Effectiveness and respiratory adverse events following inactivated and mRNA COVID-19 vaccines in patients with COPD and asthma: A Chinese population-based study

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Supplementary Table 1 ICD-9-CM codes for COPD, asthma, comorbidities, respiratory failure, and BNF codes for medications

ICD-9-CM codes	BNF codes

Study cohort

COPD	490, 491, 492, 494, 495, 496	-
Asthma	493	-
Respiratory failure	518.81-518.84	-
Bronchodilators	-	3.1
Corticosteroids (respiratory)	-	3.2

Comorbidities

Heart failure	398.91, 402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, 428	-
Hypertension	401-405, 437.2	-
Diabetes	250	-
Stroke	430-438	-
IHD	410-414	-
PVD	441, 443.9, V43.4	-
Atrial fibrillation	427.3, 427.4	-
Renal failure	580-589	-
Ulcer disease	531-534	-
Liver disease	570-573, 456.0, 456.1, 456.2	-
Hip fracture	820	-
Parkinson disease	332.0	-

Medications

Diuretics	-	2.2
Anti-arrhythmic drugs	-	2.3
Beta-blockers	-	2.4
Hypertension and heart failure drugs	-	2.5
Calcium channel blockers, nitrates	-	2.6
Anticoagulants	-	2.8
Antiplatelet drugs	-	2.9
Stable angina, ACS drugs	-	2.10
Lipid-lowering drugs	-	2.12
Antihistamines	-	3.4
Antipsychotics drugs	-	4.2
Antidepressant drugs	-	4.3
Antiepileptic drugs	-	4.8
Anti-Parkinson drugs	-	4.9
Anti-dementia drugs	-	4.11
Antibiotics	-	5.1
Antiviral	-	5.3
Antidiabetic drugs	-	6.1
Systematic steroids	-	6.3.2

Abbreviations: ICD: international coding disease; COPD: chronic obstructive pulmonary disease; BNF: British National formula; IHD: Ischaemic heart disease; PVD: peripheral vascular disease; ACS: acute coronary syndrome

Supplementary Table 2 Vaccine effectiveness of fourth doses of CoronaVac and BNT162b2 compared to non-vaccination on COVID-related death, hospitalisation, and severe complications

	Total number of people	Number of events	IPTW-adjusted HR (95% CI)	VE (95% CI)
COVID-related mortality				
Unvaccinated	24624	1077 (4.37)	1.00	1.00
CoronaVac	10563	4 (0.04)	0.03 (0.008, 0.1)	99.7% (90%, 99.92%)
BNT162b2	6709	0	NA	NA
C-C-B-B	2344	1 (0.04)	0.02 (0.008, 0.07)	99.8% (99.3%, 99.92%)
B-B-C-C	64	0	NA	NA
B-B-C-B	29	0	NA	NA
C-C-B-C	398	0	NA	NA
C-C-C-B	677	0	NA	NA
B-B-B-C	133	1 (0.75)	0.83 (0.50, 1.39)	17% (-39%, 50%)
COVID-related hospitalisation				
Unvaccinated	24624	1953 (7.93)	1.00	1.00
CoronaVac	10563	159 (1.51)	0.58 (0.47, 0.72)	42% (28%, 53%)
BNT162b2	6709	67 (1.00)	0.42 (0.34, 0.53)	58% (47%, 66%)
C-C-B-B	2344	19 (0.81)	0.28 (0.22, 0.36)	72% (64%, 78%)
B-B-C-C	64	1 (1.56)	0.72 (0.44, 1.18)	28% (-18%, 56%)
B-B-C-B	29	1 (3.45)	1.32 (0.81, 2.16)	-32% (-116%, 19%)
C-C-B-C	398	7 (1.76)	0.65 (0.53, 0.81)	35% (19%, 47%)
C-C-C-B	677	10 (1.48)	0.43 (0.34, 0.53)	57% (47%, 66%)
B-B-B-C	133	1 (0.75)	0.33 (0.20, 0.54)	67% (46%, 80%)
COVID-related severe complications				
Unvaccinated	24624	165 (0.67)	1.00	1.00
CoronaVac	10563	4 (0.04)	0.18 (0.05, 0.73)	82% (27%, 99.5%)
BNT162b2	6709	2 (0.03)	0.75 (0.37, 1.52)	25% (-52%, 63%)
C-C-B-B	2344	0	NA	NA
B-B-C-C	64	0	NA	NA
B-B-C-B	29	0	NA	NA
C-C-B-C	398	0	NA	NA
C-C-C-B	677	1 (0.15)	0.88 (0.48, 1.59)	12% (-59%, 52%)
B-B-B-C	133	1 (0.75)	1.02 (0.88, 1.38)	-2% (-38%, 12%)

Abbreviations: C-C-B-B: CoronaVac- CoronaVac-BNT162b2-BNT162b2; B-B-C-C: BNT162b2-BNT162b2- CoronaVac- CoronaVac; B-B-C-B: BNT162b2-BNT162b2- CoronaVac-bnt162B2; C-C-B-C: CoronaVac-CoronaVac-BNT162b2-CoronaVac; C-C-C-B: CoronaVac- CoronaVac- CoronaVac-BNT162b2; B-B-B-C: BNT162b2-BNT162b2-BNT162b2- CoronaVac.

