Vyvanuti III

Results of Statistical Estimation

April 29, 2023

1 Serious Course BA45+

Characteristic	N = 51,286,983[1]
SeriousCovidProxy	5,551 (<0.1%)
Immunity	
_noimmunity	2,190,732 (4.3%)
_other	1,567,539 (3.1%)
b45_062-122	13,252 (<0.1%)
boost_001-061	84,695 (0.2%)
boost_062-122	180,269 (0.4%)
boost_123-183	1,440,039 (2.8%)
boost_184-244	3,025,527 (5.9%)
boost_245-305	2,979,044 (5.8%)
boost_306-366	2,656,963 (5.2%)
boost_367-427	2,286,622 (4.5%)
boost_428-488	1,582,076 (3.1%)
boost_489-549	187,715 (0.4%)
full_123-183	212,041 (0.4%)
full_184-244	489,693 (1.0%)
full_245-305	728,875 (1.4%)
full_306-366	1,259,132 (2.5%)
full_367-427	1,317,836 (2.6%)
full_428-488	1,210,870 (2.4%)
full_489-549	907,075 (1.8%)
hybridboost_001-061	477,052 (0.9%)
hybridboost_062-122	1,142,659 (2.2%)
hybridboost_123-183	1,930,279 (3.8%)
hybridboost_184-244	1,981,955 (3.9%)
hybridboost_245-305	1,508,009 (2.9%)
hybridboost_306-366	1,253,928 (2.4%)
hybridboost_367-427	904,297 (1.8%)
hybridboost_428-488	307,950 (0.6%)
hybridfull_062-122	298,727 (0.6%)
hybridfull_123-183	1,133,345 (2.2%)
hybridfull_184-244	1,666,168 (3.2%)
hybridfull_245-305	1,756,829 (3.4%)
hybridfull_306-366	1,806,966 (3.5%)
hybridfull_367-427	1,451,552 (2.8%)
hybridfull_428-488	631,791 (1.2%)
hybridfull_489-549	293,336 (0.6%)
inf_062-122	215,700 (0.4%)
inf_123-183	754,747 (1.5%)
inf_184-244	1,145,860 (2.2%)
inf_245-305	1,141,466 (2.2%)
inf_306-366	1,121,379 (2.2%)
inf_367-427	1,068,250 (2.1%)
inf_428-488	682,001 (1.3%)
inf_489-549	425,171 (0.8%)
secbnew_001-061	287,147 (0.6%)
secbnew_062-122	277,716 (0.5%)
secbnew_123-183	205,232 (0.4%)
secboost_001-061	323,771 (0.6%)
secboost_062-122	317,146 (0.6%)
secboost_123-183	299,789 (0.6%)
secboost_184-244	156,770 (0.3%)
Sex	
F	26,292,739 (51%)
M	24,994,244 (49%)
[1] n (%)	

