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Supplementary appendix

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Supplementary Appendix: Effectiveness of CoronaVac, ChAdOx1, BNT162b2 and Ad26.COVS.2 among individuals with prior SARS-CoV-2 infection in Brazil

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Table A1. Characteristics and distribution of individuals according to vaccination status.

Characteristic	Unvaccinated		AD26.COVS		ChAdOx1		BNT162b2		CoronaVac	
	Case, N = 14,566	Control, N = 83,290	Case, N = 155	Control, N = 1,137	Case, N = 3,114	Control, N = 23,465	Case, N = 994	Control, N = 8,289	Case, N = 3,737	Control, N = 28,874
Individuals	14,566 (100.0)	36,709 (44.1)	155 (100.0)	722 (63.5)	3,114 (100.0)	12,783 (54.5)	994 (100.0)	4,941 (59.6)	3,737 (100.0)	13,271 (46.0)
Age (years), median (IQR)	35 (28 – 43)	35 (28 – 42)	40 (34 – 44)	40 (37 – 44)	42 (34 – 53)	40 (33 – 49)	37 (28 – 45)	36 (28 – 44)	39 (31 – 49)	37 (31 – 45)
Sex, female	8,287 (56.9)	48,630 (58.4)	87 (56.1)	647 (56.9)	1,978 (63.5)	15,569 (66.3)	574 (57.7)	5,061 (61.1)	2,705 (72.4)	21,024 (72.8)
Race										
White	6,484 (44.5)	38,170 (45.8)	69 (44.5)	570 (50.1)	1,496 (48.0)	11,471 (48.9)	451 (45.4)	3,669 (44.3)	1,802 (48.2)	13,523 (46.8)
Mixed	5,234 (35.9)	29,655 (35.6)	59 (38.1)	343 (30.2)	1,034 (33.2)	7,616 (32.5)	361 (36.3)	2,963 (35.7)	1,310 (35.1)	10,211 (35.4)
Black	676 (4.6)	4,084 (4.9)	9 (5.8)	62 (5.5)	145 (4.7)	1,367 (5.8)	46 (4.6)	465 (5.6)	176 (4.7)	1,594 (5.5)
Indigenous/Asian (Missing)	1,050 (7.2) 1,122 (7.7)	5,461 (6.6) 5,920 (7.1)	7 (4.5) 11 (7.1)	35 (3.1) 127 (11.2)	139 (4.5) 300 (9.6)	1,158 (4.9) 1,853 (7.9)	29 (2.9) 107 (10.8)	333 (4.0) 859 (10.4)	212 (5.7) 237 (6.3)	1,764 (6.1) 1,782 (6.2)
Region of residence										
Central-west	1,357 (9.3)	6,861 (8.2)	19 (12.3)	167 (14.7)	414 (13.3)	2,808 (12.0)	123 (12.4)	991 (12.0)	389 (10.4)	2,170 (7.5)
North	1,333 (9.2)	8,208 (9.9)	8 (5.2)	39 (3.4)	183 (5.9)	1,216 (5.2)	87 (8.8)	628 (7.6)	259 (6.9)	2,281 (7.9)
Northeast	3,447 (23.7)	17,379 (20.9)	29 (18.7)	111 (9.8)	652 (20.9)	4,541 (19.4)	183 (18.4)	1,225 (14.8)	986 (26.4)	7,233 (25.1)
South	1,358 (9.3)	8,975 (10.8)	21 (13.5)	157 (13.8)	236 (7.6)	2,205 (9.4)	97 (9.8)	1,007 (12.1)	279 (7.5)	2,401 (8.3)
Southeast	7,071 (48.5)	41,867 (50.3)	78 (50.3)	663 (58.3)	1,629 (52.3)	12,695 (54.1)	504 (50.7)	4,438 (53.5)	1,824 (48.8)	14,789 (51.2)
Residence in State Capital	5,551 (38.1)	42,336 (50.8)	54 (34.8)	522 (45.9)	1,227 (39.4)	11,967 (51.0)	439 (44.2)	4,766 (57.5)	1,711 (45.8)	17,607 (61.0)
Pregnancy Post partum	113 (0.8) 14 (0.1)	683 (0.8) 39 (0.0)	1 (0.6) 0 (0.0)	0 (0.0) 0 (0.0)	2 (0.1) 2 (0.1)	24 (0.1) 0 (0.0)	15 (1.5) 1 (0.1)	130 (1.6) 6 (0.1)	16 (0.4) 0 (0.0)	94 (0.3) 12 (0.0)
Diabetes Mellitus	578 (4.0)	3,004 (3.6)	4 (2.6)	24 (2.1)	268 (8.6)	1,739 (7.4)	38 (3.8)	345 (4.2)	242 (6.5)	1,286 (4.5)
Obesity	375 (2.6)	1,875 (2.3)	3 (1.9)	21 (1.8)	118 (3.8)	822 (3.5)	26 (2.6)	219 (2.6)	112 (3.0)	733 (2.5)
Imunossupressio n	204 (1.4)	1,144 (1.4)	2 (1.3)	15 (1.3)	62 (2.0)	394 (1.7)	11 (1.1)	137 (1.7)	46 (1.2)	321 (1.1)
Chronic Kidney Disease	90 (0.6)	446 (0.5)	0 (0.0)	1 (0.1)	44 (1.4)	217 (0.9)	7 (0.7)	53 (0.6)	35 (0.9)	203 (0.7)
Cardiac Disease	1,091 (7.5)	6,128 (7.4)	17 (11.0)	37 (3.3)	444 (14.3)	3,141 (13.4)	74 (7.4)	628 (7.6)	426 (11.4)	2,616 (9.1)
Medical comorbidities										
0	12,734 (87.4)	73,257 (88.0)	133 (85.8)	1,062 (93.4)	2,430 (78.0)	18,601 (79.3)	870 (87.5)	7,184 (86.7)	3,104 (83.1)	24,860 (86.1)
1	1,418 (9.7)	7,834 (9.4)	19 (12.3)	55 (4.8)	480 (15.4)	3,616 (15.4)	103 (10.4)	846 (10.2)	439 (11.7)	3,009 (10.4)
≥2	414 (2.8)	2,199 (2.6)	3 (1.9)	20 (1.8)	204 (6.6)	1,248 (5.3)	21 (2.1)	259 (3.1)	194 (5.2)	1,005 (3.5)
Days from first positive test to second test, median (IQR)	204 (138 – 273)	203 (142 – 269)	219 (154 – 332)	226 (159 – 325)	225 (157 – 320)	240 (165 – 325)	212 (150 – 308)	228 (162 – 324)	258 (179 – 334)	269 (193 – 339)

