Vyvanuti III

Results of Statistical Estimation

July 4, 2023

1 Serious Course BA12

Characteristic	N = 43,154,538[1]
SeriousCovidProxy	7,656 (<0.1%)
Immunity	
_noimmunity	2,867,553 (6.6%)
_other	732,962 (1.7%)
boost_001-061	3,350,025 (7.8%)
boost_062-122	3,264,147 (7.6%)
boost_123-183	3,049,848 (7.1%)
boost_184-244	2,338,205 (5.4%)
full_001-061	610,276 (1.4%)
full_062-122	976,872 (2.3%)
full_123-183	2,866,169 (6.6%)
full_184-244	2,163,706 (5.0%)
full_245-305	1,137,393 (2.6%)
full_306-366	856,990 (2.0%)
full_367-427	268,250 (0.6%)
full_428-488	40,985 (<0.1%)
hybridboost_001-061	2,152,926 (5.0%)
hybridboost_062-122	2,073,520 (4.8%)
hybridboost_123-183	1,558,849 (3.6%)
hybridfull_001-061	1,854,771 (4.3%)
hybridfull_062-122	2,132,577 (4.9%)
hybridfull_123-183	2,445,060 (5.7%)
hybridfull_184-244	1,351,132 (3.1%)
hybridfull_245-305	610,400 (1.4%)
hybridfull_306-366	324,500 (0.8%)
hybridfull_367-427	75,490 (0.2%)
inf_062-122	1,190,450 (2.8%)
inf_123-183	1,106,986 (2.6%)
inf_245-305	343,688 (0.8%)
inf_306-366	318,216 (0.7%)
inf_367-427	371,936 (0.9%)
inf_428-488	403,641 (0.9%)
inf_489-549	317,015 (0.7%)
Sex	
F	22,046,730 (51%)
M	21,107,808 (49%)

[1] n (%)
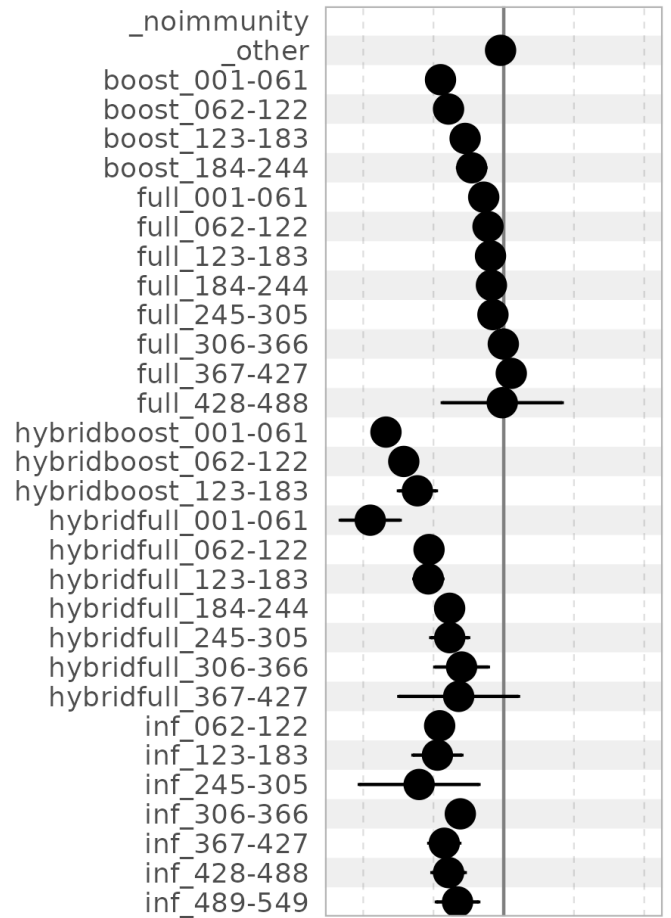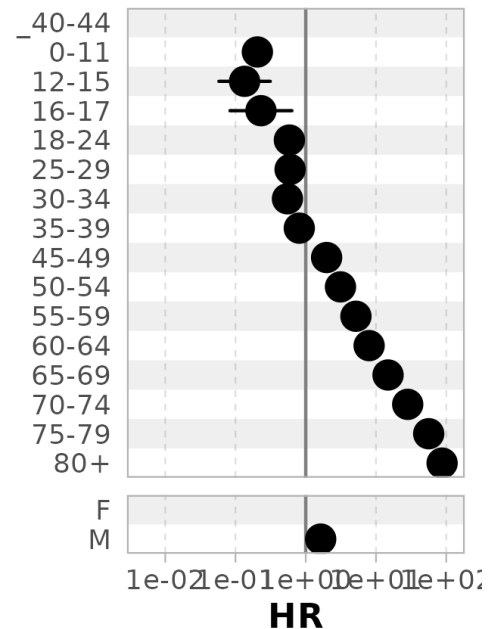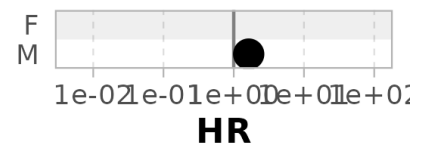
	beta	lower	upper	HR	lower	upper	eff	upper	lower
Immunity_other	-0.10	-0.28	0.07	0.90	0.76	1.08	0.10	0.24	-0.08
Immunityboost_001-061	-2.07	-2.17	-1.97	0.13	0.11	0.14	0.87	0.89	0.86
Immunityboost_062-122	-1.81	-1.87	-1.74	0.16	0.15	0.17	0.84	0.85	0.83
Immunityboost_123-183	-1.27	-1.36	-1.17	0.28	0.26	0.31	0.72	0.74	0.69
Immunityboost_184-244	-1.05	-1.51	-0.58	0.35	0.22	0.56	0.65	0.78	0.44
Immunityfull_001-061	-0.66	-0.84	-0.47	0.52	0.43	0.62	0.48	0.57	0.38
Immunityfull_062-122	-0.51	-0.67	-0.36	0.60	0.51	0.70	0.40	0.49	0.30
Immunityfull_123-183	-0.43	-0.58	-0.29	0.65	0.56	0.75	0.35	0.44	0.25
Immunityfull_184-244	-0.40	-0.50	-0.31	0.67	0.61	0.74	0.33	0.39	0.26
Immunityfull_245-305	-0.35	-0.47	-0.24	0.70	0.63	0.78	0.30	0.37	0.22
Immunityfull_306-366	-0.01	-0.16	0.13	0.99	0.85	1.14	0.01	0.15	-0.14
Immunityfull_367-427	0.25	-0.05	0.54	1.28	0.95	1.72	-0.28	0.05	-0.72
Immunityfull_428-488	-0.05	-2.01	1.92	0.95	0.13	6.80	0.05	0.87	-5.80
Immunityhybridboost_001-061	-3.86	-4.27	-3.45	0.02	0.01	0.03	0.98	0.99	0.97
Immunityhybridboost_062-122	-3.28	-3.61	-2.94	0.04	0.03	0.05	0.96	0.97	0.95
Immunityhybridboost_123-183	-2.83	-3.45	-2.21	0.06	0.03	0.11	0.94	0.97	0.89
Immunityhybridfull_001-061	-4.38	-5.36	-3.39	0.01	0.00	0.03	0.99	1.00	0.97
Immunityhybridfull_062-122	-2.45	-2.78	-2.12	0.09	0.06	0.12	0.91	0.94	0.88
Immunityhybridfull_123-183	-2.47	-2.95	-1.99	0.08	0.05	0.14	0.92	0.95	0.86
Immunityhybridfull_184-244	-1.77	-2.18	-1.36	0.17	0.11	0.26	0.83	0.89	0.74
Immunityhybridfull_245-305	-1.77	-2.39	-1.15	0.17	0.09	0.32	0.83	0.91	0.68
Immunityhybridfull_306-366	-1.38	-2.26	-0.50	0.25	0.10	0.60	0.75	0.90	0.40
Immunityhybridfull_367-427	-1.48	-3.44	0.48	0.23	0.03	1.62	0.77	0.97	-0.62
Immunityinf_062-122	-2.10	-2.50	-1.70	0.12	0.08	0.18	0.88	0.92	0.82
Immunityinf_123-183	-2.17	-2.97	-1.37	0.11	0.05	0.25	0.89	0.95	0.75
Immunityinf_245-305	-2.77	-4.73	-0.81	0.06	0.01	0.44	0.94	0.99	0.56
Immunityinf_306-366	-1.42	-1.83	-1.01	0.24	0.16	0.36	0.76	0.84	0.64
Immunityinf_367-427	-1.95	-2.46	-1.44	0.14	0.09	0.24	0.86	0.91	0.76
Immunityinf_428-488	-1.81	-2.35	-1.26	0.16	0.10	0.28	0.84	0.90	0.72
Immunityinf_489-549	-1.51	-2.21	-0.82	0.22	0.11	0.44	0.78	0.89	0.56
AgeGr0-11	-1.58	-1.96	-1.21	0.20	0.14	0.30	0.80	0.86	0.70
AgeGr12-15	-2.00	-2.84	-1.17	0.13	0.06	0.31	0.87	0.94	0.69
AgeGr16-17	-1.47	-2.48	-0.46	0.23	0.08	0.63	0.77	0.92	0.37
AgeGr18-24	-0.54	-0.94	-0.13	0.58	0.39	0.88	0.42	0.61	0.12
AgeGr25-29	-0.51	-0.92	-0.11	0.60	0.40	0.90	0.40	0.60	0.10
AgeGr30-34	-0.60	-1.01	-0.19	0.55	0.37	0.82	0.45	0.63	0.18
AgeGr35-39	-0.21	-0.57	0.15	0.81	0.56	1.16	0.19	0.44	-0.16
AgeGr45-49	0.68	0.39	0.98	1.98	1.48	2.66	-0.98	-0.48	-1.66
AgeGr50-54	1.14	0.86	1.42	3.12	2.35	4.14	-2.12	-1.35	-3.14
AgeGr55-59	1.65	1.38	1.91	5.18	3.98	6.76	-4.18	-2.98	-5.76
AgeGr60-64	2.08	1.82	2.33	7.98	6.18	10.31	-6.98	-5.18	-9.31
AgeGr65-69	2.70	2.45	2.94	14.84	11.60	18.99	-13.84	-10.60	-17.99
AgeGr70-74	3.34	3.10	3.58	28.28	22.21	36.02	-27.28	-21.21	-35.02
AgeGr75-79	4.03	3.79	4.27	56.26	44.21	71.58	-55.26	-43.21	-70.58
AgeGr80+	4.47	4.23	4.71	87.32	68.82	110.79	-86.32	-67.82	-109.79
SexM	0.49	0.44	0.54	1.63	1.56	1.71	-0.63	-0.56	-0.71