Forest Plot TBD
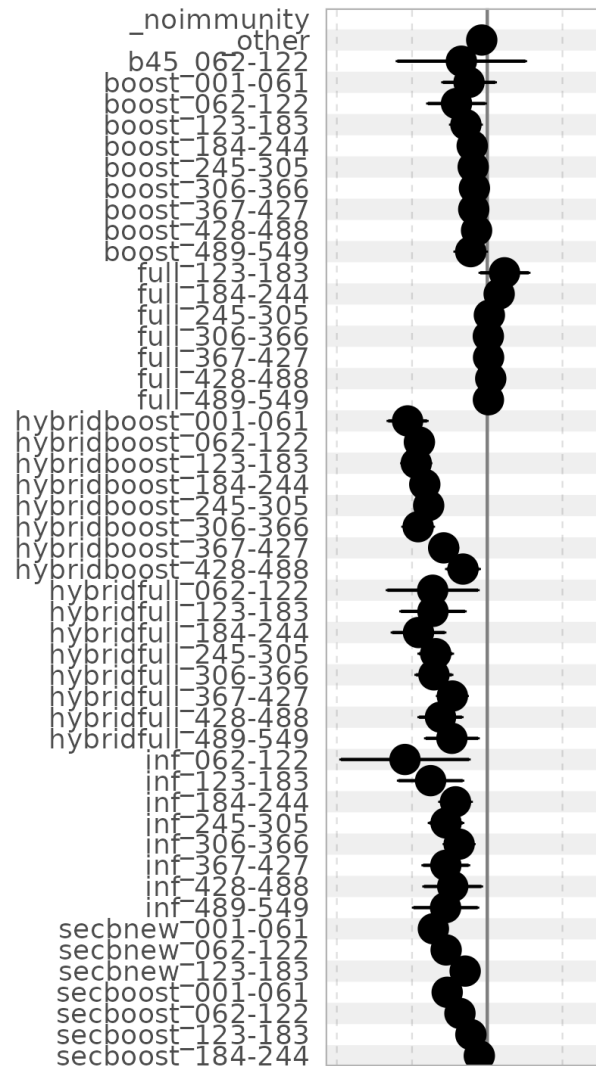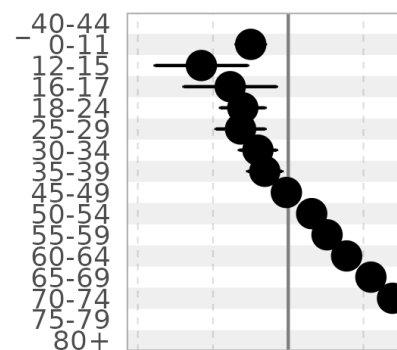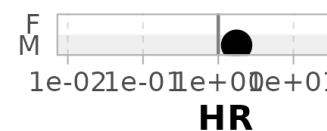
	beta	lower	upper	HR	lower	upper	eff	upper	lower
Immunity_other	-0.17	-0.31	-0.03	0.84	0.73	0.97	0.16	0.27	0.03
Immunityb45_062-122	-0.79	-2.75	1.17	0.45	0.06	3.22	0.55	0.94	-2.22
Immunityboost_001-061	-0.56	-1.36	0.25	0.57	0.26	1.28	0.43	0.74	-0.28
Immunityboost_062-122	-0.94	-1.82	-0.06	0.39	0.16	0.94	0.61	0.84	0.06
Immunityboost_123-183	-0.65	-1.12	-0.19	0.52	0.33	0.83	0.48	0.67	0.17
Immunityboost_184-244	-0.46	-0.60	-0.32	0.63	0.55	0.73	0.37	0.45	0.27
Immunityboost_245-305	-0.43	-0.52	-0.34	0.65	0.59	0.71	0.35	0.41	0.29
Immunityboost_306-366	-0.39	-0.49	-0.30	0.67	0.61	0.74	0.33	0.39	0.26
Immunityboost_367-427	-0.41	-0.54	-0.29	0.66	0.59	0.75	0.34	0.41	0.25
Immunityboost_428-488	-0.33	-0.48	-0.18	0.72	0.62	0.84	0.28	0.38	0.16
Immunityboost_489-549	-0.51	-0.99	-0.03	0.60	0.37	0.97	0.40	0.63	0.03
Immunityfull_123-183	0.53	-0.22	1.27	1.69	0.81	3.57	-0.69	0.19	-2.57
Immunityfull_184-244	0.36	0.04	0.69	1.44	1.04	1.99	-0.44	-0.04	-0.99
Immunityfull_245-305	0.06	-0.20	0.33	1.07	0.82	1.39	-0.07	0.18	-0.39
Immunityfull_306-366	0.03	-0.23	0.29	1.03	0.80	1.34	-0.03	0.20	-0.34
Immunityfull_367-427	0.04	-0.15	0.23	1.04	0.86	1.26	-0.04	0.14	-0.26
Immunityfull_428-488	0.11	-0.06	0.27	1.11	0.94	1.31	-0.11	0.06	-0.31
Immunityfull_489-549	0.04	-0.16	0.23	1.04	0.86	1.25	-0.04	0.14	-0.25
Immunityhybridboost_001-061	-2.44	-3.03	-1.84	0.09	0.05	0.16	0.91	0.95	0.84
Immunityhybridboost_062-122	-2.08	-2.50	-1.66	0.13	0.08	0.19	0.87	0.92	0.81
Immunityhybridboost_123-183	-2.17	-2.62	-1.73	0.11	0.07	0.18	0.89	0.93	0.82
Immunityhybridboost_184-244	-1.91	-2.26	-1.56	0.15	0.10	0.21	0.85	0.90	0.79
Immunityhybridboost_245-305	-1.79	-2.11	-1.47	0.17	0.12	0.23	0.83	0.88	0.77
Immunityhybridboost_306-366	-2.12	-2.58	-1.65	0.12	0.08	0.19	0.88	0.92	0.81
Immunityhybridboost_367-427	-1.33	-1.76	-0.91	0.26	0.17	0.40	0.74	0.83	0.60
Immunityhybridboost_428-488	-0.74	-1.24	-0.24	0.48	0.29	0.78	0.52	0.71	0.22
Immunityhybridfull_062-122	-1.67	-3.06	-0.28	0.19	0.05	0.75	0.81	0.95	0.25
Immunityhybridfull_123-183	-1.66	-2.64	-0.68	0.19	0.07	0.51	0.81	0.93	0.49
Immunityhybridfull_184-244	-2.10	-2.91	-1.30	0.12	0.05	0.27	0.88	0.95	0.73
Immunityhybridfull_245-305	-1.58	-2.09	-1.07	0.21	0.12	0.34	0.79	0.88	0.66
