

Supplementary Appendix

Supplement to: Andrews N, Stowe J, Kirsebom F, et al. Covid-19 vaccine effectiveness against the omicron (B.1.1.529) variant. N Engl J Med. DOI: 10.1056/NEJMoa2119451

This appendix has been provided by the authors to give readers additional information about the work.

Table of Contents

Supplementary Tables	1
Supplementary Table 1. Weekly COVID-19 cases by gender, age and region and incidence ethnicity in the general population*.....	1
Supplementary Table 2. Logistic regression model results for Omicron and for Delta showing all factors included*.....	2
Supplementary Figures	7
Supplementary Figure 1. Flow chart demonstrating test selection and methodology.	7
Supplementary Figure 2. Distribution of Delta and Omicron cases in the study period.	8

Supplementary Tables

Supplementary Table 1. Weekly COVID-19 cases by gender, age and region and incidence ethnicity in the general population*

Category		Number of Cases**	%
Gender	Male	16003032	39.6
	Female	22607593	56.0
	Missing	1759501	4.4
Age	10 to 19	3432688	9.7
	20 to 29	5527668	15.6
	30 to 39	6604404	18.6
	40 to 49	6008448	16.9
	50 to 59	5978604	16.8
	60 to 69	3754437	10.6
	70 to 79	2117846	6.0
	80+	1947527	5.5
	Unknown	124914	0.4
Region	East Midlands	3047258	7.5
	East of England	4954257	12.3
	London	7391485	18.3
	North East	1795178	4.4
	North West	5138366	12.7
	South East	6908226	17.1
	South West	4093489	10.1
	West Midlands	3838332	9.5
	Yorkshire and Humber	3203399	7.9
		Unknown	136
Ethnicity	White	4569980	84
	Indian (Asian or Asian British)	167568	3
	Pakistani (Asian or Asian British)	94046	2
	Other Asian / Asian British	177846	3
	Black / African / Caribbean / Black British	215031	4
	Mixed / Multiple ethnic groups	157049	3
	Other ethnic group	68339	1

*data extracted from National flu and COVID-19 surveillance data report: 13 January 2022 (week 2)
[<https://www.gov.uk/government/statistics/national-flu-and-covid-19-surveillance-reports-2021-to-2022-season>]

**Pillar 1 and Pillar 2, from week 40 of 2021 to week 1 of 2022

Supplementary Table 2. Logistic regression model results for Omicron and for Delta showing all factors included*