Table 1: Cox model summary

	immunities	deltas	lower_of_deltas	upper_of_deltas
2	Immunityfull	0.03	0.02	0.04
3	Immunityboost	0.03	0.02	0.04
4	Immunitysecboost			
5	Immunitysecbnew			
6	Immunityinf	0.00	-0.00	0.01
7	Immunityhybridfull	0.02	0.02	0.03
8	Immunityhybridboost	0.01	0.00	0.02

Table 2: Monthly percentage decrease of effectiveness/protection

	1	2	3	4	5	6	7
1		39.16%			57.74%	52.85%	54.73%
2	-39.16%				6.90%	11.30%	12.01%
3							
4							
5	-57.74%	-6.90%				1.99%	7.84%
6	-52.85%	-11.30%			-1.99%		0.35%
7	-54.73%	-12.01%			-7.84%	-0.35%	

Table 3: Effectiveness/protection differences

	1	2	3	4	5	6	7
		14.11			16.84	21.64	18.32
	-14.11				3.06	15.22	21.22
	-16.84	-3.06				0.85	3.40
	-21.64	-15.22			-0.85		0.53
	-18.32	-21.22			-3.40	-0.53	

Table 4: Z-scores of effectiveness/protection differences

2 Serious Course BA45+

Characteristic	N = 60,571,840[1]
SeriousCovidProxy	5,723 (<0.1%)
Immunity	
_noimmunity	2,185,667 (3.6%)
_other	2,440,451 (4.0%)
b45_001-061	14,703 (<0.1%)
b45_062-122	14,560 (<0.1%)
boost_001-061	84,727 (0.1%)
boost_062-122	180,625 (0.3%)
boost_123-183	1,441,355 (2.4%)
boost_184-244	3,034,282 (5.0%)
boost_245-305	3,005,127 (5.0%)
boost_306-366	2,689,731 (4.4%)
boost_367-427	2,359,454 (3.9%)
boost_428-488	2,233,916 (3.7%)
boost_489-549	1,822,356 (3.0%)
full_123-183	212,984 (0.4%)
full_184-244	491,602 (0.8%)
full_245-305	731,367 (1.2%)
full_306-366	1,262,491 (2.1%)
full_367-427	1,327,804 (2.2%)
full_428-488	1,319,693 (2.2%)
full_489-549	1,228,309 (2.0%)
hybridboost_001-061	938,244 (1.5%)
hybridboost_062-122	1,209,048 (2.0%)
hybridboost_123-183	2,085,452 (3.4%)
hybridboost_184-244	2,344,181 (3.9%)
hybridboost_245-305	1,778,898 (2.9%)
hybridboost_306-366	1,389,158 (2.3%)
hybridboost_367-427	1,218,779 (2.0%)
hybridboost_428-488	965,090 (1.6%)
hybridboost_489-549	407,175 (0.7%)
hybridfull_062-122	359,431 (0.6%)
hybridfull_123-183	1,148,541 (1.9%)
hybridfull_184-244	1,711,626 (2.8%)
hybridfull_245-305	1,817,766 (3.0%)
hybridfull_306-366	1,843,201 (3.0%)
hybridfull_367-427	1,575,104 (2.6%)
hybridfull_428-488	1,169,470 (1.9%)
hybridfull_489-549	674,096 (1.1%)
inf_062-122	224,787 (0.4%)
inf_123-183	762,636 (1.3%)
inf_184-244	1,175,370 (1.9%)
inf_245-305	1,193,948 (2.0%)
inf_306-366	1,142,528 (1.9%)
inf_367-427	1,128,669 (1.9%)
inf_428-488	1,205,640 (2.0%)
inf_489-549	913,725 (1.5%)
secbnew_001-061	287,528 (0.5%)
secbnew_062-122	285,494 (0.5%)
secbnew_123-183	278,665 (0.5%)
secboost_001-061	323,798 (0.5%)
secboost_062-122	318,766 (0.5%)
secboost_123-183	313,666 (0.5%)
secboost_184-244	300,156 (0.5%)
Sex	
F	31,150,951 (51%)
M	29,420,889 (49%)

[1] n (%)