Hospitalized during 1st infection	401 (2.8)	3,274 (3.9)	7 (4.5)	54 (4.7)	147 (4.7)	1,361 (5.8)	43 (4.3)	389 (4.7)	183 (4.9)	1,429 (4.9)
Days, 1st vaccine dose to 2nd positive test, median (IQR)	NA (NA – NA)	NA (NA – NA)	179 (109 – 300)	189 (112 – 288)	164 (93 – 252)	167 (97 – 249)	162 (99 – 264)	177 (113 – 277)	172 (91 – 237)	187 (100 – 243)
Vaccination Status at test date										
Unvaccinated	14,566 (100.0)	83,290 (100.0)	—	—	—	—	—	—	—	—
One dose										
0-13	—	—	29 (18.7)	164 (14.4)	413 (13.3)	2,138 (9.1)	192 (19.3)	1,288 (15.5)	303 (8.1)	1,804 (6.2)
≥14	—	—	126 (81.3)	973 (85.6)	1,897 (60.9)	13,916 (59.3)	670 (67.4)	5,648 (68.1)	630 (16.9)	3,997 (13.8)
Two doses										
0-13	—	—	—	—	160 (5.1)	1,400 (6.0)	48 (4.8)	400 (4.8)	271 (7.3)	2,091 (7.2)
≥14	—	—	—	—	644 (20.7)	6,011 (25.6)	84 (8.5)	953 (11.5)	2,533 (67.8)	20,982 (72.7)
Hospitalization (up to 28 days)	1,002 (6.9)	1,094 (1.3)	9 (5.8)	11 (1.0)	255 (8.2)	475 (2.0)	46 (4.6)	137 (1.7)	233 (6.2)	479 (1.7)
Death (up to 28 days)	166 (1.1)	214 (0.3)	0 (0.0)	0 (0.0)	47 (1.5)	68 (0.3)	5 (0.5)	11 (0.1)	72 (1.9)	93 (0.3)
Hospitalization or Death	1,011 (6.9)	1,123 (1.3)	9 (5.8)	11 (1.0)	257 (8.3)	478 (2.0)	47 (4.7)	137 (1.7)	240 (6.4)	489 (1.7)

Table A2. Vaccine effectiveness among recently vaccinated individuals (0 to 6 days and 7 to 13 days post first dose).

	Symptomatic Disease		Hospitalization or Death	
	Vaccine Effectiveness	95% CI	Vaccine Effectiveness	95% CI
Unvaccinated	Ref	-	Ref	-
BNT162b2				
0-6 days	-1.3%	-29.4 to 20.7	-40.1%	-284.6 to 49
7-13 days	27.2%	9.8 to 41.2	29.4	-73 to 71.2
ChAdOx1				
0-6 days	13.9%	-2.9 to 27.9	-4.7%	-92.4 to 37.8
7-13 days	-25.5%	-45.5 to -8.2	-48.4%	-131.1 to 4.8
CoronaVac				
0-6 days	21.0%	2.3 to 36.1	8.7%	-77.0 to 52.9
7-13 days	-9.6%	-29.4 to 7.2	1.6%	-76.9 to 45.3
Ad26.COV2.S				
0-6 days	29.6%	-41.6 to 65.0	-25.2%	-1817.7 to 91.8
7-13 days	-2.2%	-71.6 to 39.1	-14.8%	-1045.6 to 88.5

Table A3. Vaccine effectiveness ≥ 14 days after series completion against symptomatic COVID-19 by subgroup.

	Vaccine waning (time after series completion)			Natural immunity waning (time after first infection)			Age		
	14-90 days	>90 days	p-value	91-180 days	181-613 days	p-value	18-49 years	≥ 50 years	p-value
BNT162b2	64.2% (54.2-72.0)	100% (*)	0.277	35.3% (-2.7-59.3)	70.7% (61.1-77.9)	0.011	64.6% (53.0-73.3)	66.9% (46.0-79.7)	0.891
ChAdOx1	55.5% (50.5-60.1)	56.8% (46.6-65.1)	0.544	47.0% (32.7-58.3)	58.4% (53.7-62.6)	0.201	54.8% (49.4-59.7)	59.9% (50.8-67.3)	0.274
CoronaVac	40.5% (36.4-44.3)	38.0% (33.1-42.5)	0.760	31.6% (24.1-38.4)	42.4% (38.8-45.8)	0.050	39.6% (36.0-43.0)	39.2% (30.5-46.8)	0.750
Ad26.COV2.S	46.1% (32.7-56.7)	30.6% (-12.4-57.1)	0.420	39.6% (15.5-56.8)	46.0% (31.2-57.7)	0.832	41.0% (27.8-52.4)	67.0% (29.0-84.7)	0.142

Table A4. Vaccine effectiveness ≥ 14 days after series completion against severe outcomes by subgroup.