Factor				Omicron			Delta				
				Odds Ratio	95% CI lower end	95% CI upper end	Odds Ratio	95% CI lower end	95% CI upper end		
Vaccination Status and intervals after vaccine	Manufacturer	Dose	Interval								
	Unvaccinated			1.00	Baseline		1.00	Baseline			
	ChAdOx1-S	Dose 1	0-4 weeks		0.83	0.45	1.55	0.72	0.31	1.70	
			4+ weeks		0.82	0.79	0.86	0.57	0.54	0.60	
		Dose 2	0-2 weeks		0.83	0.65	1.06	0.32	0.22	0.47	
			2-5 weeks		0.51	0.43	0.61	0.17	0.12	0.25	
			5-9 weeks		0.66	0.59	0.75	0.23	0.19	0.30	
			10-14 weeks		0.71	0.64	0.79	0.31	0.27	0.35	
			15-19 weeks		0.82	0.78	0.87	0.46	0.45	0.48	
			20-24 weeks		0.96	0.94	0.98	0.53	0.52	0.54	
		25+ weeks		1.03	1.01	1.04	0.57	0.55	0.58		
		Booster (any)	0-1 days		0.86	0.83	0.88	0.52	0.50	0.54	
			2-6 days		0.76	0.75	0.78	0.43	0.41	0.44	
		BNT162b2	Booster (BNT162b2)	1 week		0.41	0.40	0.42	0.11	0.11	0.12
				2-4 weeks		0.38	0.37	0.38	0.05	0.04	0.05
				5-9 weeks		0.47	0.46	0.48	0.07	0.07	0.08
	10+ weeks			0.60	0.59	0.62	0.12	0.11	0.13		
	Booster (mRNA-1273)		1 week		0.32	0.31	0.33	0.09	0.08	0.09	
			2-4 weeks		0.30	0.29	0.30	0.03	0.03	0.03	
			5-9 weeks		0.39	0.38	0.40	0.05	0.04	0.06	
			10+ weeks		0.78	0.49	1.24	0.23	0.03	1.85	
	Booster (ChAdOx1-S)		1 week		0.42	0.29	0.62	0.23	0.12	0.45	
			2-4 weeks		0.44	0.35	0.56	0.18	0.11	0.29	
		5-9 weeks		0.53	0.43	0.66	0.17	0.09	0.30		
		10+ weeks		0.50	0.32	0.77	n/a*				
	BNT162b2	Dose 1	0-4 weeks		0.57	0.55	0.60	0.52	0.49	0.56	
4+ weeks			0.68	0.67	0.70	0.55	0.53	0.57			
Dose 2		0-2 weeks		0.42	0.40	0.44	0.28	0.25	0.31		
		2-5 weeks		0.35	0.33	0.36	0.09	0.08	0.10		
		5-9 weeks		0.51	0.50	0.53	0.14	0.14	0.15		
		10-14 weeks		0.70	0.68	0.71	0.21	0.21	0.22		
		15-19 weeks		0.85	0.83	0.86	0.26	0.25	0.26		
		20-24 weeks		0.88	0.87	0.90	0.33	0.32	0.33		
25+ weeks		0.91	0.89	0.93	0.37	0.36	0.38				
Booster (any)		0-1 days		0.71	0.69	0.73	0.26	0.24	0.28		
		2-6 days		0.59	0.57	0.60	0.23	0.22	0.24		
Booster (BNT162b2)		1 week		0.33	0.32	0.34	0.08	0.07	0.08		
		2-4 weeks		0.33	0.32	0.33	0.05	0.05	0.05		
		5-9 weeks		0.45	0.44	0.46	0.08	0.08	0.09		

		10+ weeks	0.54	0.53	0.55	0.10	0.10	0.11
	Booster (mRNA-1273)	1 week	0.26	0.25	0.27	0.06	0.05	0.07
		2-4 weeks	0.26	0.25	0.27	0.03	0.03	0.04
		5-9 weeks	0.36	0.34	0.37	0.05	0.04	0.07
		10+ weeks	0.45	0.29	0.70	0.10	0.01	0.75
	Dose 1	0-4 weeks	0.52	0.48	0.57	0.40	0.33	0.48
		4+ weeks	0.68	0.64	0.73	0.43	0.38	0.47
	Dose 2	0-2 weeks	0.39	0.32	0.47	0.25	0.18	0.36
		2-5 weeks	0.25	0.21	0.29	0.05	0.03	0.09
		5-9 weeks	0.47	0.43	0.52	0.08	0.06	0.10
		10-14 weeks	0.64	0.62	0.67	0.16	0.15	0.17
		15-19 weeks	0.75	0.73	0.77	0.17	0.16	0.18
		20-24 weeks	0.85	0.82	0.88	0.24	0.22	0.25
	Booster (any)	25+ weeks	0.85	0.75	0.96	0.20	0.12	0.33
		0-1 days	0.69	0.64	0.75	0.18	0.14	0.22
		2-6 days	0.56	0.53	0.59	0.16	0.13	0.19
	Booster (BNT162b2)	1 week	0.36	0.33	0.38	0.04	0.03	0.07
		2-4 weeks	0.35	0.33	0.38	0.05	0.03	0.11
		5-9 weeks	0.50	0.25	0.99	n/a*		
		10+ weeks	n/a*			n/a*		
	Booster (mRNA-1273)	1 week	0.32	0.30	0.34	0.05	0.03	0.08
		2-4 weeks	0.34	0.31	0.36	0.04	0.01	0.09
		5-9 weeks	0.95	0.27	3.42	n/a*		
Gender	Female		1.00	Baseline		1.00	Baseline	
	Male		1.22	1.22	1.23	1.20	1.19	1.21
Age	18-19		1.00	Baseline		1.00	Baseline	
	20-24		0.96	0.95	0.98	1.07	1.03	1.11
	25-29		0.84	0.83	0.86	1.16	1.11	1.20
	30-34		0.74	0.73	0.76	1.31	1.26	1.36
	35-39		0.73	0.71	0.74	1.58	1.52	1.64
	40-44		0.78	0.77	0.80	1.79	1.72	1.86
	45-49		0.84	0.82	0.85	1.87	1.80	1.95
	50-54		0.85	0.83	0.86	1.83	1.76	1.90
	55-59		0.81	0.80	0.83	1.78	1.71	1.86
	60-64		0.75	0.74	0.77	1.72	1.64	1.80
	65-69		0.68	0.65	0.72	1.49	1.33	1.67
	70-74		0.68	0.64	0.72	1.54	1.35	1.76
	75-79		0.71	0.66	0.75	1.60	1.39	1.84
	80-84		0.65	0.61	0.70	1.55	1.32	1.81
	85-89		0.59	0.54	0.64	1.70	1.43	2.03
>=90		0.56	0.50	0.62	1.51	1.20	1.90	
Ethnicity	African		1.66	1.62	1.70	0.66	0.63	0.69
	Another Asian background		1.08	1.05	1.11	0.90	0.86	0.95
	Another Black background		1.43	1.33	1.54	0.68	0.59	0.79