Immunityhybridfull_306-366	-1.63	-2.18	-1.09	0.20	0.11	0.34	0.80	0.89	0.66
Immunityhybridfull_367-427	-1.07	-1.52	-0.61	0.34	0.22	0.54	0.66	0.78	0.46
Immunityhybridfull_428-488	-1.43	-2.09	-0.78	0.24	0.12	0.46	0.76	0.88	0.54
Immunityhybridfull_489-549	-1.08	-1.89	-0.28	0.34	0.15	0.76	0.66	0.85	0.24
Immunityinf_062-122	-2.52	-4.48	-0.56	0.08	0.01	0.57	0.92	0.99	0.43
Immunityinf_123-183	-1.73	-2.72	-0.75	0.18	0.07	0.47	0.82	0.93	0.53
Immunityinf_184-244	-0.97	-1.45	-0.49	0.38	0.23	0.61	0.62	0.77	0.39
Immunityinf_245-305	-1.26	-1.77	-0.75	0.28	0.17	0.47	0.72	0.83	0.53
Immunityinf_306-366	-0.86	-1.31	-0.41	0.42	0.27	0.67	0.58	0.73	0.33
Immunityinf_367-427	-1.27	-1.97	-0.57	0.28	0.14	0.56	0.72	0.86	0.44
Immunityinf_428-488	-1.06	-1.94	-0.18	0.35	0.14	0.84	0.65	0.86	0.16
Immunityinf_489-549	-1.28	-2.26	-0.29	0.28	0.10	0.75	0.72	0.90	0.25
Immunitysecbnew_001-061	-1.65	-1.99	-1.31	0.19	0.14	0.27	0.81	0.86	0.73
Immunitysecbnew_062-122	-1.26	-1.59	-0.93	0.28	0.20	0.39	0.72	0.80	0.61
Immunitysecbnew_123-183	-0.68	-1.07	-0.29	0.51	0.34	0.75	0.49	0.66	0.25
Immunitysecboost_001-061	-1.23	-1.43	-1.02	0.29	0.24	0.36	0.71	0.76	0.64
Immunitysecboost_062-122	-0.84	-1.04	-0.63	0.43	0.35	0.53	0.57	0.65	0.47
Immunitysecboost_123-183	-0.50	-0.71	-0.29	0.61	0.49	0.75	0.39	0.51	0.25
Immunitysecboost_184-244	-0.24	-0.55	0.06	0.78	0.58	1.06	0.22	0.42	-0.06
AgeGr0-11	-1.15	-1.60	-0.70	0.32	0.20	0.50	0.68	0.80	0.50
AgeGr12-15	-2.66	-4.08	-1.24	0.07	0.02	0.29	0.93	0.98	0.71
AgeGr16-17	-1.78	-3.19	-0.36	0.17	0.04	0.70	0.83	0.96	0.30
AgeGr18-24	-1.39	-2.08	-0.71	0.25	0.13	0.49	0.75	0.87	0.51
AgeGr25-29	-1.46	-2.21	-0.71	0.23	0.11	0.49	0.77	0.89	0.51
AgeGr30-34	-0.93	-1.50	-0.36	0.40	0.22	0.70	0.60	0.78	0.30
AgeGr35-39	-0.72	-1.24	-0.19	0.49	0.29	0.82	0.51	0.71	0.18
AgeGr45-49	-0.06	-0.47	0.35	0.94	0.63	1.42	0.06	0.37	-0.42
AgeGr50-54	0.72	0.35	1.08	2.05	1.42	2.95	-1.05	-0.42	-1.95
AgeGr55-59	1.19	0.85	1.53	3.28	2.33	4.61	-2.28	-1.33	-3.61
AgeGr60-64	1.79	1.47	2.11	5.97	4.33	8.23	-4.97	-3.33	-7.23
AgeGr65-69	2.53	2.23	2.83	12.55	9.26	17.01	-11.55	-8.26	-16.01
AgeGr70-74	3.19	2.89	4 3.49	24.34	18.06	32.80	-23.34	-17.06	-31.80
AgeGr75-79	3.88	3.58	4.18	48.43	36.01	65.13	-47.43	-35.01	-64.13
AgeGr80+	4.64	4.34	4.93	103.36	77.08	138.59	-102.36	-76.08	-137.59
SexM	0.56	0.51	0.62	1.76	1.66	1.85	-0.76	-0.66	-0.85