	Vaccine waning (time after series completion)			Natural immunity waning (time after first infection)			Age		
	14-90 days	>90 days	p-value	91-180 days	181-613 days	p-value	18-49 years	≥ 50 years	p-value
BNT162b2	88.8% (50.0-97.5)	100% (*)	0.765	100% (*)	88.5% (48.3-97.4)	0.456	88.6% (6.3-98.6)	89.8% (17.0-98.7)	0.933
ChAdOx1	86.6% (77.6-92.0)	95.1% (84.8-98.4)	0.007	92.9% (67.4-98.4)	90.0% (83.3-94.0)	0.579	88.7% (73.9-95.1)	89.9% (81.4-94.5)	0.776
CoronaVac	86.6% (79.8-90.3)	74.4% (63.3-82.2)	0.012	74.1% (57.9-84.1)	84.10% (78.4-88.4)	0.118	84.9% (76.6-90.3)	79.2% (69.7-85.7)	0.153
Ad26.COV2.S	60.2% (-10.8-85.7)	41.0% (-240.9-89.9)	0.978	6.9% (-179.6-69.0)	81.8% (17.1-96.0)	0.064	65.2% (3.3-87.5)	-32.3% (-764.1-79.6)	0.211

Table A5- Estimates for covariates from models for estimating vaccine effectiveness.

Covariate	Symptomatic COVID-19		COVID-19 related hospitalisation or death	
		Odds Ratio (95% CI)		Odds Ratio (95% CI)
Days first infection to second test (first non-linear component)		0.9989 (0.9984-0.9993)		0.9970 (0.9952- 0.9987)
Days first infection to second test (second non-linear component)		1.0018 (1.0013-1.0024)		1.0039 (1.0017- 1.0061)
Hospitalization (First infection)		0.7020 (0.6462-0.7626)		0.7617 (0.6255- 0.9276)
Race				
	White	Reference		Reference
	Mixed	0.9945 (0.9581-1.0323)		0.9802 (0.8433- 1.1394)
	Black	0.9615 (0.8950-1.0330)		0.9183 (0.7027- 1.2001)
	Indigenous/Asian	0.9970 (0.9333-1.0650)		1.1995 (0.9124- 1.5769)
	(Missing)	1.1357 (1.0685-1.2070)		0.9011 (0.6950- 1.1683)
Number of comorbidities				
	None	Reference		Reference
	1	1.0146 (0.9655-1.0662)		2.3401 (2.0154- 2.7170)
	≥2	1.1246 (1.0336-1.2236)		4.2217 (3.4931- 5.1023)
Pregnancy (Yes)		0.9817 (0.8164-1.1805)		3.1823 (1.4896- 6.7986)
Postpartum period (Yes)		1.8559 (1.0344-3.3296)		14.4189 (1.0368-200.5334)
Age - continuous		Not included		1.0637 (1.0407- 1.0873)

Table A6- Sensitivity analyses with different matching criteria*. Vaccine effectiveness against symptomatic COVID-19

Vaccination status	Matching 1	Matching 2	Matching 3	Matching 4	Matching 5
BNT162b2					
One dose					
0-13	14 (-2.4 to 27.8)	14.5 (0.6 to 26.4)	16.2 (1.2 to 28.9)	17.5 (2.3 to 30.4)	17.9 (1.8 to 31.4)
≥14	46.9 (41.1 to 52.1)	43.3 (38.1 to 48)	47.1 (41.7 to 52)	47.1 (41.5 to 52.1)	46.4 (40.5 to 51.7)
Two doses					
0-13	50.9 (30.3 to 65.4)	52.4 (35.5 to 64.8)	52.9 (35 to 65.9)	52.3 (33.7 to 65.7)	51.3 (31.6 to 65.3)
≥14	66.8 (56.7 to 74.5)	60.8 (51.1 to 68.6)	64.7 (54.9 to 72.4)	64.2 (54 to 72.2)	64.8 (54.6 to 72.7)
ChAdOx1					
One dose					
0-13	-8 (-22.5 to 4.8)	-10.4 (-22.2 to 0.3)	-5.9 (-18.9 to 5.6)	-7 (-20.5 to 5.1)	-5.1 (-19.3 to 7.5)
≥14	32.8 (28.2 to 37)	32.3 (28.6 to 35.9)	34 (29.9 to 37.9)	34 (29.7 to 38)	33 (28.4 to 37.3)
Two doses					
0-13	45.6 (34.4 to 54.9)	46.3 (36.8 to 54.3)	47.2 (36.9 to 55.7)	47.6 (37.2 to 56.3)	48 (37.4 to 56.8)
≥14	56.4 (51.4 to 60.8)	54.4 (50.1 to 58.3)	56 (51.4 to 60.2)	55.6 (50.8 to 59.9)	54.5 (49.4 to 59)
CoronaVac					
One dose					
0-13	7.1 (-7.5 to 19.6)	1.9 (-10.5 to 12.9)	3.7 (-10.1 to 15.7)	2.4 (-12.1 to 15)	2.3 (-13.2 to 15.7)
≥14	19 (10.3 to 26.8)	16.1 (8.8 to 22.9)	18.9 (10.9 to 26.2)	20.6 (12.6 to 27.9)	15.9 (6.7 to 24.2)
Two doses					
0-13	33 (22.1 to 42.4)	28.1 (18.6 to 36.6)	26.5 (15.6 to 36)	29.2 (18.4 to 38.6)	26 (13.7 to 36.5)
≥14	39.5 (35.9 to 42.9)	39.1 (36 to 41.9)	39.4 (36 to 42.5)	39.6 (36.2 to 42.8)	37.8 (34 to 41.3)
Ad26.COV2.S					
One dose					
0-13	16.2 (-29.4 to 45.8)	-10.1 (-60.3 to 24.4)	9.5 (-37.4 to 40.3)	11 (-37 to 42.1)	10.8 (-39.3 to 42.9)
≥14	42.8 (29 to 53.9)	38.2 (25.8 to 48.5)	43.9 (31.4 to 54.1)	42.6 (29.5 to 53.3)	41.2 (27.3 to 52.4)