	Another ethnic background	0.99	0.95	1.02	0.80	0.75	0.85
	Arab	0.77	0.73	0.81	0.82	0.75	0.90
	Bangladeshi	0.82	0.79	0.84	0.95	0.89	1.01
	Caribbean	1.83	1.77	1.89	0.89	0.84	0.95
	Chinese	0.78	0.75	0.80	0.65	0.61	0.70
	Indian	0.82	0.80	0.83	0.68	0.66	0.70
	Mixed or multiple ethnic groups	1.15	1.13	1.17	0.82	0.79	0.86
	Pakistani	0.82	0.80	0.84	0.75	0.72	0.79
	White	1.00	Baseline		1.00	Baseline	
	Prefer not to say	0.87	0.85	0.88	0.80	0.77	0.82
NHS Region	East of England	1.00	Baseline		1.00	Baseline	
	London	1.68	1.66	1.71	0.95	0.93	0.97
	Midlands	1.27	1.26	1.29	1.16	1.14	1.18
	North East	1.56	1.54	1.58	1.41	1.38	1.44
	North West	2.36	2.33	2.39	1.61	1.57	1.64
	South East	1.22	1.20	1.23	1.05	1.03	1.07
	South West	0.90	0.89	0.91	1.07	1.05	1.09
IMD Quintiles	1	1.00	Baseline		1.00	Baseline	
	2	1.02	1.01	1.03	1.00	0.98	1.02
	3	1.01	1.00	1.02	1.00	0.98	1.01
	4	1.03	1.02	1.04	1.00	0.98	1.01
	5	1.02	1.01	1.03	0.97	0.95	0.98
Previously positive	No	1.00	Baseline		1.00	Baseline	
	Yes	0.50	0.49	0.50	0.09	0.09	0.10
Health care worker	No	1.00	Baseline		1.00	Baseline	
	Yes	0.76	0.75	0.77	0.73	0.71	0.76
In a risk group	No	1.00	Baseline		1.00	Baseline	
	Yes	0.84	0.83	0.84	0.89	0.87	0.90
	Age 65+	0.92	0.87	0.97	1.01	0.90	1.13
CEV	No	1.00	Baseline		1.00	Baseline	
	Yes	0.89	0.88	0.90	1.02	1.00	1.05
Care home resident	No	1.00	Baseline		1.00	Baseline	
	Yes	0.97	0.88	1.06	0.76	0.61	0.95
Recent travel	No	1.00	Baseline		1.00	Baseline	
	Yes	1.06	1.03	1.08	0.82	0.79	0.85
Test date	27-Nov-21	1.00	Baseline		1.00	Baseline	
	28-Nov-21	0.73	0.36	1.50	1.04	1.00	1.09
	29-Nov-21	0.64	0.34	1.20	0.81	0.78	0.84
	30-Nov-21	1.13	0.64	2.00	0.67	0.64	0.70
	01-Dec-21	1.99	1.16	3.39	0.77	0.74	0.80
	02-Dec-21	2.64	1.55	4.49	0.77	0.74	0.81
	03-Dec-21	4.02	2.38	6.77	0.83	0.80	0.87
	04-Dec-21	7.22	4.31	12.09	0.89	0.85	0.93
	05-Dec-21	12.04	7.26	19.96	0.85	0.81	0.89