	immunities	deltas	lower_of_deltas	upper_of_deltas
2	Immunityfull	-0.01	-0.04	0.02
3	Immunityboost	0.07	0.05	0.08
4	Immunitysecboost	0.09	0.06	0.11
5	Immunitysecnew	0.06	0.02	0.10
6	Immunityinf	0.01	-0.01	0.03
7	Immunityhybridfull	0.01	-0.00	0.02
8	Immunityhybridboost	0.01	0.01	0.02

Table 2: Monthly percentage decrease of effectiveness/protection

	1	2	3	4	5	6	7
1		41.67%	71.53%	118.69%	76.73%	83.01%	84.57%
2	-41.67%		-5.97%	12.00%	32.47%	44.08%	47.94%
3	-71.53%	5.97%		11.51%	38.78%	44.32%	29.87%
4	-118.69%	-12.00%	-11.51%		24.49%	20.91%	14.90%
5	-76.73%	-32.47%	-38.78%	-24.49%		8.49%	9.91%
6	-83.01%	-44.08%	-44.32%	-20.91%	-8.49%		2.67%
7	-84.57%	-47.94%	-29.87%	-14.90%	-9.91%	-2.67%	

Table 3: Effectiveness/protection differences

	1	2	3	4	5	6	7
		7.22	2.90	1.82	10.56	12.83	12.15
	-7.22		-0.74	1.12	7.68	13.87	19.24
	-2.90	0.74		3.29	5.93	5.88	10.30
	-1.82	-1.12	-3.29		3.17	2.11	4.65
	-10.56	-7.68	-5.93	-3.17		1.92	2.66
	-12.83	-13.87	-5.88	-2.11	-1.92		0.91
	-12.15	-19.24	-10.30	-4.65	-2.66	-0.91	

Table 4: Z-scores of effectiveness/protection differences

2 Serious Course BA12

Characteristic	N = 40,663,534[1]
SeriousCovidProxy	6,587 (<0.1%)
Immunity	
_noimmunity	2,867,553 (7.1%)
_other	677,882 (1.7%)
boost_001-061	3,350,025 (8.2%)
boost_062-122	3,264,147 (8.0%)
boost_123-183	3,049,848 (7.5%)
boost_184-244	2,338,205 (5.8%)
full_001-061	610,276 (1.5%)
full_062-122	976,872 (2.4%)
full_123-183	2,866,169 (7.0%)
full_184-244	2,163,706 (5.3%)
full_245-305	1,137,393 (2.8%)
full_306-366	856,990 (2.1%)
full_367-427	268,250 (0.7%)
full_428-488	40,985 (0.1%)
hybridboost_001-061	1,306,758 (3.2%)
hybridboost_062-122	2,052,786 (5.0%)
hybridboost_123-183	1,515,388 (3.7%)
hybridfull_001-061	341,368 (0.8%)
hybridfull_062-122	2,131,494 (5.2%)
hybridfull_123-183	2,441,509 (6.0%)
hybridfull_184-244	1,346,216 (3.3%)
hybridfull_245-305	607,878 (1.5%)
hybridfull_306-366	324,441 (0.8%)
hybridfull_367-427	75,463 (0.2%)
inf_062-122	1,190,450 (2.9%)
inf_123-183	1,106,986 (2.7%)
inf_245-305	343,688 (0.8%)
inf_306-366	318,216 (0.8%)
inf_367-427	371,936 (0.9%)
inf_428-488	403,641 (1.0%)
inf_489-549	317,015 (0.8%)
Sex	
F	20,703,181 (51%)
M	19,960,353 (49%)