*Matching 1: ±5 days (sample collection date), ±5 years (age), exact matching: sex, city. 1:10 with replacement
 Matching 2: ±20 days (sample collection date), ±10 years (age), exact matching: sex, city. 1:10 with replacement
 Matching 3: ±10 days (sample collection date), ±5 years (age), exact matching: sex, city. 1:10 with replacement. Removed control tests of cases individuals
 Matching 4: ±10 days (sample collection date), ±5 years (age), exact matching: sex, city. 1:5 with replacement
 Matching 5: ±10 days (sample collection date), ±5 years (age), exact matching: sex, city. 1:5 without replacement

Table A7- Sensitivity analyses with different matching criteria*. Vaccine effectiveness against COVID-19 related hospitalisation or death

Vaccination status	Matching 1	Matching 2	Matching 3	Matching 4	Matching 5
BNT162b2					
One dose					
0-13	9.9 (-80 to 54.9)	30.7 (-28.4 to 62.6)	2.9 (-90.9 to 50.6)	14.8 (-74.6 to 58.4)	21.3 (-63.7 to 62.1)
≥14	64.8 (44.1 to 77.8)	64.6 (46.9 to 76.3)	62.2 (41.5 to 75.6)	61.2 (38.9 to 75.4)	66.5 (46.7 to 79)
Two doses					
0-13	100 (†)	100 (†)	100 (†)	100 (†)	100 (†)
≥14	89 (50.7 to 97.6)	90 (57 to 97.7)	89.7 (54 to 97.7)	86.5 (36 to 97.2)	89.1 (48.6 to 97.7)
ChAdOx1					
One dose					
0-13	-16 (-73.9 to 22.6)	-38.5 (-87.4 to -2.4)	-32.9 (-91 to 7.5)	-29.3 (-90.2 to 12.1)	-36.2 (-103.9 to 9)
≥14	61.5 (49.8 to 70.4)	61.3 (52.4 to 68.6)	57.2 (45.5 to 66.4)	57.3 (45.2 to 66.7)	58.5 (45.4 to 68.4)
Two doses					
0-13	71.4 (39.5 to 86.5)	73.7 (50.7 to 86)	71.7 (43.4 to 85.8)	74.2 (47 to 87.4)	72.3 (39.5 to 87.3)
≥14	91.4 (85 to 95.1)	88.7 (82.7 to 92.6)	89.9 (83.5 to 93.8)	89.1 (82 to 93.4)	91 (84.7 to 94.7)
CoronaVac					
One dose					
0-13	5.5 (-56.9 to 43)	10.8 (-33.4 to 40.3)	3.3 (-52.4 to 38.6)	2.1 (-57.6 to 39.1)	-8.8 (-88.6 to 37.3)
≥14	47 (22.3 to 63.8)	30.4 (7.6 to 47.5)	36.2 (9.4 to 55.1)	37.4 (10 to 56.5)	32.5 (-1.9 to 55.2)
Two doses					
0-13	72.5 (47.7 to 85.6)	56.7 (31.9 to 72.5)	61 (32.4 to 77.5)	65 (39.7 to 79.7)	63.6 (31.8 to 80.5)
≥14	83.3 (77.3 to 87.7)	78.8 (73.5 to 83.1)	81.4 (75.4 to 85.9)	80.8 (74.6 to 85.5)	81.9 (75.5 to 86.7)
Ad26.COV2.S					
One dose					
0-13	-37.2 (-791.4 to 78.9)	-43.3 (-783 to 76.7)	-14.2 (-571.7 to 80.6)	6 (-530.6 to 86)	0 (-516.9 to 83.8)
≥14	59.7 (-0.3 to 83.8)	55.2 (3.4 to 79.2)	58.7 (-0.4 to 83)	59.8 (-0.8 to 83.9)	62.8 (7.3 to 85.1)

*Matching 1: ±5 days (sample collection date), ±5 years (age), exact matching: sex, city. 1:10 with replacement
 Matching 2: ±20 days (sample collection date), ±10 years (age), exact matching: sex, city. 1:10 with replacement
 Matching 3: ±10 days (sample collection date), ±5 years (age), exact matching: sex, city. 1:10 with replacement. Removed control tests of cases individuals
 Matching 4: ±10 days (sample collection date), ±5 years (age), exact matching: sex, city. 1:5 with replacement
 Matching 5: ±10 days (sample collection date), ±5 years (age), exact matching: sex, city. 1:5 without replacement

† Confidence interval could not be estimated due to zero events in the group

Figure A1 Cumulative proportion of the population receiving each vaccine, by age group.