06-Dec-21	13.78	8.38	22.66	0.62	0.60	0.65
07-Dec-21	31.08	18.97	50.92	0.66	0.64	0.69
08-Dec-21	48.04	29.36	78.60	0.70	0.67	0.73
09-Dec-21	66.78	40.83	109.22	0.76	0.73	0.79
10-Dec-21	105.31	64.41	172.18	0.92	0.88	0.96
11-Dec-21	123.17	75.32	201.42	0.83	0.80	0.87
12-Dec-21	185.72	113.61	303.59	0.80	0.77	0.84
13-Dec-21	186.28	114.02	304.35	0.50	0.48	0.52
14-Dec-21	283.74	173.69	463.50	0.45	0.43	0.47
15-Dec-21	370.97	227.12	605.94	0.44	0.42	0.45
16-Dec-21	351.38	215.13	573.94	0.41	0.40	0.43
17-Dec-21	334.05	204.51	545.66	0.37	0.35	0.38
18-Dec-21	441.07	270.01	720.48	0.34	0.33	0.36
19-Dec-21	516.74	316.33	844.11	0.33	0.31	0.35
20-Dec-21	487.68	298.59	796.53	0.27	0.25	0.28
21-Dec-21	575.94	352.63	940.66	0.24	0.23	0.25
22-Dec-21	725.04	443.93	1184.18	0.23	0.22	0.24
23-Dec-21	692.73	424.13	1131.44	0.20	0.19	0.21
24-Dec-21	1219.66	746.69	1992.19	0.32	0.30	0.33
25-Dec-21	2797.41	1711.55	4572.17	0.51	0.46	0.55
26-Dec-21	1800.68	1102.26	2941.64	0.30	0.28	0.32
27-Dec-21	1193.37	730.62	1949.22	0.21	0.20	0.22
28-Dec-21	1035.21	633.80	1690.86	0.13	0.13	0.14
29-Dec-21	1271.99	778.83	2077.43	0.18	0.17	0.19
30-Dec-21	1483.55	908.35	2423.01	0.14	0.13	0.15
31-Dec-21	1479.17	905.59	2416.02	0.12	0.11	0.13
01-Jan-22	1547.61	947.34	2528.23	0.13	0.11	0.14
02-Jan-22	1372.85	840.52	2242.31	0.11	0.10	0.12
03-Jan-22	1408.09	862.15	2299.74	0.09	0.09	0.10
04-Jan-22	1167.32	714.76	1906.42	0.07	0.07	0.08
05-Jan-22	1134.84	694.85	1853.45	0.06	0.06	0.07
06-Jan-22	1014.64	621.24	1657.16	0.05	0.05	0.05
07-Jan-22	1012.14	619.64	1653.25	0.05	0.04	0.06
08-Jan-22	1009.61	617.98	1649.42	0.05	0.04	0.06
09-Jan-22	1208.09	739.41	1973.86	0.05	0.04	0.06
10-Jan-22	1113.06	681.42	1818.13	0.00	0.00	0.01
11-Jan-22	1056.63	646.81	1726.11	0.00	0.00	0.00
12-Jan-22	890.44	545.02	1454.78	0.00	0.00	0.01
Hosmer-Lemeshow goodness of fit	Decile of predicted probability of being a case			Observed/Expected cases (ratio)		
1	647/761 (0.85)			292/203 (1.44)		
2	14092/15306 (0.92)			992/940 (1.06)		
3	44574/45327 (0.98)			2078/2098 (0.99)		
4	67420/67468 (1)			3719/3990 (0.93)		
5	85441/83947 (1.02)			6848/6993 (0.98)		
6	100073/98100 (1.02)			11053/11598 (0.95)		

7	114430/112772 (1.01)	19420/19522 (0.99)
8	130280/130014 (1)	32821/31996 (1.03)
9	149325/149959 (1)	51518/50275 (1.02)
10	175558/178185 (0.99)	74504/75631 (0.99)

