

**S Table1. Descriptive summary by number of vaccine doses administered, based on individual participants**

	Number of vaccine doses administered				
	3 (N=63)	4 (N=123)	5 (N=172)	more than 6 (N=66)	All (N=424)
Sex					
Male	11 (17.5%)	31 (25.2%)	38 (22.1%)	17 (25.8%)	97 (22.9%)
Female	52 (82.5%)	92 (74.8%)	134 (77.9%)	49 (74.2%)	327 (77.1%)
Age group (years)					
18-30s	15 (23.8%)	25 (20.3%)	27 (15.7%)	13 (19.7%)	80 (18.9%)
40-50s	37 (58.7%)	65 (52.8%)	60 (34.9%)	30 (45.5%)	192 (45.3%)
60-70s	7 (11.1%)	24 (19.5%)	41 (23.8%)	13 (19.7%)	85 (20.0%)
Over 80s	4 (6.3%)	9 (7.3%)	44 (25.6%)	10 (15.2%)	67 (15.8%)
Vaccine type					
Pfizer original	50 (79.4%)	31 (25.2%)	2 (1.2%)	0 (0.0%)	83 (19.6%)
Pfizer Omicron-compatible	10 (15.9%)	54 (43.9%)	151 (87.8%)	12 (18.2%)	227 (53.5%)
Pfizer XBB-compatible	0 (0.0%)	0 (0.0%)	7 (4.1%)	40 (60.6%)	47 (11.1%)
Moderna original	2 (3.2%)	33 (26.8%)	1 (0.6%)	0 (0.0%)	36 (8.5%)
Moderna Omicron	0 (0.0%)	5 (4.1%)	11 (6.4%)	8 (12.1%)	24 (5.7%)
Moderna XBB-compatible	1 (1.6%)	0 (0.0%)	0 (0.0%)	6 (9.1%)	7 (1.7%)
Days since vaccination	583.37 (151.14)	417.62 (86.48)	332.23 (81.26)	89.00 (75.21)	356.45 (170.88)
Prior COVID-19 infection					
No	19 (30.2%)	27 (22.0%)	50 (29.1%)	28 (42.4%)	124 (29.2%)
Yes	44 (69.8%)	96 (78.0%)	122 (70.9%)	38 (57.6%)	300 (70.8%)
Elapsed days after infection					
No history of infection	21 (33.3%)	30 (24.4%)	55 (32.0%)	29 (43.9%)	135 (31.8%)
7-89 days	2 (3.2%)	9 (7.3%)	2 (1.2%)	2 (3.0%)	15 (3.5%)
90-179 days	5 (7.9%)	8 (6.5%)	8 (4.7%)	5 (7.6%)	26 (6.1%)
Over 180 days	35 (55.6%)	76 (61.8%)	107 (62.2%)	30 (45.5%)	248 (58.5%)
Underlying medical conditions					
No	52 (82.5%)	95 (77.2%)	109 (63.4%)	46 (69.7%)	302 (71.2%)
Yes	11 (17.5%)	28 (22.8%)	63 (36.6%)	20 (30.3%)	122 (28.8%)
Immunocompromised state					
No	63 (100.0%)	116 (94.3%)	166 (96.5%)	65 (98.5%)	410 (96.7%)
Yes	0 (0.0%)	7 (5.7%)	6 (3.5%)	1 (1.5%)	14 (3.3%)
Attributes					
General public	30 (47.6%)	36 (29.3%)	37 (21.5%)	9 (13.6%)	112 (26.4%)
Residents and staff of elderly facility	7 (11.1%)	26 (21.1%)	30 (17.4%)	21 (31.8%)	84 (19.8%)
Healthcare professionals	26 (41.3%)	61 (49.6%)	105 (61.0%)	36 (54.5%)	228 (53.8%)
S-RBD IgG antibody titers*	8550.6 (12267.1)	11890.5 (20193.4)	12455.6 (23016.7)	29613.1 (39547.0)	12542.1 (24305.0)
S-RBD IgG antibody titers**	5999.4 (4154.4-8663.9)	8064.2 (5964.1-10903.9)	10501.9 (8717.8-12651.1)	24290.6 (19368.0-30464.3)	10198.8 (8892.7-11696.7)

Total of 424 study participants, with each participant contributing one data.