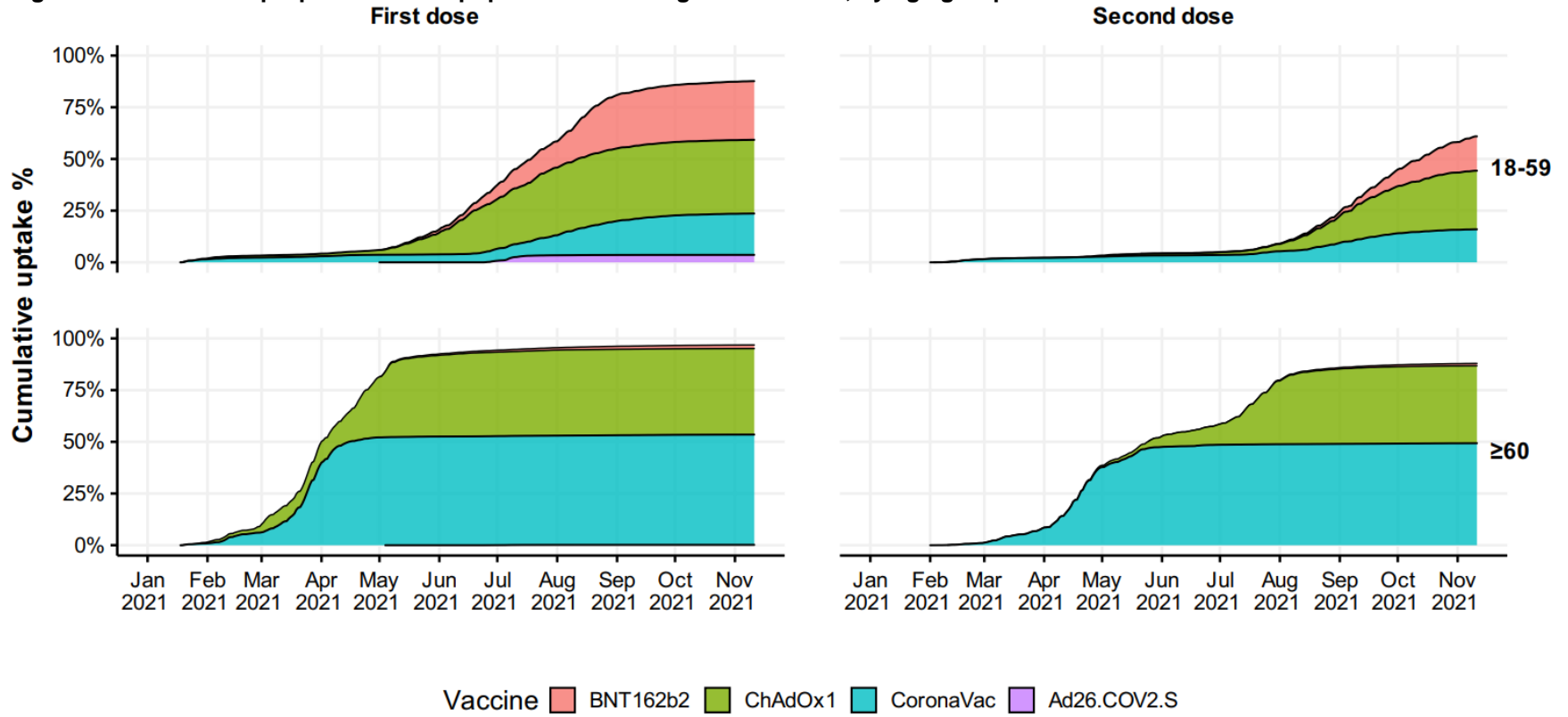


Figure A2. Prevalence of SARS-CoV-2 variants of concern in Brazil from January 01, 2021, to November, 30, 2021, stratified by region. Data obtained from the Fiocruz Genomic Network and GISAID.

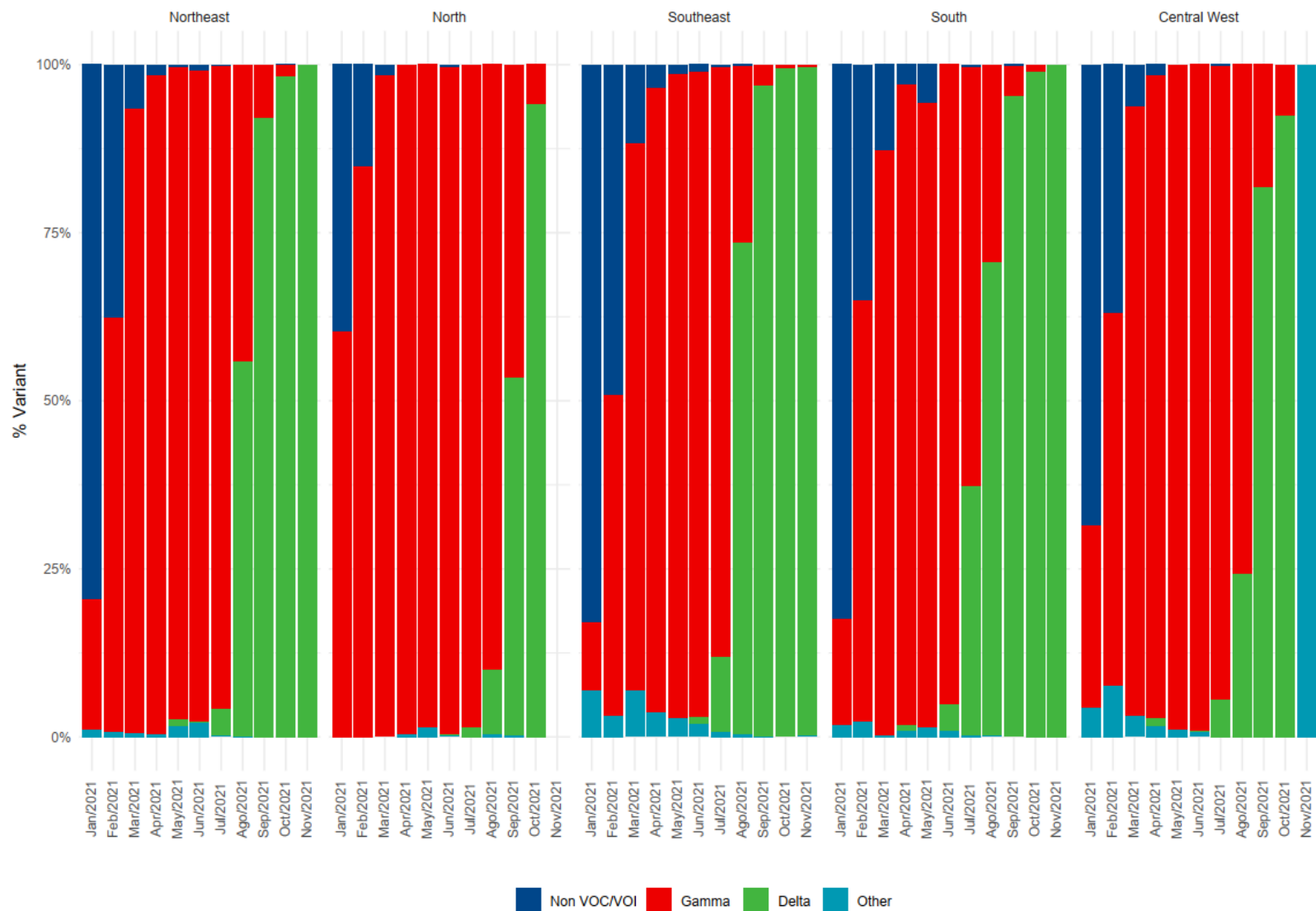


Figure A3. Time elapsed between the first (gray) or second (orange) dose and RT-PCR test among vaccinated people who had a prior SARS-CoV-2 infection. A dashed line is shown at 90 days.