[1] n (%)
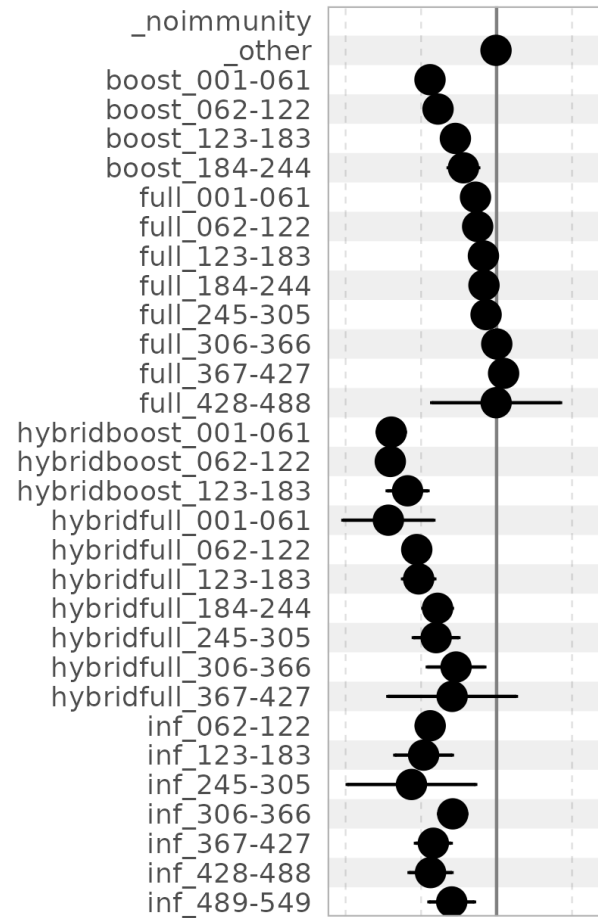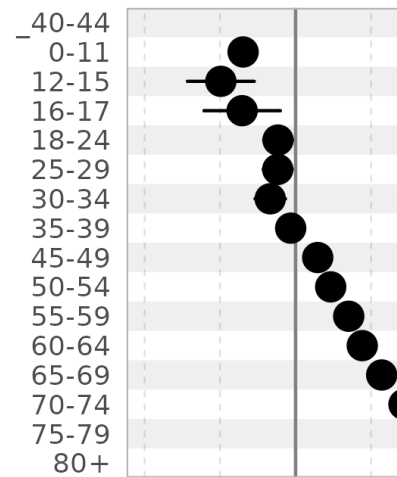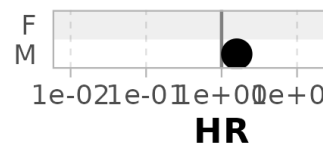
Forest Plot TBD

	beta	lower	upper	HR	lower	upper	eff	upper	lower
Immunity_other	-0.02	-0.21	0.17	0.98	0.81	1.19	0.02	0.19	-0.19
Immunityboost_001-061	-2.03	-2.14	-1.92	0.13	0.12	0.15	0.87	0.88	0.85
Immunityboost_062-122	-1.79	-1.86	-1.72	0.17	0.16	0.18	0.83	0.84	0.82
Immunityboost_123-183	-1.26	-1.36	-1.16	0.28	0.26	0.31	0.72	0.74	0.69
Immunityboost_184-244	-1.01	-1.48	-0.54	0.36	0.23	0.58	0.64	0.77	0.42
Immunityfull_001-061	-0.64	-0.84	-0.44	0.53	0.43	0.64	0.47	0.57	0.36
Immunityfull_062-122	-0.58	-0.75	-0.40	0.56	0.47	0.67	0.44	0.53	0.33
Immunityfull_123-183	-0.40	-0.56	-0.24	0.67	0.57	0.78	0.33	0.43	0.22
Immunityfull_184-244	-0.38	-0.49	-0.28	0.68	0.61	0.76	0.32	0.39	0.24
Immunityfull_245-305	-0.32	-0.44	-0.20	0.73	0.64	0.82	0.27	0.36	0.18
Immunityfull_306-366	0.01	-0.15	0.16	1.01	0.86	1.17	-0.01	0.14	-0.17
Immunityfull_367-427	0.21	-0.10	0.53	1.24	0.90	1.70	-0.24	0.10	-0.70
Immunityfull_428-488	-0.01	-1.98	1.95	0.99	0.14	7.04	0.01	0.86	-6.04
Immunityhybridboost_001-061	-3.21	-3.64	-2.78	0.04	0.03	0.06	0.96	0.97	0.94
Immunityhybridboost_062-122	-3.24	-3.60	-2.88	0.04	0.03	0.06	0.96	0.97	0.94
Immunityhybridboost_123-183	-2.72	-3.34	-2.09	0.07	0.04	0.12	0.93	0.96	0.88
Immunityhybridfull_001-061	-3.30	-4.69	-1.91	0.04	0.01	0.15	0.96	0.99	0.85
Immunityhybridfull_062-122	-2.44	-2.80	-2.08	0.09	0.06	0.13	0.91	0.94	0.87
Immunityhybridfull_123-183	-2.38	-2.87	-1.88	0.09	0.06	0.15	0.91	0.94	0.85
Immunityhybridfull_184-244	-1.80	-2.25	-1.35	0.17	0.11	0.26	0.83	0.89	0.74
Immunityhybridfull_245-305	-1.84	-2.54	-1.15	0.16	0.08	0.32	0.84	0.92	0.68
Immunityhybridfull_306-366	-1.24	-2.11	-0.36	0.29	0.12	0.70	0.71	0.88	0.30
Immunityhybridfull_367-427	-1.36	-3.32	0.60	0.26	0.04	1.83	0.74	0.96	-0.83
Immunityinf_062-122	-2.03	-2.45	-1.61	0.13	0.09	0.20	0.87	0.91	0.80
Immunityinf_123-183	-2.23	-3.10	-1.35	0.11	0.04	0.26	0.89	0.96	0.74
Immunityinf_245-305	-2.60	-4.56	-0.64	0.07	0.01	0.53	0.93	0.99	0.47
Immunityinf_306-366	-1.34	-1.77	-0.91	0.26	0.17	0.40	0.74	0.83	0.60
Immunityinf_367-427	-1.93	-2.47	-1.38	0.15	0.08	0.25	0.85	0.92	0.75
Immunityinf_428-488	-2.02	-2.67	-1.36	0.13	0.07	0.26	0.87	0.93	0.74
Immunityinf_489-549	-1.37	-2.06	-0.67	0.25	0.13	0.51	0.75	0.87	0.49
AgeGr0-11	-1.60	-2.00	-1.20	0.20	0.14	0.30	0.80	0.86	0.70
AgeGr12-15	-2.28	-3.29	-1.27	0.10	0.04	0.28	0.90	0.96	0.72
AgeGr16-17	-1.63	-2.79	-0.47	0.20	0.06	0.62	0.80	0.94	0.38
AgeGr18-24	-0.54	-0.97	-0.10	0.59	0.38	0.90	0.41	0.62	0.10
AgeGr25-29	-0.54	-0.98	-0.11	0.58	0.38	0.90	0.42	0.62	0.10
AgeGr30-34	-0.77	-1.23	-0.32	0.46	0.29	0.73	0.54	0.71	0.27
AgeGr35-39	-0.15	-0.53	0.23	0.86	0.59	1.26	0.14	0.41	-0.26
AgeGr45-49	0.67	0.36	0.99	1.96	1.44	2.68	-0.96	-0.44	-1.68
AgeGr50-54	1.07	0.77	1.37	2.92	2.15	3.95	-1.92	-1.15	-2.95
AgeGr55-59	1.62	1.34	1.90	5.06	3.81	6.71	-4.06	-2.81	-5.71
AgeGr60-64	2.03	1.76	2.31	7.64	5.82	10.04	-6.64	-4.82	-9.04
AgeGr65-69	2.63	2.36	2.89	13.83	10.64	17.98	-12.83	-9.64	-16.98
AgeGr70-74	3.31	3.05	3.56	27.29	21.11	35.30	-26.29	-20.11	-34.30
AgeGr75-79	3.99	3.73	4.24	53.86	41.68	69.58	-52.86	-40.68	-68.58
AgeGr80+	4.44	4.18	4.69	84.53	65.63	108.88	-83.53	-64.63	-107.88
SexM	0.46	0.41	0.51	1.59	1.51	1.67	-0.59	-0.51	-0.67