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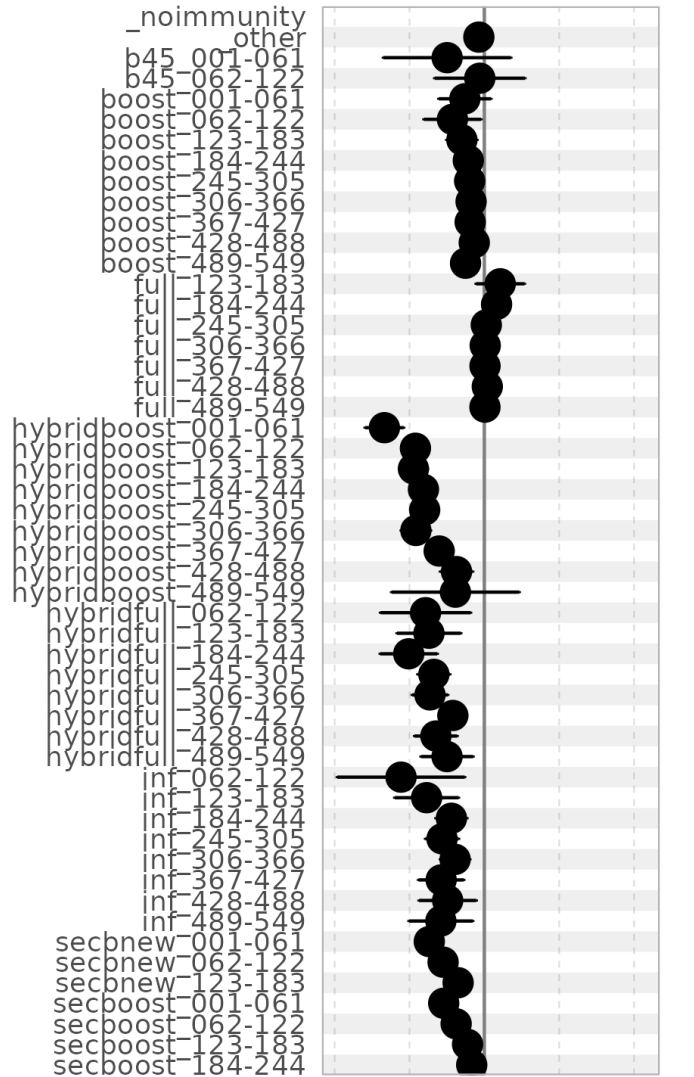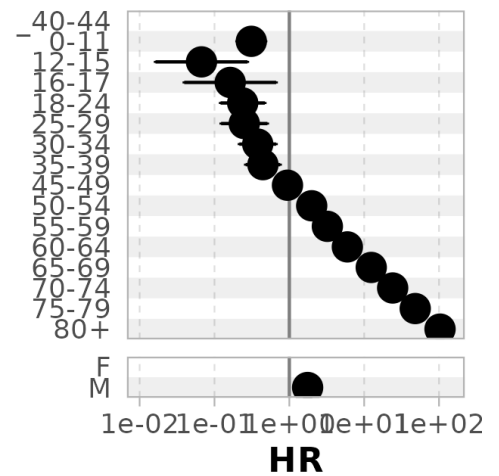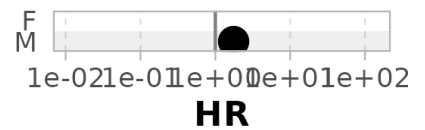
	beta	lower	upper	HR	lower	upper	eff	upper	lower
Immunity_other	-0.17	-0.31	-0.03	0.85	0.74	0.97	0.15	0.26	0.03
Immunityb45_001-061	-1.14	-3.11	0.82	0.32	0.04	2.26	0.68	0.96	-1.26
Immunityb45_062-122	-0.14	-1.53	1.25	0.87	0.22	3.49	0.13	0.78	-2.49
Immunityboost_001-061	-0.60	-1.40	0.20	0.55	0.25	1.23	0.45	0.75	-0.23
Immunityboost_062-122	-0.98	-1.86	-0.10	0.38	0.16	0.90	0.62	0.84	0.10
Immunityboost_123-183	-0.69	-1.16	-0.22	0.50	0.31	0.80	0.50	0.69	0.20
Immunityboost_184-244	-0.49	-0.63	-0.35	0.61	0.53	0.70	0.39	0.47	0.30
Immunityboost_245-305	-0.45	-0.54	-0.36	0.64	0.58	0.70	0.36	0.42	0.30
Immunityboost_306-366	-0.41	-0.50	-0.31	0.67	0.61	0.73	0.33	0.39	0.27
Immunityboost_367-427	-0.44	-0.56	-0.32	0.65	0.57	0.73	0.35	0.43	0.27
Immunityboost_428-488	-0.31	-0.46	-0.16	0.73	0.63	0.85	0.27	0.37	0.15
Immunityboost_489-549	-0.58	-1.00	-0.15	0.56	0.37	0.86	0.44	0.63	0.14
Immunityfull_123-183	0.49	-0.25	1.23	1.63	0.78	3.44	-0.63	0.22	-2.44
Immunityfull_184-244	0.38	0.06	0.69	1.46	1.06	2.00	-0.46	-0.06	-1.00
Immunityfull_245-305	0.06	-0.20	0.32	1.06	0.82	1.38	-0.06	0.18	-0.38
Immunityfull_306-366	0.03	-0.23	0.28	1.03	0.80	1.33	-0.03	0.20	-0.33
Immunityfull_367-427	0.02	-0.17	0.21	1.02	0.85	1.23	-0.02	0.15	-0.23
Immunityfull_428-488	0.09	-0.07	0.26	1.10	0.93	1.29	-0.10	0.07	-0.29
Immunityfull_489-549	0.02	-0.17	0.21	1.02	0.84	1.23	-0.02	0.16	-0.23
Immunityhybridboost_001-061	-3.07	-3.67	-2.48	0.05	0.03	0.08	0.95	0.97	0.92
Immunityhybridboost_062-122	-2.12	-2.54	-1.70	0.12	0.08	0.18	0.88	0.92	0.82
Immunityhybridboost_123-183	-2.18	-2.61	-1.75	0.11	0.07	0.17	0.89	0.93	0.83
Immunityhybridboost_184-244	-1.87	-2.21	-1.54	0.15	0.11	0.22	0.85	0.89	0.78
Immunityhybridboost_245-305	-1.84	-2.15	-1.52	0.16	0.12	0.22	0.84	0.88	0.78
Immunityhybridboost_306-366	-2.11	-2.56	-1.65	0.12	0.08	0.19	0.88	0.92	0.81
Immunityhybridboost_367-427	-1.39	-1.81	-0.97	0.25	0.16	0.38	0.75	0.84	0.62
Immunityhybridboost_428-488	-0.86	-1.35	-0.36	0.42	0.26	0.70	0.58	0.74	0.30
Immunityhybridboost_489-549	-0.89	-2.85	1.07	0.41	0.06	2.93	0.59	0.94	-1.93
Immunityhybridfull_062-122	-1.81	-3.20	-0.42	0.16	0.04	0.66	0.84	0.96	0.34
Immunityhybridfull_123-183	-1.70	-2.69	-0.72	0.18	0.07	0.49	0.82	0.93	0.51
Immunityhybridfull_184-244	-2.33	-3.20	-1.45	0.10	0.04	0.24	0.90	0.96	0.76
Immunityhybridfull_245-305	-1.55	-2.05	-1.06	0.21	0.13	0.35	0.79	0.87	0.65
Immunityhybridfull_306-366	-1.67	-2.22	-1.13	0.19	0.11	0.32	0.81	0.89	0.68
Immunityhybridfull_367-427	-0.97	-1.39	-0.55	0.38	0.25	0.58	0.62	0.75	0.42
Immunityhybridfull_428-488	-1.49	-2.15	-0.83	0.23	0.12	0.43	0.77	0.88	0.57
Immunityhybridfull_489-549	-1.15	-1.95	-0.34	0.32	0.14	0.71	0.68	0.86	0.29
Immunityinf_062-122	-2.56	-4.52	-0.60	0.08	0.01	0.55	0.92	0.99	0.45
Immunityinf_123-183	-1.78	-2.76	-0.79	0.17	0.06	0.45	0.83	0.94	0.55
Immunityinf_184-244	-1.01	-1.49	-0.53	0.36	0.23	0.59	0.64	0.77	0.41
Immunityinf_245-305	-1.30	-1.81	-0.79	0.27	0.16	0.45	0.73	0.84	0.55
Immunityinf_306-366	-0.90	-1.35	-0.45	0.41	0.26	0.64	0.59	0.74	0.36
Immunityinf_367-427	-1.33	-2.02	-0.63	0.26	0.13	0.53	0.74	0.87	0.47
Immunityinf_428-488	-1.13	-2.01	-0.25	0.32	0.13	0.78	0.68	0.87	0.22
Immunityinf_489-549	-1.34	-2.32	-0.35	0.26	0.10	0.70	0.74	0.90	0.30
Immunitysecbnew_001-061	-1.69	-2.04	-1.35	0.18	0.13	0.26	0.82	0.87	0.74
Immunitysecbnew_062-122	-1.27	-1.59	-0.94	0.28	0.20	0.39	0.72	0.80	0.61
Immunitysecbnew_123-183	-0.81	-1.19	-0.42	0.45	0.30	0.66	0.55	0.70	0.34
Immunitysecboost_001-061	-1.25	-1.45	-1.05	0.29	0.23	0.35	0.71	0.77	0.65
Immunitysecboost_062-122	-0.87	-1.07	-0.66	0.42	0.34	0.52	0.58	0.66	0.48
Immunitysecboost_123-183	-0.52	-0.72	-0.31	0.60	0.48	0.74	0.40	0.52	0.26
Immunitysecboost_184-244	-0.39	-0.69	-0.08	0.68	0.50	0.92	0.32	0.50	0.08
AgeGr0-11	-1.17	-1.61	-0.73	0.31	0.20	0.48	0.69	0.80	0.52
AgeGr12-15	-2.70	-4.12	-1.29	0.07	0.02	0.28	0.93	0.98	0.72
AgeGr16-17	-1.82	-3.23	-0.40	0.16	0.04	0.67	0.84	0.96	0.33
AgeGr18-24	-1.43	-2.12	-0.75	0.24	0.12	0.47	0.76	0.88	0.53
AgeGr25-29	-1.39	-2.10	-0.67	0.25	0.12	0.51	0.75	0.88	0.49
AgeGr30-34	-0.97	-1.54	-0.41	0.38	0.21	0.67	0.62	0.79	0.33
AgeGr35-39	-0.81	-1.34	-0.28	0.44	0.26	0.76	0.56	0.74	0.24
AgeGr45-49	-0.06	-0.46	0.34	0.94	0.63	1.41	0.06	0.37	-0.41
AgeGr50-54	0.69	0.33	1.05	1.99	1.39	2.85	-0.99	-0.39	-1.85
AgeGr55-59	1.17	0.84	1.50	3.22	2.31	4.50	-2.22	-1.31	-3.50
AgeGr60-64	1.79	1.47 7	2.10	5.96	4.35	8.17	-4.96	-3.35	-7.17
AgeGr65-69	2.52	2.22	2.82	12.43	9.23	16.75	-11.43	-8.23	-15.75
AgeGr70-74	3.18	2.89	3.47	24.03	17.94	32.18	-23.03	-16.94	-31.18
AgeGr75-79	3.87	3.58	4.16	48.11	35.99	64.30	-47.11	-34.99	-63.30