Categorical data are presented as frequency with percentage.

\*S-RBD IgG antibody titers are presented as median with interquartile range.

\*\*S-RBD IgG antibody titers are presented as geometric mean titers with 95% confidence intervals.

**S\_Table 2. Mixed effects censored random intercept model on antibody titer trends after vaccination**

Explanatory variables	Model 1 (n=821)			Model 2 (n=676)		
	Coefficient	95% CI		Coefficient	95% CI	
(Intercept)	3.756	3.333	4.178	3.752	3.259	4.244
Days post-vaccination (in 10 day-intervals)	-0.006	-0.015	0.002	-0.006	-0.016	0.004
Previous COVID-19 infection	0.243	-0.057	0.543	0.359	0.012	0.707
Previous COVID-19 infection* <sub>Δ</sub> Days post-vaccination	0.004	-0.001	0.009	0.003	-0.003	0.009
Number of days since infection						
0–89 days	0.429	0.173	0.684	0.367	0.073	0.661
90–179 days	0.307	0.057	0.557	0.232	-0.058	0.521
Over 180 days	0.085	-0.157	0.327	0.009	-0.272	0.290
Vaccine type						
Pfizer Omicron-compatible	0.206	0.008	0.404	0.197	-0.040	0.434
Pfizer XBB-compatible	0.329	-0.005	0.664	0.334	-0.061	0.729
Moderna original	0.184	-0.057	0.425	0.200	-0.104	0.504
Moderna Omicron	0.326	0.019	0.632	0.318	-0.032	0.667
Moderna XBB-compatible	0.445	-0.063	0.953	0.519	-0.053	1.091
Recent vaccine dose						
4	-0.042	-0.243	0.159	-0.061	-0.305	0.183
5	0.051	-0.180	0.282	0.038	-0.237	0.312
6 and more	0.284	-0.030	0.598	0.370	0.001	0.740
Age group (years)						
Age 40–59	0.066	-0.208	0.341	0.014	-0.315	0.342
Age 60–79	-0.025	-0.349	0.298	0.020	-0.378	0.418
Over 80	0.057	-0.290	0.404	0.200	-0.254	0.654
Age group (years)* <sub>Δ</sub> Days post-vaccination						
Age 40–59* <sub>Δ</sub> Days post-vaccination	-0.002	-0.008	0.005	0.000	-0.007	0.008
Age 60–79* <sub>Δ</sub> Days post-vaccination	-0.003	-0.011	0.005	-0.003	-0.013	0.006
Over 80* <sub>Δ</sub> Days post-vaccination	-0.005	-0.014	0.003	-0.008	-0.020	0.003
Female sex	-0.192	-0.444	0.060	-0.110	-0.408	0.189
Female sex* <sub>Δ</sub> Days post-vaccination	0.003	-0.003	0.009	0.000	-0.007	0.007
Underlying medical conditions				-0.265	-0.541	0.011
Underlying medical conditions* <sub>Δ</sub> Days post-vaccination				0.009	0.002	0.016
Immunocompromised state				0.069	-0.534	0.671
Immunocompromised state* <sub>Δ</sub> Days post-vaccination				-0.005	-0.021	0.012
Attributes						
Residents and staff of elderly facility				-0.063	-0.248	0.121
Healthcare professionals				-0.036	-0.198	0.125
<b>Random-effects parameters</b>	<b>Estimate</b>	<b>95% CI</b>		<b>Estimate</b>	<b>95% CI</b>	
Variance of the random intercept	0.284	0.245	0.330	0.297	0.252	0.351
Variance of the residual error	0.027	0.023	0.031	0.273	0.023	0.032
BIC		860.970			796.110	

References for the categorical variables are as follows:

No history of previous COVID-19 infection is the reference group for the post-infection days category.

Pfizer original vaccine is the reference group for the vaccine type category.