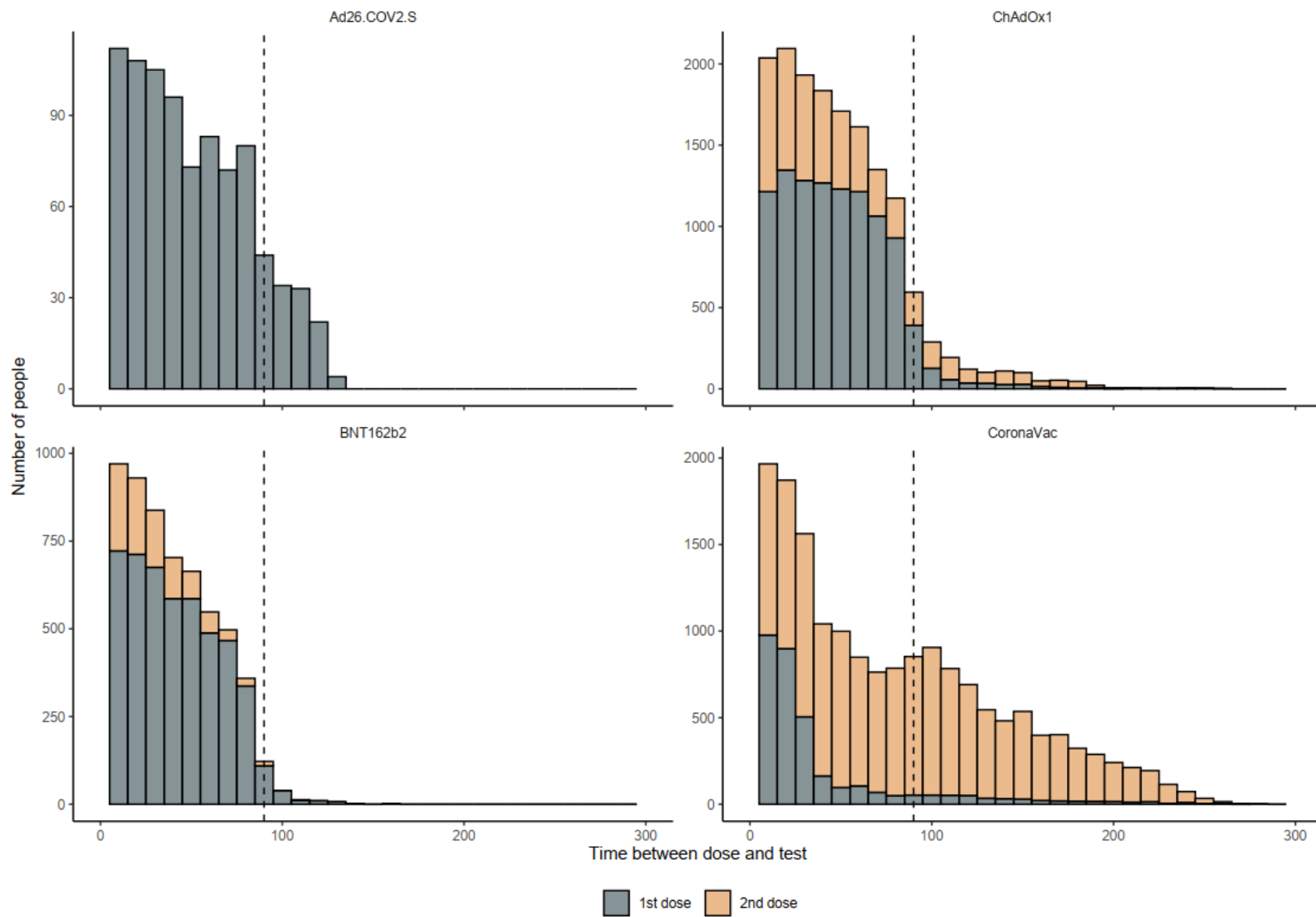


Figure A4. Number of enrolled discordant case-control pairs by date of RT-PCR testing during the study period between January 18 and November 11, 2021.