Table 5: Cox model summary

	immunities	deltas	lower_of_deltas	upper_of_deltas
2	Immunityfull	-0.00	-0.01	0.01
3	Immunityboost	-0.01	-0.02	-0.00
4	Immunitysecboost			
5	Immunitysecbnew			
6	Immunityinf	-0.01	-0.01	0.00
7	Immunityhybridfull	0.02	0.01	0.03
8	Immunityhybridboost	-0.01	-0.01	0.00

Table 6: Monthly percentage decrease of effectiveness/protection

	1	2	3	4	5	6	7
1		38.45%			56.38%	52.70%	53.37%
2	-38.45%				7.03%	10.85%	12.07%
3							
4							
5	-56.38%	-7.03%				2.35%	8.09%
6	-52.70%	-10.85%			-2.35%		3.22%
7	-53.37%	-12.07%			-8.09%	-3.22%	

Table 7: Effectiveness/protection differences

	1	2	3	4	5	6	7
		12.82			15.10	19.57	16.46
	-12.82				2.82	8.57	17.30
	-15.10	-2.82				0.90	3.17
	-19.57	-8.57			-0.90		2.41
	-16.46	-17.30			-3.17	-2.41	

Table 8: Z-scores of effectiveness/protection differences

3 Long Covid BA12 - Population

	beta	lower	upper	HR	lower	upper	eff	upper	lower
Immunity_other	-0.28	-0.51	-0.06	0.75	0.60	0.95	0.25	0.40	0.05
Immunityboost_001-061	-0.94	-1.02	-0.86	0.39	0.36	0.42	0.61	0.64	0.58
Immunityboost_062-122	-0.42	-0.49	-0.34	0.66	0.61	0.71	0.34	0.39	0.29
Immunityboost_123-183	0.13	-0.02	0.29	1.14	0.98	1.34	-0.14	0.02	-0.34
Immunityfull_001-061	-0.49	-0.65	-0.32	0.61	0.52	0.72	0.39	0.48	0.28
Immunityfull_062-122	-0.31	-0.45	-0.17	0.73	0.64	0.85	0.27	0.36	0.15
Immunityfull_123-183	-0.15	-0.26	-0.04	0.86	0.77	0.96	0.14	0.23	0.04
Immunityfull_184-244	-0.07	-0.15	0.01	0.94	0.86	1.01	0.06	0.14	-0.01
Immunityfull_245-305	0.30	0.16	0.43	1.34	1.18	1.53	-0.34	-0.18	-0.53
Immunityfull_306-366	0.48	0.23	0.73	1.61	1.26	2.07	-0.61	-0.26	-1.07
Immunityfull_367-427	0.62	-0.00	1.24	1.86	1.00	3.46	-0.86	0.00	-2.46
Immunityhybridboost_001-061	-1.46	-1.63	-1.29	0.23	0.20	0.28	0.77	0.80	0.72
Immunityhybridboost_062-122	-0.79	-0.96	-0.63	0.45	0.38	0.53	0.55	0.62	0.47
Immunityhybridboost_123-183	-0.91	-1.61	-0.22	0.40	0.20	0.80	0.60	0.80	0.20
Immunityhybridfull_001-061	-1.34	-1.75	-0.93	0.26	0.17	0.39	0.74	0.83	0.61
Immunityhybridfull_062-122	-1.62	-1.84	-1.40	0.20	0.16	0.25	0.80	0.84	0.75
Immunityhybridfull_123-183	-0.72	-0.91	-0.52	0.49	0.40	0.59	0.51	0.60	0.41
Immunityhybridfull_184-244	-0.34	-0.50	-0.17	0.72	0.61	0.84	0.28	0.39	0.16
Immunityhybridfull_245-305	-0.10	-0.42	0.21	0.90	0.66	1.23	0.10	0.34	-0.23
Immunityhybridfull_306-366	0.28	-0.26	0.83	1.32	0.77	2.28	-0.32	0.23	-1.28
Immunityinf_062-122	-0.82	-0.99	-0.65	0.44	0.37	0.52	0.56	0.63	0.48
Immunityinf_123-183	-0.65	-1.03	-0.27	0.52	0.36	0.77	0.48	0.64	0.23
Immunityinf_184-244	0.20	-0.60	1.00	1.22	0.55	2.72	-0.22	0.45	-1.72
Immunityinf_245-305	-0.09	-0.51	0.33	0.91	0.60	1.39	0.09	0.40	-0.39
Immunityinf_306-366	-0.23	-0.42	-0.03	0.80	0.66	0.97	0.20	0.34	0.03
Immunityinf_367-427	-0.07	-0.27	0.12	0.93	0.77	1.13	0.07	0.23	-0.13
Immunityinf_428-488	0.20	0.00	0.40	1.22	1.00	1.49	-0.22	-0.00	-0.49
Immunityinf_489-549	0.04	-0.30	0.37	1.04	0.74	1.45	-0.04	0.26	-0.45
AgeGr0-11	-3.49	-3.77	-3.20	0.03	0.02	0.04	0.97	0.98	0.96
AgeGr12-15	-2.30	-2.62	-1.98	0.10	0.07	0.14	0.90	0.93	0.86
AgeGr16-17	-2.37	-2.89	-1.86	0.09	0.06	0.16	0.91	0.94	0.84
AgeGr18-24	-0.96	-1.11	-0.81	0.38	0.33	0.45	0.62	0.67	0.55
AgeGr25-29	-0.44	-0.57	-0.31	0.64	0.56	0.73	0.36	0.44	0.27
AgeGr30-34	-0.24	-0.35	-0.12	0.79	0.70	0.89	0.21	0.30	0.11
AgeGr35-39	-0.13	-0.24	-0.02	0.88	0.79	0.98	0.12	0.21	0.02
AgeGr45-49	0.33	0.24	0.43	1.39	1.27	1.53	-0.39	-0.27	-0.53
AgeGr50-54	0.42	0.32	0.52	1.52	1.38	1.68	-0.52	-0.38	-0.68
AgeGr55-59	0.47	0.37	0.56	1.59	1.45	1.76	-0.59	-0.45	-0.76
AgeGr60-64	0.14	0.04	0.25	1.16	1.04	1.29	-0.16	-0.04	-0.29
AgeGr65-69	-0.11	-0.22	0.00	0.90	0.80	1.00	0.10	0.20	-0.00
AgeGr70-74	-0.13	-0.25	-0.02	0.88	0.78	0.98	0.12	0.22	0.02
AgeGr75-79	-0.09	-0.21	0.04	0.92	0.81	1.04	0.08	0.19	-0.04
AgeGr80+	-0.06	-0.18	0.05	0.94	0.84	1.06	0.06	0.16	-0.06
SexM	-0.41	-0.46	-0.37	0.66	0.63	0.69	0.34	0.37	0.31

Table 9: Cox model summary

Characteristic	N = 28,214,379[1]
LongCovid	7,910 (<0.1%)
Immunity	
_noimmunity	3,240,247 (11%)
_other	716,971 (2.5%)
boost_001-061	3,350,348 (12%)
boost_062-122	2,759,033 (9.8%)
boost_123-183	507,424 (1.8%)
full_001-061	657,597 (2.3%)
full_062-122	1,743,501 (6.2%)
full_123-183	3,871,409 (14%)
full_184-244	2,108,518 (7.5%)
full_245-305	555,451 (2.0%)
full_306-366	69,163 (0.2%)
full_367-427	10,300 (<0.1%)
hybridboost_001-061	1,209,388 (4.3%)
hybridboost_062-122	783,425 (2.8%)
hybridboost_123-183	70,827 (0.3%)
hybridfull_001-061	390,758 (1.4%)
hybridfull_062-122	1,434,630 (5.1%)
hybridfull_123-183	1,474,389 (5.2%)
hybridfull_184-244	696,978 (2.5%)
hybridfull_245-305	168,707 (0.6%)
hybridfull_306-366	24,021 (<0.1%)
inf_062-122	730,404 (2.6%)
inf_123-183	285,421 (1.0%)
inf_184-244	70,443 (0.2%)
inf_245-305	268,525 (1.0%)
inf_306-366	360,340 (1.3%)
inf_367-427	374,606 (1.3%)
inf_428-488	195,764 (0.7%)
inf_489-549	85,791 (0.3%)
Sex	
F	14,458,774 (51%)
M	13,755,605 (49%)