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

Table 6: Monthly percentage decrease of effectiveness/protection

	1	2	3	4	5	6	7
1		41.37%	81.49%	118.61%	77.13%	81.76%	83.86%
2	-41.37%		-3.58%	12.93%	32.46%	43.46%	46.89%
3	-81.49%	3.58%		11.80%	36.56%	42.37%	29.79%
4	-118.61%	-12.93%	-11.80%		22.99%	19.02%	16.16%
5	-77.13%	-32.46%	-36.56%	-22.99%		7.62%	9.00%
6	-81.76%	-43.46%	-42.37%	-19.02%	-7.62%		1.89%
7	-83.86%	-46.89%	-29.79%	-16.16%	-9.00%	-1.89%	

Table 7: Effectiveness/protection differences

	1	2	3	4	5	6	7
		7.43	3.43	1.90	11.00	12.99	12.59
	-7.43		-0.48	1.28	8.03	14.21	19.51
	-3.43	0.48		3.52	5.90	6.21	11.69
	-1.90	-1.28	-3.52		3.16	2.14	5.78
	-11.00	-8.03	-5.90	-3.16		1.81	2.54
	-12.99	-14.21	-6.21	-2.14	-1.81		0.68
	-12.59	-19.51	-11.69	-5.78	-2.54	-0.68	