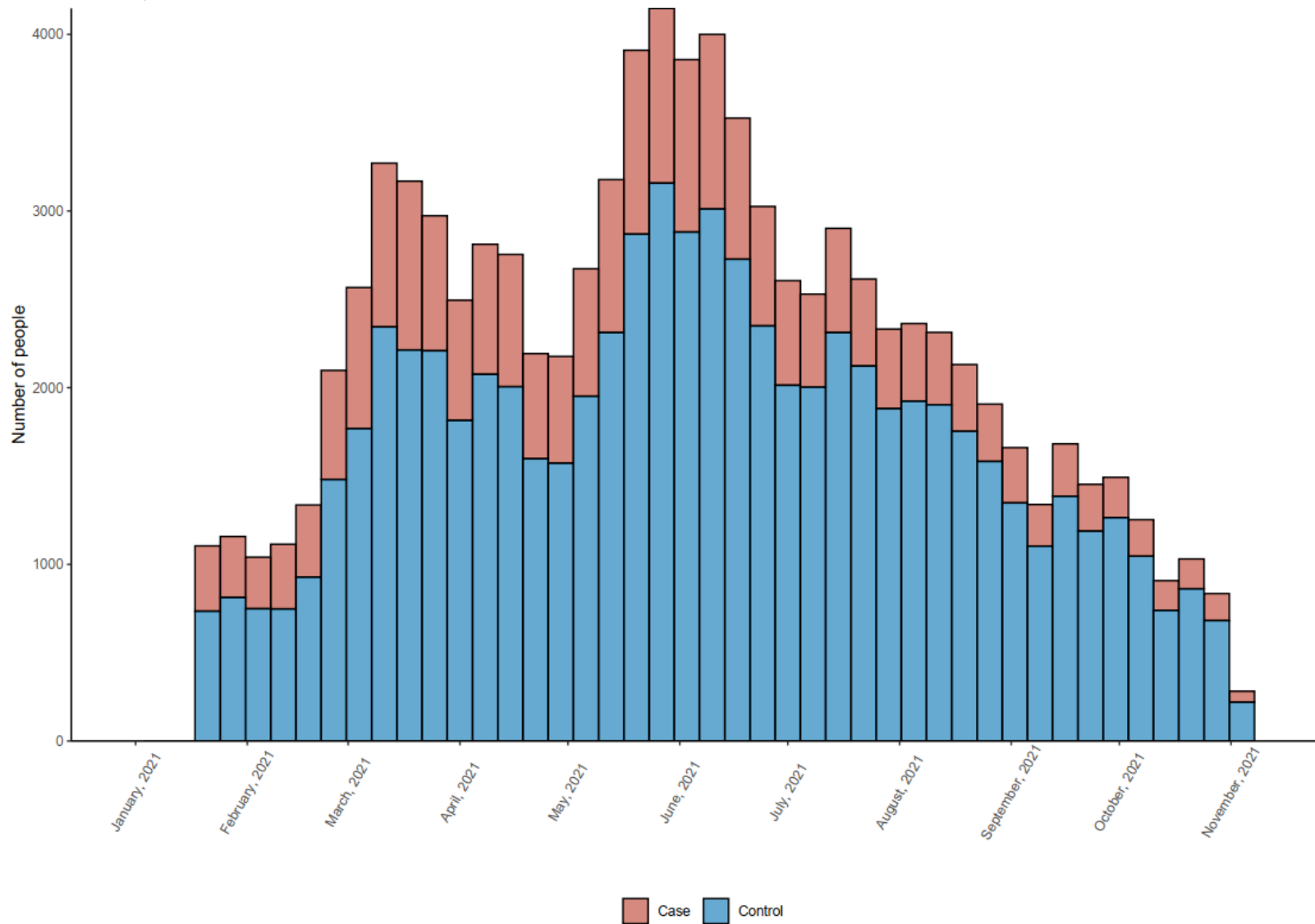
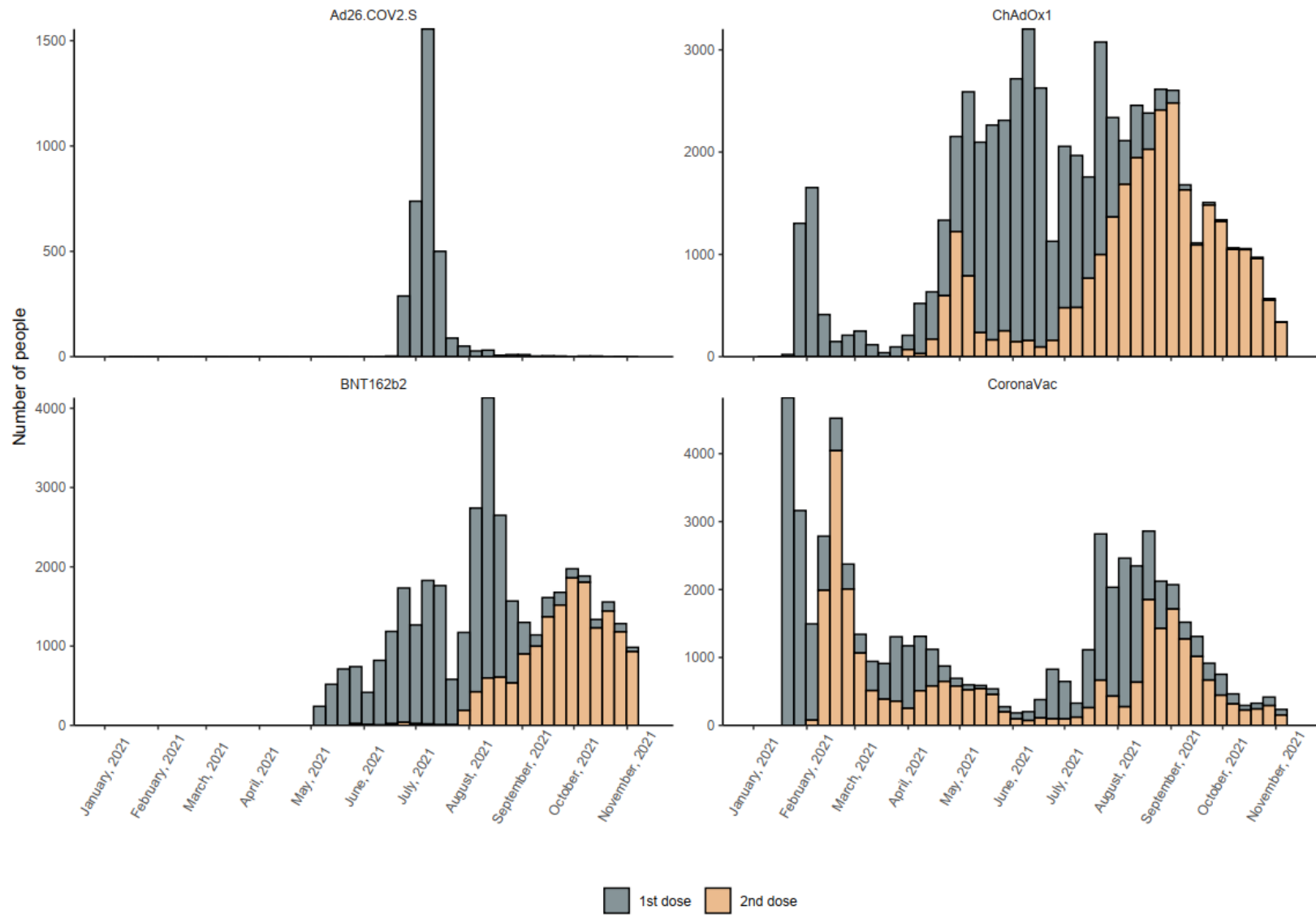


Figure A5. Week of vaccination for AD26.COV2.S, ChAdOx1, BNT162b2 and CoronaVac among matched participants.