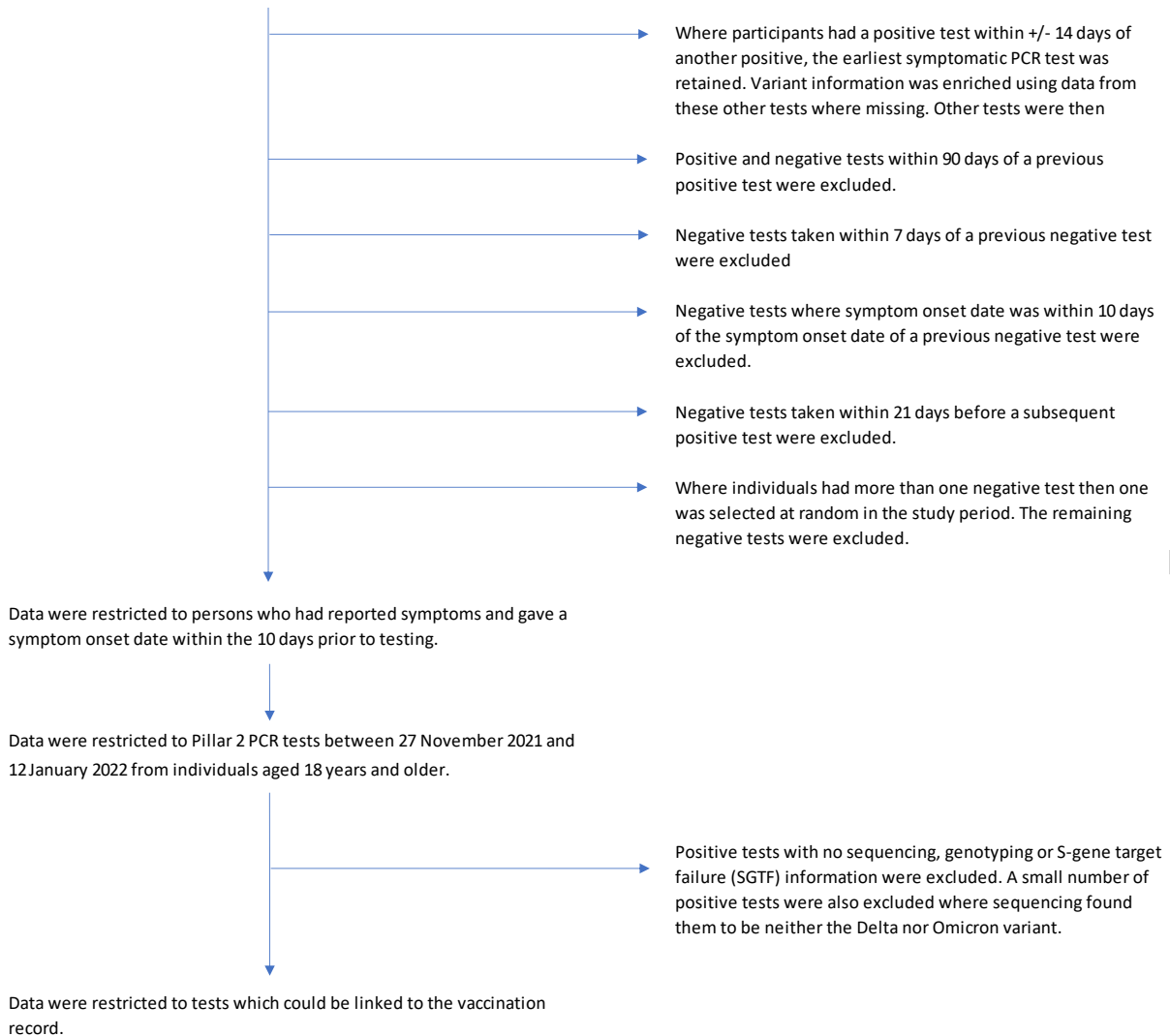
*to ensure reasonable precision estimates are given if there are at least 10 cases or 2000 controls.

**no cases

Supplementary Figures

Supplementary Figure 1. Flow chart demonstrating test selection and methodology.

Data on all positive PCR and LFT tests (Pillar 1 and Pillar 2), and on negative Pillar 2 PCR tests from symptomatic individuals with an onset date after 25 November 2020 were extracted up to 12 January 2022.



Supplementary Figure 2. Distribution of Delta and Omicron cases in the study period.