Table 8: Z-scores of effectiveness/protection differences

3   Long Covid BA12 - Population

Characteristic	N = 61,304,667[1]
LongCovid	2,327 (<0.1%)
Immunity	
_noimmunity	3,281,891 (5.4%)
_other	1,281,884 (2.1%)
boost_001-061	3,506,779 (5.7%)
boost_062-122	3,299,721 (5.4%)
boost_123-183	3,126,434 (5.1%)
boost_184-244	3,011,757 (4.9%)
boost_245-305	2,539,278 (4.1%)
full_001-061	715,316 (1.2%)
full_062-122	1,916,412 (3.1%)
full_123-183	4,375,148 (7.1%)
full_184-244	2,714,601 (4.4%)
full_245-305	1,569,481 (2.6%)
full_306-366	1,037,004 (1.7%)
full_367-427	844,648 (1.4%)
full_428-488	350,035 (0.6%)
full_489-549	42,791 (<0.1%)
hybridboost_001-061	2,574,232 (4.2%)
hybridboost_062-122	2,246,133 (3.7%)
hybridboost_123-183	1,964,995 (3.2%)
hybridboost_184-244	1,467,947 (2.4%)
hybridboost_245-305	589,526 (1.0%)
hybridfull_001-061	2,163,498 (3.5%)
hybridfull_062-122	2,526,025 (4.1%)
hybridfull_123-183	3,161,701 (5.2%)
hybridfull_184-244	2,387,658 (3.9%)
hybridfull_245-305	1,297,612 (2.1%)
hybridfull_306-366	560,338 (0.9%)
hybridfull_367-427	284,975 (0.5%)
inf_062-122	1,217,970 (2.0%)
inf_123-183	1,169,042 (1.9%)
inf_184-244	1,174,522 (1.9%)
inf_245-305	997,272 (1.6%)
inf_306-366	653,581 (1.1%)
inf_367-427	455,952 (0.7%)
inf_428-488	416,115 (0.7%)
inf_489-549	382,393 (0.6%)
Sex	
F	31,408,185 (51%)
M	29,896,482 (49%)
[1] n (%)	
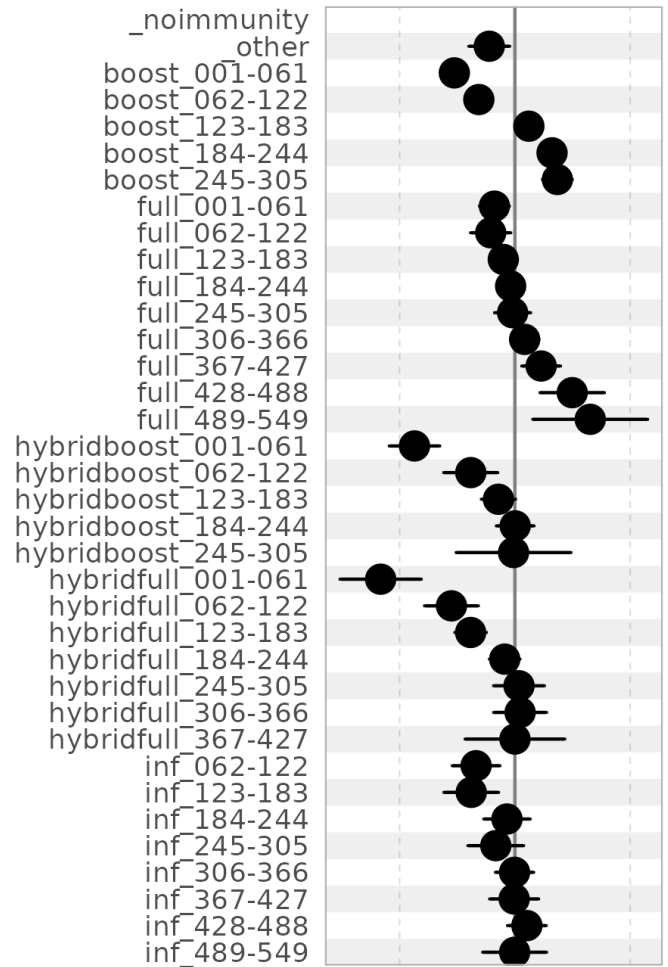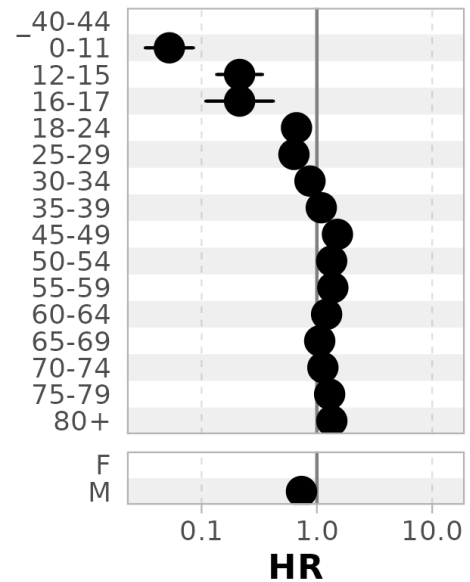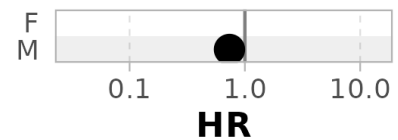
	beta	lower	upper	HR	lower	upper	eff	upper	lower
Immunity_other	-0.51	-0.91	-0.11	0.60	0.40	0.90	0.40	0.60	0.10
Immunityboost_001-061	-1.21	-1.39	-1.03	0.30	0.25	0.36	0.70	0.75	0.64
Immunityboost_062-122	-0.72	-0.99	-0.46	0.49	0.37	0.63	0.51	0.63	0.37
Immunityboost_123-183	0.28	0.06	0.50	1.32	1.06	1.64	-0.32	-0.06	-0.64
Immunityboost_184-244	0.74	0.56	0.92	2.10	1.76	2.51	-1.10	-0.76	-1.51
Immunityboost_245-305	0.85	0.56	1.14	2.34	1.74	3.13	-1.34	-0.74	-2.13
Immunityfull_001-061	-0.41	-0.70	-0.11	0.66	0.50	0.89	0.34	0.50	0.11
Immunityfull_062-122	-0.48	-0.88	-0.09	0.62	0.41	0.92	0.38	0.59	0.08
Immunityfull_123-183	-0.23	-0.40	-0.06	0.79	0.67	0.94	0.21	0.33	0.06
Immunityfull_184-244	-0.08	-0.27	0.10	0.92	0.77	1.10	0.08	0.23	-0.10
Immunityfull_245-305	-0.05	-0.40	0.31	0.96	0.67	1.36	0.04	0.33	-0.36
Immunityfull_306-366	0.19	-0.09	0.48	1.22	0.92	1.61	-0.22	0.08	-0.61
Immunityfull_367-427	0.52	0.14	0.91	1.69	1.15	2.47	-0.69	-0.15	-1.47
Immunityfull_428-488	1.14	0.51	1.78	3.14	1.66	5.95	-2.14	-0.66	-4.95
Immunityfull_489-549	1.50	0.36	2.65	4.50	1.44	14.10	-3.50	-0.44	-13.10
Immunityhybridboost_001-061	-2.01	-2.50	-1.51	0.13	0.08	0.22	0.87	0.92	0.78
Immunityhybridboost_062-122	-0.88	-1.42	-0.35	0.41	0.24	0.71	0.59	0.76	0.29
Immunityhybridboost_123-183	-0.33	-0.66	0.01	0.72	0.51	1.01	0.28	0.49	-0.01