Dose of 3 is the reference group for the recent vaccine dose category.

Age <40 years is the reference group for the age group category.

Male sex, no underlying medical conditions, and non-immunocompromised state are the reference group for female sex, underlying medical condition, and immunocompromised state.

General public is the reference group for the attribute category.

Days post-vaccination, a continuous variable measured at 10-day intervals from 0 to 80 days, representing 800 days.

The symbol “\*<sub>Δ</sub>” indicates interaction.

CI, confidence interval

BIC, Bayesian Information Criterion

**S\_Table 3. Generalized estimating equations model on antibody titer trends after vaccination**

Explanatory variables	Model 1 (n=821)			Model 2 (n=676)		
	Coefficient	95% CI		Coefficient	95% CI	
(Intercept)	3.774	3.390	4.159	3.784	3.363	4.206
Days post-vaccination (in 10 day-intervals)	-0.007	-0.014	0.001	-0.007	-0.015	0.002
Previous COVID-19 infection	0.237	-0.136	0.611	0.345	-0.112	0.803
Previous COVID-19 infection* Days post-vaccination	0.005	-0.001	0.011	0.005	-0.002	0.011
Number of days since infection						
0–89 days	0.350	-0.029	0.730	0.289	-0.169	0.746
90–179 days	0.240	-0.102	0.581	0.165	-0.254	0.585
Over 180 days	0.018	-0.299	0.334	-0.071	-0.464	0.323
Vaccine type						
Pfizer Omicron-compatible	0.200	-0.023	0.423	0.195	-0.071	0.460
Pfizer XBB-compatible	0.266	-0.027	0.559	0.269	-0.080	0.618
Moderna original	0.169	-0.097	0.436	0.168	-0.187	0.523
Moderna Omicron	0.320	0.059	0.582	0.319	0.018	0.620
Moderna XBB-compatible	0.391	0.086	0.697	0.438	0.072	0.805
Recent vaccine dose						
4	-0.040	-0.253	0.173	-0.061	-0.320	0.197
5	0.057	-0.145	0.260	0.033	-0.218	0.284
6 and more	0.279	0.033	0.526	0.328	0.021	0.635
Age group (years)						
Age 40–59	0.044	-0.189	0.277	-0.006	-0.270	0.257
Age 60–79	-0.014	-0.261	0.232	0.019	-0.274	0.312
Over 80	0.060	-0.255	0.375	0.158	-0.209	0.525
Age group (years)* Days post-vaccination						
Age 40–59* Days post-vaccination	-0.001	-0.008	0.006	0.001	-0.007	0.009
Age 60–79* Days post-vaccination	-0.003	-0.011	0.004	-0.003	-0.012	0.006
Over 80* Days post-vaccination	-0.005	-0.014	0.003	-0.007	-0.017	0.003
Female sex	-0.160	-0.342	0.021	-0.093	-0.317	0.131
Female sex: Days post-vaccination	0.002	-0.003	0.007	-0.000	-0.006	0.006
Underlying medical conditions				-0.210	-0.453	0.033
Underlying medical conditions* Days post-vaccination				0.007	0.000	0.014
Immunocompromised state				-0.041	-0.453	0.371
Immunocompromised state* Days post-vaccination				-0.002	-0.014	0.009
Attributes						
Residents and staff of elderly facility				-0.037	-0.229	0.155
Healthcare professionals				-0.015	-0.178	0.148

References for the categorical variables are as follows:

No history of previous COVID-19 infection is the reference group for the post-infection days category.

Pfizer original vaccine is the reference group for the vaccine type category.

Dose of 3 is the reference group for the recent vaccine dose category.

Age <40 years is the reference group for the age group category.

Male sex, no underlying medical conditions, and non-immunocompromised state are the reference group for female sex, underlying medical condition, and immunocompromised state.

General public is the reference group for the attribute category.

Days post-vaccination, a continuous variable measured at 10-day intervals from 0 to 80 days, representing 800 days.

The symbol “\*” indicates interaction.

CI, confidence interval