangzhuo Chen (UVA), Stefan Hoops (UVA), Parantapa Bhattacharya (UVA), Dustin Machi (UVA), Bryan Lewis (UVA), Madhav Marathe (UVA)
- University of Virginia Biocomplexity Institute — FluXSim
  - Srini Venkatramanan, Aniruddha Adiga, Przemek Porebski, Brian Klahn, Benjamin Hurt, Bryan Lewis (UVA), Madhav Marathe (UVA)

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- Harry Hochheiser, University of Pittsburgh
- Katriona Shea, Penn State University
- Michael Runge, USGS
- Erica Carcelen, Johns Hopkins University
- Sung-mok Jung, University of North Carolina,
- J Espino, University of Pittsburgh
- John Levander, University of Pittsburgh