Immunityhybridboost_184-244	0.01	-0.36	0.38	1.01	0.69	1.46	-0.01	0.31	-0.46
Immunityhybridboost_245-305	-0.03	-1.17	1.12	0.97	0.31	3.05	0.03	0.69	-2.05
Immunityhybridfull_001-061	-2.68	-3.49	-1.88	0.07	0.03	0.15	0.93	0.97	0.85
Immunityhybridfull_062-122	-1.27	-1.80	-0.74	0.28	0.17	0.48	0.72	0.83	0.52
Immunityhybridfull_123-183	-0.88	-1.19	-0.57	0.41	0.30	0.56	0.59	0.70	0.44
Immunityhybridfull_184-244	-0.20	-0.50	0.10	0.82	0.61	1.10	0.18	0.39	-0.10
Immunityhybridfull_245-305	0.08	-0.42	0.59	1.09	0.66	1.80	-0.09	0.34	-0.80
Immunityhybridfull_306-366	0.10	-0.42	0.63	1.11	0.66	1.87	-0.11	0.34	-0.87
Immunityhybridfull_367-427	0.00	-0.99	0.99	1.00	0.37	2.70	-0.00	0.63	-1.70
Immunityinf_062-122	-0.77	-1.25	-0.30	0.46	0.29	0.74	0.54	0.71	0.26
Immunityinf_123-183	-0.87	-1.41	-0.33	0.42	0.24	0.72	0.58	0.76	0.28
Immunityinf_184-244	-0.16	-0.62	0.30	0.85	0.54	1.35	0.15	0.46	-0.35
Immunityinf_245-305	-0.38	-0.93	0.17	0.68	0.39	1.19	0.32	0.61	-0.19
Immunityinf_306-366	-0.01	-0.38	0.37	0.99	0.68	1.45	0.01	0.32	-0.45
Immunityinf_367-427	-0.01	-0.50	0.47	0.99	0.61	1.60	0.01	0.39	-0.60
Immunityinf_428-488	0.24	-0.14	0.62	1.27	0.87	1.86	-0.27	0.13	-0.86
Immunityinf_489-549	-0.00	-0.64	0.63	1.00	0.53	1.87	0.00	0.47	-0.87
AgeGr0-11	-2.95	-3.42	-2.47	0.05	0.03	0.08	0.95	0.97	0.92
AgeGr12-15	-1.54	-2.00	-1.09	0.21	0.14	0.34	0.79	0.86	0.66
AgeGr16-17	-1.54	-2.21	-0.87	0.21	0.11	0.42	0.79	0.89	0.58
AgeGr18-24	-0.41	-0.65	-0.16	0.67	0.52	0.85	0.33	0.48	0.15
AgeGr25-29	-0.46	-0.71	-0.20	0.63	0.49	0.82	0.37	0.51	0.18
AgeGr30-34	-0.14	-0.36	0.08	0.87	0.70	1.09	0.13	0.30	-0.09
AgeGr35-39	0.09	-0.12	0.29	1.09	0.89	1.34	-0.09	0.11	-0.34
AgeGr45-49	0.41	0.23	0.59	1.51	1.26	1.81	-0.51	-0.26	-0.81
AgeGr50-54	0.29	0.10	0.49	1.34	1.10	1.63	-0.34	-0.10	-0.63
AgeGr55-59	0.32	0.12	0.51	1.38	1.13	1.67	-0.38	-0.13	-0.67
AgeGr60-64	0.19	-0.01	0.40	1.21	0.99	1.49	-0.21	0.01	-0.49
AgeGr65-69	0.06	-0.15	0.26	1.06	0.86	1.30	-0.06	0.14	-0.30
AgeGr70-74	0.12	-0.09	0.33	1.13	0.91	1.39	-0.13	0.09	-0.39
AgeGr75-79	0.25	0.03	0.48	1.29	1.03	1.61	-0.29	-0.03	-0.61
AgeGr80+	0.30	0.09	0.51	1.35	1.09	1.66	-0.35	-0.09	-0.66
SexM	-0.31	-0.39	-0.22	0.73	0.68	0.80	0.27	0.32	0.20

Table 9: Cox model summary

	immunities	deltas	lower_of_deltas	upper_of_deltas
2	Immunityfull	0.06	0.03	0.09
3	Immunityboost	0.20	0.16	0.25
4	Immunitysecboost			
5	Immunitysecnew			
6	Immunityinf	0.06	0.03	0.09
7	Immunityhybridfull	0.10	0.08	0.13
8	Immunityhybridboost	0.14	0.10	0.19

Table 10: Monthly percentage decrease of effectiveness/protection

	1	2	3	4	5	6	7
1		3.41%			27.91%	36.96%	29.43%
2	-3.41%				45.37%	26.66%	20.05%
3							
4							
5	-27.91%	-45.37%				4.05%	-13.13%
6	-36.96%	-26.66%			-4.05%		-9.37%
7	-29.43%	-20.05%			13.13%	9.37%	