Supplementary Information on Data Sources and Linkage

Data Sources

The Brazilian Ministry of Health Department of Informatics (DATASUS) provided unidentified datasets on the COVID-19 Vaccination Campaign (SI-PNI), Suspected Cases of Acute Respiratory Infection (e-SUS-Notifica), and Severe Acute Respiratory Infection/Illness (SIVEP-Gripe). A key-coded individual identification number present in each of the three datasets (paciente_id) was used to perform deterministic linkage, and then removed from the resulting dataset used in our analyses. No personally identifiable data was accessed at any stage. These sources have been used before separately (1 - 4), linked to other data (5 - 7) and linked among them (8 - 9). Additional and updated details follow.

SIVEP-Gripe, the national system for the registry of SARI (Severe Acute Respiratory Infection/Illness)-related hospitalisations and deaths created during the H1N1 pandemic in 2009, has also been used as a source for epidemiological studies (1,2). All COVID-19 related SARI hospitalisations and deaths (regardless of prior hospitalisation) are registered in this system. 2,054,000 cases were reported for 2020 and 2021 in the study database.

e-SUS-Notifica, is a nationwide online health surveillance information system for registering acute respiratory infections and suspected/confirmed cases of COVID-19. It has been used as a data source for epidemiological research before (3) and is the official source of information about COVID-19 infections. 59.6 million cases were reported in the study database.

SI-PNI is a data warehouse containing information on all vaccine doses administered by Brazilian public health services. Brazil has a large experience in national immunizations (4) and this data source has been widely used for research (5-7). All COVID-19 immunisations in Brazil are recorded in this database. The Ministry of Health (MoH) obtained all vaccine doses used in Brazil and offered them free to the population. Some vaccination sites were located in private institutions, but received the doses from the MoH; these private sites were required to use the national unified reporting system. We expect less than 0.5% of the study population to have been vaccinated outside of Brazil. 353 million COVID-19 doses were administered in Brazil and recorded in the study database.

Open versions of all datasets have been made available at: <https://opendatasus.saude.gov.br>.

Linkage

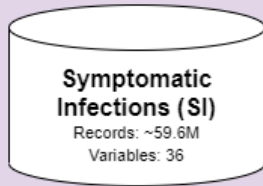
Records regarding the same person were identified in the database by a unique variable (paciente_id) provided by DATASUS, based on the official national identification numbers of the individual in Brazil, CPF and CNS. The taxpayer number (CPF) was established in 1968, and National Health System Number (CNS) was established in 2002 to include non-taxpayers in public health databases.

CNS collects information about full name, social name, mothers name, fathers name, gender, place of birth (city, state/province and country) date of birth, Brazilian indigenous ethnicity. We used patient_id as a deterministic key to link the records.

Over 99.9% of immunization records had valid information for date of birth, sex, municipality of residence and attending healthcare facility. To test the record consistency we tested the matching of three key variables for the people that were successfully linked with any other dataset, totalling 35.5 million records. The matching was of 97% for gender, 95% for place of birth (State) and 96% date of birth.

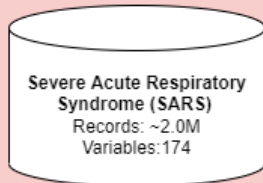
The Brazilian population in 2021 is estimated at 213.4 million individuals, 177 million of them are over 12 years old. We have identified 158.5 million individuals with at least one vaccine dose - 89.5% of the eligible population. This is compatible with the pace of the immunization campaign up to the study ending date - November 11th, 2021.

The flowchart of the linkage process is presented below



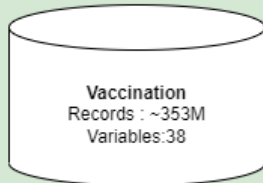
Rules applied to the records of the same person:

- The five most recent records, by register date, were considered.
- If two or more records were registered on the same day, the one with least null values on variables was considered.
- Data were transposed from long to wide, one line for each person, 3 sets of collums corresponding to each selected symptomatic infection event
- Results: ~41.4 million people had symptomatic infections in the period of the study



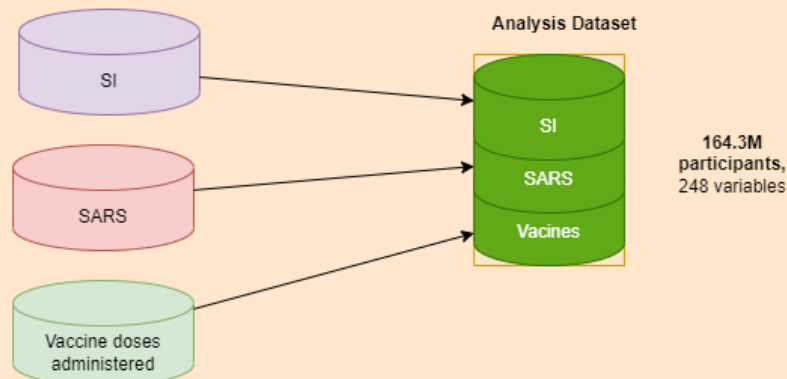
Rules applied to the records of the same person:

- The most recent two record of SARS were considered
- If two or more records were registered on the same day, the one with least null values on variables were considered.
- Results: 1.9 million people that had SARS in 2020 and 2021 were identified



Rules applied to the records of the same person:

- Duplicate vaccines administered to the same individual in the same day and healthcare facility were removed. The most recently updated record was considered
- Dataset remodeled from long to wide, considering the first dose record and up to one second dose record. Participantes with more than 3 doses were not included
- Total Vacinees: ~158.5M



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