[1] n (%)
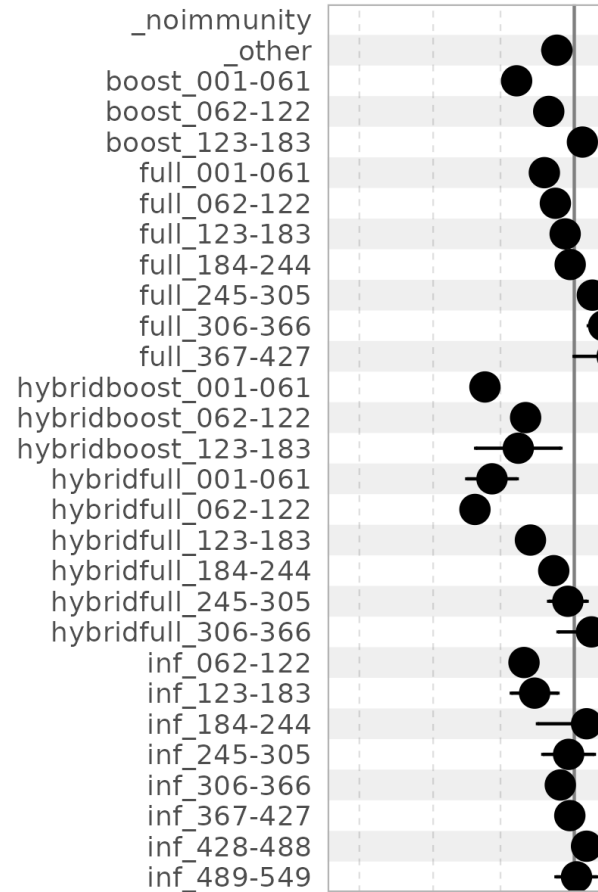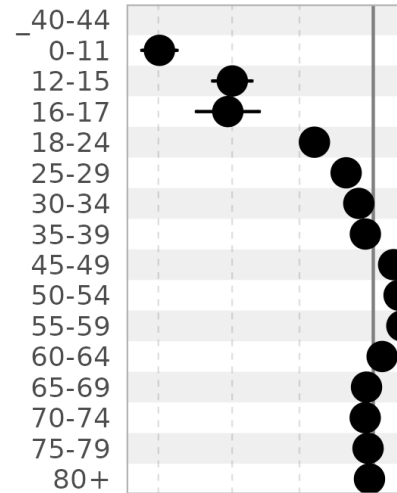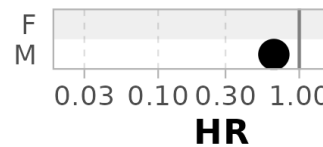
Forest Plot TBD

	immunities	deltas	lower_of_deltas	upper_of_deltas
2	Immunityfull	0.05	0.03	0.06
3	Immunityboost	0.13	0.11	0.16
4	Immunitysecboost			
5	Immunitysecnew			
6	Immunityinf	0.04	0.03	0.06
7	Immunityhybridfull	0.10	0.08	0.12
8	Immunityhybridboost	0.09	0.05	0.13

Table 10: Monthly percentage decrease of effectiveness/protection

	1	2	3	4	5	6	7
1		10.46%			33.69%	38.60%	34.75%
2	-10.46%				25.09%	39.50%	17.60%
3							
4							
5	-33.69%	-25.09%				20.32%	-0.05%
6	-38.60%	-39.50%			-20.32%		-13.96%
7	-34.75%	-17.60%			0.05%	13.96%	

Table 11: Effectiveness/protection differences

	1	2	3	4	5	6	7
		2.94			6.61	12.05	8.67
	-2.94				6.08	14.47	8.62
	-6.61	-6.08				5.16	-0.01
	-12.05	-14.47			-5.16		-4.11
	-8.67	-8.62			0.01	4.11	

Table 12: Z-scores of effectiveness/protection differences

4 Long Covid BA12 - Infected

Characteristic	N = 825,018[1]
LongCovid	7,910 (1.0%)
Immunity	
_noimmunity	265,373 (32%)
_other	8,774 (1.1%)
boost_001-061	100,358 (12%)
boost_062-122	80,600 (9.8%)
boost_123-183	10,178 (1.2%)
full_001-061	23,548 (2.9%)
full_062-122	26,621 (3.2%)
full_123-183	75,230 (9.1%)
full_184-244	90,200 (11%)
full_245-305	15,331 (1.9%)
full_306-366	3,574 (0.4%)
full_367-427	597 (<0.1%)
hybridboost_001-061	12,892 (1.6%)
hybridboost_062-122	7,810 (0.9%)
hybridboost_123-183	664 (<0.1%)
hybridfull_001-061	2,895 (0.4%)
hybridfull_062-122	8,461 (1.0%)
hybridfull_123-183	12,994 (1.6%)
hybridfull_184-244	14,423 (1.7%)
hybridfull_245-305	2,937 (0.4%)
hybridfull_306-366	751 (<0.1%)
inf_062-122	15,593 (1.9%)
inf_123-183	2,983 (0.4%)
inf_184-244	463 (<0.1%)
inf_245-305	2,203 (0.3%)
inf_306-366	12,617 (1.5%)
inf_367-427	12,948 (1.6%)
inf_428-488	10,543 (1.3%)
inf_489-549	3,457 (0.4%)
Sex	
F	442,477 (54%)
M	382,541 (46%)

[1] n (%)

Forest Plot TBD

Variable		N	Odds ratio	
Immunity	_noimmunity	265373		Reference
	_other	8774		1.00 (0.79, 1.25)
	boost_001-061	100358		0.73 (0.68, 0.79)
	boost_062-122	80600		0.78 (0.72, 0.84)
	boost_123-183	10178		0.77 (0.66, 0.90)
	full_001-061	23548		0.84 (0.71, 0.99)
	full_062-122	26621		0.94 (0.81, 1.08)
	full_123-183	75230		0.79 (0.71, 0.88)
	full_184-244	90200		0.82 (0.75, 0.89)
	full_245-305	15331		0.98 (0.86, 1.12)
	full_306-366	3574		0.96 (0.74, 1.23)
	full_367-427	597		0.99 (0.49, 1.76)
	hybridboost_001-061	12892		0.81 (0.68, 0.96)
	hybridboost_062-122	7810		1.04 (0.87, 1.22)
	hybridboost_123-183	664		0.56 (0.26, 1.06)
	hybridfull_001-061	2895		0.86 (0.55, 1.27)
	hybridfull_062-122	8461		0.86 (0.68, 1.06)
	hybridfull_123-183	12994		0.90 (0.74, 1.09)
	hybridfull_184-244	14423		0.92 (0.78, 1.08)
	hybridfull_245-305	2937		0.89 (0.64, 1.21)
	hybridfull_306-366	751		1.09 (0.60, 1.81)
	inf_062-122	15593		1.59 (1.33, 1.88)
	inf_123-183	2983		1.19 (0.79, 1.71)
	inf_184-244	463		1.74 (0.69, 3.57)
	inf_245-305	2203		1.23 (0.78, 1.83)
	inf_306-366	12617		0.94 (0.77, 1.14)
	inf_367-427	12948		0.88 (0.72, 1.07)
	inf_428-488	10543		0.99 (0.80, 1.20)
	inf_489-549	3457		0.94 (0.66, 1.29)
DCCI		825018		1.49 (1.44, 1.53)
AgeGr	_40-44	79940		Reference
	0-11	75209		0.08 (0.06, 0.10)
	12-15	48416		0.09 (0.07, 0.12)
	16-17	22660		0.08 (0.04, 0.12)
	18-24	67706		0.38 (0.32, 0.44)
	25-29	59026		0.68 (0.60, 0.78)
	30-34	73562		0.76 (0.67, 0.85)
	35-39	74238		0.83 (0.74, 0.93)
	45-49	85799		1.27 (1.15, 1.40)
	50-54	63099		1.47 (1.33, 1.62)
	55-59	54693		1.70 (1.54, 1.88)
	60-64	37550		1.66 (1.49, 1.85)
	65-69	27425		1.85 (1.65, 2.07)
	70-74	21909		2.10 (1.87, 2.36)
	75-79	16029		2.07 (1.82, 2.36)
	80+	17757		2.23 (1.98, 2.52)
Sex	F	442477		Reference
	M	382541		0.80 (0.76, 0.83)