Table 11: Effectiveness/protection differences

1	2	3	4	5	6	7
	0.48			3.53	6.54	4.00
-0.48				4.73	7.56	5.22
-3.53	-4.73				0.51	-1.28
-6.54	-7.56			-0.51		-2.38
-4.00	-5.22			1.28	2.38	

Table 12: Z-scores of effectiveness/protection differences

4 Long Covid BA12 - Infected

Characteristic	N = 1,486,354[1]
LongCovid	15,582 (1.0%)
Immunity	
_noimmunity	430,865 (29%)
_other	18,912 (1.3%)
boost_001-061	133,091 (9.0%)
boost_062-122	124,741 (8.4%)
boost_123-183	43,009 (2.9%)
boost_184-244	49,726 (3.3%)
boost_245-305	38,423 (2.6%)
boost_306-366	4,948 (0.3%)
full_001-061	34,085 (2.3%)
full_062-122	38,849 (2.6%)
full_123-183	122,630 (8.3%)
full_184-244	127,476 (8.6%)
full_245-305	33,467 (2.3%)
full_306-366	15,266 (1.0%)
full_367-427	11,878 (0.8%)
full_428-488	3,113 (0.2%)
full_489-549	664 (<0.1%)
hybridboost_001-061	17,469 (1.2%)
hybridboost_062-122	13,462 (0.9%)
hybridboost_123-183	6,575 (0.4%)
hybridboost_184-244	11,061 (0.7%)
hybridboost_245-305	5,358 (0.4%)
hybridboost_306-366	417 (<0.1%)
hybridfull_001-061	4,148 (0.3%)
hybridfull_062-122	12,011 (0.8%)
hybridfull_123-183	23,154 (1.6%)
hybridfull_184-244	27,239 (1.8%)
hybridfull_245-305	10,738 (0.7%)
hybridfull_306-366	4,635 (0.3%)
hybridfull_367-427	2,905 (0.2%)
hybridfull_428-488	754 (<0.1%)
hybridfull_489-549	142 (<0.1%)
inf_062-122	21,364 (1.4%)
inf_123-183	9,907 (0.7%)
inf_184-244	10,159 (0.7%)
inf_245-305	9,579 (0.6%)
inf_306-366	19,148 (1.3%)
inf_367-427	18,964 (1.3%)
inf_428-488	16,958 (1.1%)
inf_489-549	7,224 (0.5%)
secboost_001-061	1,790 (0.1%)
secboost_062-122	50 (<0.1%)
Sex	
F	802,366 (54%)
M	683,988 (46%)

[1] n (%)

Variable		N	Odds ratio		p
Immunity	_noimmunity	430865		Reference	
	_other	18912		1.02 (0.87, 1.17)	0.829
	boost_001-061	133091		0.75 (0.70, 0.80)	<0.001
	boost_062-122	124741		0.80 (0.76, 0.85)	<0.001
	boost_123-183	43009		0.86 (0.80, 0.94)	<0.001
	boost_184-244	49726		0.88 (0.81, 0.95)	0.001
	boost_245-305	38423		0.79 (0.72, 0.86)	<0.001
	boost_306-366	4948		0.64 (0.51, 0.78)	<0.001
	full_001-061	34085		0.90 (0.79, 1.03)	0.125
	full_062-122	38849		0.91 (0.81, 1.03)	0.137
	full_123-183	122630		0.83 (0.76, 0.90)	<0.001
	full_184-244	127476		0.85 (0.80, 0.91)	<0.001
	full_245-305	33467		0.98 (0.89, 1.08)	0.744
	full_306-366	15266		0.94 (0.81, 1.08)	0.395
	full_367-427	11878		0.95 (0.81, 1.11)	0.554
	full_428-488	3113		1.00 (0.77, 1.28)	0.982
	full_489-549	664		1.18 (0.71, 1.83)	0.492
	hybridboost_001-061	17469		0.78 (0.67, 0.90)	<0.001
	hybridboost_062-122	13462		0.96 (0.84, 1.10)	0.597
	hybridboost_123-183	6575		0.93 (0.76, 1.13)	0.474
	hybridboost_184-244	11061		0.82 (0.69, 0.96)	0.017
	hybridboost_245-305	5358		0.81 (0.65, 1.00)	0.061
	hybridboost_306-366	417		0.71 (0.30, 1.39)	0.372
	hybridfull_001-061	4148		0.85 (0.58, 1.18)	0.354
	hybridfull_062-122	12011		0.95 (0.79, 1.13)	0.548
	hybridfull_123-183	23154		0.92 (0.80, 1.06)	0.267
	hybridfull_184-244	27239		0.91 (0.80, 1.02)	0.121
	hybridfull_245-305	10738		0.91 (0.77, 1.08)	0.312
	hybridfull_306-366	4635		0.94 (0.71, 1.21)	0.627
	hybridfull_367-427	2905		0.94 (0.67, 1.28)	0.706
	hybridfull_428-488	754		1.19 (0.68, 1.91)	0.508
	hybridfull_489-549	142		1.16 (0.28, 3.07)	0.804
	inf_062-122	21364		1.57 (1.36, 1.81)	<0.001
	inf_123-183	9907		1.04 (0.84, 1.28)	0.715
	inf_184-244	10159		0.89 (0.71, 1.11)	0.314
	inf_245-305	9579		0.90 (0.71, 1.12)	0.351
	inf_306-366	19148		0.99 (0.85, 1.15)	0.921
	inf_367-427	18964		0.91 (0.78, 1.07)	0.268
	inf_428-488	16958		0.95 (0.80, 1.11)	0.496
	inf_489-549	7224		1.03 (0.82, 1.27)	0.811
	secboost_001-061	1790		0.78 (0.56, 1.06)	0.132
	secboost_062-122	50		1.62 (0.26, 5.25)	0.507
DCCI		1486354		1.47 (1.44, 1.50)	<0.001
AgeGr	_40-44	141880		Reference	
	0-11	118001		0.09 (0.07, 0.11)	<0.001
	12-15	75582		0.11 (0.08, 0.13)	<0.001
	16-17	36666		0.09 (0.06, 0.13)	<0.001
	18-24	114540		0.44 (0.39, 0.49)	<0.001
	25-29	102986		0.63 (0.57, 0.70)	<0.001
	30-34	128997		0.75 (0.68, 0.81)	<0.001
	35-39	130709		0.86 (0.79, 0.93)	<0.001
	45-49	153876		1.25 (1.16, 1.34)	<0.001
	50-54	115133		1.43 (1.33, 1.54)	<0.001
	55-59	102737		1.66 (1.54, 1.78)	<0.001
	60-64	73011		1.70 (1.57, 1.84)	<0.001
	65-69	59542		1.83 (1.68, 1.98)	<0.001
	70-74	50835		1.99 (1.83, 2.16)	<0.001
	75-79	39812		2.09 (1.91, 2.28)	<0.001
	80+	42047		2.38 (2.19, 2.58)	<0.001
Sex	F	802366		Reference	
	M	683988		0.83 (0.81, 0.86)	<0.001