0.05 0.1 0.2 0.5 1 2

	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-4.7046	0.0443	-106.13	0.0000
Immunity_other	0.0034	0.1173	0.03	0.9767
Immunityboost_001-061	-0.3123	0.0390	-8.01	0.0000
Immunityboost_062-122	-0.2496	0.0380	-6.57	0.0000
Immunityboost_123-183	-0.2598	0.0785	-3.31	0.0009
Immunityfull_001-061	-0.1704	0.0840	-2.03	0.0426
Immunityfull_062-122	-0.0607	0.0721	-0.84	0.3998
Immunityfull_123-183	-0.2309	0.0547	-4.22	0.0000
Immunityfull_184-244	-0.2019	0.0413	-4.89	0.0000
Immunityfull_245-305	-0.0207	0.0676	-0.31	0.7593
Immunityfull_306-366	-0.0394	0.1293	-0.30	0.7606
Immunityfull_367-427	-0.0069	0.3210	-0.02	0.9827
Immunityhybridboost_001-061	-0.2052	0.0874	-2.35	0.0190
Immunityhybridboost_062-122	0.0353	0.0867	0.41	0.6838
Immunityhybridboost_123-183	-0.5753	0.3574	-1.61	0.1075
Immunityhybridfull_001-061	-0.1461	0.2111	-0.69	0.4890
Immunityhybridfull_062-122	-0.1542	0.1130	-1.37	0.1722
Immunityhybridfull_123-183	-0.1055	0.0983	-1.07	0.2834
Immunityhybridfull_184-244	-0.0832	0.0826	-1.01	0.3138
Immunityhybridfull_245-305	-0.1133	0.1613	-0.70	0.4825
Immunityhybridfull_306-366	0.0858	0.2817	0.30	0.7606
Immunityinf_062-122	0.4620	0.0877	5.27	0.0000
Immunityinf_123-183	0.1767	0.1955	0.90	0.3661
Immunityinf_184-244	0.5534	0.4138	1.34	0.1812
Immunityinf_245-305	0.2077	0.2164	0.96	0.3371
Immunityinf_306-366	-0.0587	0.0996	-0.59	0.5556
Immunityinf_367-427	-0.1227	0.0992	-1.24	0.2159
Immunityinf_428-488	-0.0131	0.1020	-0.13	0.8974
Immunityinf_489-549	-0.0643	0.1720	-0.37	0.7086
DCCI	0.3969	0.0149	26.61	0.0000
AgeGr0-11	-2.5640	0.1460	-17.56	0.0000
AgeGr12-15	-2.3934	0.1631	-14.67	0.0000
AgeGr16-17	-2.5572	0.2612	-9.79	0.0000
AgeGr18-24	-0.9688	0.0787	-12.30	0.0000
AgeGr25-29	-0.3802	0.0660	-5.76	0.0000
AgeGr30-34	-0.2775	0.0594	-4.67	0.0000
AgeGr35-39	-0.1894	0.0573	-3.31	0.0009
AgeGr45-49	0.2379	0.0493	4.83	0.0000
AgeGr50-54	0.3837	0.0508	7.56	0.0000
AgeGr55-59	0.5304	0.0506	10.49	0.0000
AgeGr60-64	0.5062	0.0556	9.10	0.0000
AgeGr65-69	0.6142	0.0587	10.46	0.0000
AgeGr70-74	0.7422	0.0603	12.31	0.0000
AgeGr75-79	0.7292	0.0658	11.08	0.0000
AgeGr80+	0.8039	0.0619	12.98	0.0000
SexM	-0.2282	0.0234	-9.77	0.0000

Table 13: Logistic regression summary

	immunities	deltas	lower_of_deltas	upper_of_deltas
2	Immunityfull	0.01	-0.00	0.03
3	Immunityboost	0.03	0.00	0.05
4	Immunitysecboost			
5	Immunitysecbnew			
6	Immunityinf	-0.05	-0.07	-0.03
7	Immunityhybridfull	0.01	-0.03	0.05
8	Immunityhybridboost	0.02	-0.06	0.10

Table 14: Monthly percentage decrease of effectiveness/protection

	1	2	3	4	5	6	7
1		9.98%			-30.27%	-4.78%	0.21%
2	-9.98%				-71.26%	-10.57%	-12.73%
3							
4							
5	30.27%	71.26%				46.66%	56.83%
6	4.78%	10.57%			-46.66%		-2.29%
7	-0.21%	12.73%			-56.83%	2.29%	

Table 15: Effectiveness/protection differences

	1	2	3	4	5	6	7
		2.39			-3.44	-0.99	0.03
	-2.39				-5.92	-1.58	-2.34
	3.44	5.92				4.05	3.98
	0.99	1.58			-4.05		-0.24
	-0.03	2.34			-3.98	0.24	

Table 16: Z-scores of effectiveness/protection differences