Odds ratio axis: 0.1　0.2　0.5　1　2　5

	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-4.7212	0.0332	-142.23	0.0000
Immunity_other	0.0162	0.0751	0.22	0.8293
Immunityboost_001-061	-0.2889	0.0323	-8.94	0.0000
Immunityboost_062-122	-0.2203	0.0297	-7.43	0.0000
Immunityboost_123-183	-0.1450	0.0410	-3.53	0.0004
Immunityboost_184-244	-0.1298	0.0399	-3.25	0.0011
Immunityboost_245-305	-0.2393	0.0428	-5.59	0.0000
Immunityboost_306-366	-0.4539	0.1112	-4.08	0.0000
Immunityfull_001-061	-0.1042	0.0679	-1.54	0.1247
Immunityfull_062-122	-0.0905	0.0609	-1.49	0.1369
Immunityfull_123-183	-0.1862	0.0415	-4.48	0.0000
Immunityfull_184-244	-0.1608	0.0335	-4.80	0.0000
Immunityfull_245-305	-0.0161	0.0491	-0.33	0.7435
Immunityfull_306-366	-0.0633	0.0745	-0.85	0.3954
Immunityfull_367-427	-0.0481	0.0813	-0.59	0.5539
Immunityfull_428-488	0.0029	0.1301	0.02	0.9824
Immunityfull_489-549	0.1655	0.2409	0.69	0.4921
Immunityhybridboost_001-061	-0.2533	0.0762	-3.32	0.0009
Immunityhybridboost_062-122	-0.0371	0.0703	-0.53	0.5974
Immunityhybridboost_123-183	-0.0728	0.1017	-0.72	0.4740
Immunityhybridboost_184-244	-0.2042	0.0852	-2.40	0.0165
Immunityhybridboost_245-305	-0.2056	0.1100	-1.87	0.0614
Immunityhybridboost_306-366	-0.3413	0.3825	-0.89	0.3722
Immunityhybridfull_001-061	-0.1656	0.1788	-0.93	0.3541
Immunityhybridfull_062-122	-0.0547	0.0912	-0.60	0.5482
Immunityhybridfull_123-183	-0.0804	0.0724	-1.11	0.2667
Immunityhybridfull_184-244	-0.0951	0.0613	-1.55	0.1209
Immunityhybridfull_245-305	-0.0892	0.0883	-1.01	0.3123
Immunityhybridfull_306-366	-0.0649	0.1337	-0.49	0.6272
Immunityhybridfull_367-427	-0.0630	0.1668	-0.38	0.7055
Immunityhybridfull_428-488	0.1735	0.2622	0.66	0.5081
Immunityhybridfull_489-549	0.1452	0.5859	0.25	0.8042
Immunityinf_062-122	0.4521	0.0739	6.12	0.0000
Immunityinf_123-183	0.0395	0.1083	0.36	0.7155
Immunityinf_184-244	-0.1153	0.1146	-1.01	0.3144
Immunityinf_245-305	-0.1083	0.1161	-0.93	0.3508
Immunityinf_306-366	-0.0079	0.0793	-0.10	0.9208
Immunityinf_367-427	-0.0890	0.0804	-1.11	0.2681
Immunityinf_428-488	-0.0557	0.0818	-0.68	0.4964
Immunityinf_489-549	0.0268	0.1122	0.24	0.8112
Immunitysecboost_001-061	-0.2465	0.1636	-1.51	0.1320
Immunitysecboost_062-122	0.4803	0.7242	0.66	0.5072
DCCI	0.3857	0.0107	36.03	0.0000
AgeGr0-11	-2.3990	0.1077	-22.27	0.0000
AgeGr12-15	-2.2502	0.1216	-18.51	0.0000
AgeGr16-17	-2.3570	0.1850	-12.74	0.0000
AgeGr18-24	-0.8243	0.0565	-14.58	0.0000
AgeGr25-29	-0.4612	0.0508	-9.08	0.0000
AgeGr30-34	-0.2934	0.0445	-6.59	0.0000
AgeGr35-39	-0.1501	0.0423	-3.55	0.0004
AgeGr45-49	0.2238	0.0367	6.10	0.0000
AgeGr50-54	0.3591	0.0378	9.50	0.0000
AgeGr55-59	0.5038	0.0374	13.47	0.0000
AgeGr60-64	0.5313	0.0402	13.22	0.0000
AgeGr65-69	0.6028	0.0416	14.50	0.0000
AgeGr70-74	0.6862	0.0425	16.16	0.0000
AgeGr75-79	0.7363	0.0446	16.50	0.0000
AgeGr80+	0.8662	0.0424	20.42	0.0000
SexM	-0.1837	0.0166	-11.08	0.0000

Table 13: Logistic regression summary

	immunities	deltas	lower_of_deltas	upper_of_deltas
2	Immunityfull	0.01	-0.00	0.02
3	Immunityboost	0.00	-0.00	0.01
4	Immunitysecboost	0.42	-0.74	1.57
5	Immunitysecbnew			
6	Immunityinf	-0.02	-0.04	-0.01
7	Immunityhybridfull	0.00	-0.02	0.03
8	Immunityhybridboost	-0.00	-0.02	0.02

Table 14: Monthly percentage decrease of effectiveness/protection

	1	2	3	4	5	6	7
1		6.58%	10.80%		-9.40%	-3.43%	4.09%
2	-6.58%		-4.17%		-27.24%	-9.19%	-4.64%
3	-10.80%	4.17%			4.49%	-4.57%	1.42%
4							
5	9.40%	27.24%	-4.49%			10.30%	22.35%
6	3.43%	9.19%	4.57%		-10.30%		5.48%
7	-4.09%	4.64%	-1.42%		-22.35%	-5.48%	

Table 15: Effectiveness/protection differences

1	2	3	4	5	6	7
	2.90	0.77		-2.20	-0.99	1.07
-2.90		-0.33		-5.45	-2.56	-1.39
-0.77	0.33			0.04	-0.23	0.10
2.20	5.45	-0.04			1.89	3.44
0.99	2.56	0.23		-1.89		1.12
-1.07	1.39	-0.10		-3.44	-1.12	

Table 16: Z-scores of effectiveness/protection differences