Supplementary Table 3 Subgroup analysis for estimating the association of 28-day respiratory exacerbation after CoronaVac vaccination

	Number of events	Total person-years	Incidence rate (95% CI)/person-years)	Adjusted IRR (95% CI)
Male				
Baseline period	3634	6352.35	0.57 (0.56, 0.58)	1.00
First dose				
Day 0-28	86	171.68	0.50 (0.43, 0.58)	1.15 (0.92, 1.44)
Day 0-7	28	49.30	0.57 (0.45, 0.72)	1.30 (0.89, 1.91)
Day 8-28	58	122.37	0.47 (0.39, 0.57)	1.08 (0.83, 1.42)
Second dose				

Day **0**-28	73	162.48	0.45 (0.38, 0.53)	1.03 (0.80, 1.31)
Day **0**-7	23	46.52	0.49 (0.37, 0.66)	1.13 (0.75, 1.72)
Day 8-28	50	115.95	0.43 (0.35, 0.53)	0.98 (0.74, 1.31)
Third dose				
Day **0**-28	59	134.37	0.44 (0.36, 0.53)	1.1 (0.84, 1.50)
Day **0**-7	10	38.83	0.26 (0.15, 0.44)	0.67 (0.36, 1.25)
Day 8-28	49	95.54	0.51 (0.42, 0.62)	1.32 (0.97, 1.80)
Fourth dose				
Day **0**-28	11	22.00	0.50 (0.33, 0.76)	1.33 (0.88, 1.78)
Day **0**-7	2	6.57	0.30 (0.10, 0.97)	1.46 (0.36, 5.83)
Day 8-28	9	15.43	0.58 (0.38, 0.89)	1.17 (0.91, 1.43)
Female				
Baseline period	2031	3599.51	0.56 (0.55, 0.58)	1.00
First dose				
Day 0-28	36	104.38	0.34 (0.26, 0.45)	0.72 (0.51, 1.02)
Day 0-7	6	30.04	0.20 (0.10, 0.41)	0.42 (0.19, 0.95)
Day 8-28	30	74.34	0.40 (0.31, 0.53)	0.85 (0.58, 1.23)
Second dose				
Day 0-28	39	100.84	0.39 (0.30, 0.49)	0.79 (0.56, 1.09)
Day 0-7	12	28.89	0.42 (0.27, 0.64)	0.85 (0.48, 1.50)
Day 8-28	27	71.95	0.38 (0.28, 0.51)	0.77 (0.52, 1.14)
Third dose				
Day 0-28	35	82.73	0.42 (0.33, 0.54)	0.92 (0.64, 1.32)
Day 0-7	9	23.91	0.38 (0.22 0.63)	0.83 (0.43, 1.62)
Day 8-28	26	58.82	0.44 (0.33, 0.59)	097 (0.64, 1.45)
Fourth dose				
Day **0**-28	4	12.17	0.33 (0.15, 0.73)	0.73 (0.25, 2.19)
Day **0**-7	1	3.67	0.27 (0.05, 1.45)	0.65 (0.09, 4.67)
Day 8-28	3	8.49	0.35 (0.14, 0.88)	0.83 (0.23, 2.94)
Age<65				
Baseline period	878	1516.60	0.58 (0.55, 0.60)	1.00
First dose				
Day 0-28	29	56.87	0.51 (0.40, 0.66)	1.23 (0.83, 1.81)
Day 0-7	11	16.25	0.68 (0.48, 0.95)	1.62 (0.88, 2.96)
Day 8-28	18	40.62	0.44 (0.31, 0.63)	1.06 (0.65, 1.72)
Second dose				
Day 0-28	19	55.84	0.34 (0.24, 0.49)	0.82 (0.51, 1.32)
Day 0-7	8	15.97	0.50 (0.31, 0.82)	1.21 (0.59, 2.45)
Day 8-28	11	39.87	0.28 (0.17, 0.46)	0.66 (0.36, 1.21)
Third dose				
Day 0-28	24	48.94	0.49 (0.37, 0.65)	1.35 (0.86, 2.11)
Day 0-7	3	14.09	0.21 (0.08, 0.58)	0.59 (0.19, 1.86)
Day 8-28	21	34.84	0.60 (0.46, 0.79)	1.68 (0.88, 2.48)
Fourth dose				
Day 0-28	1	6.34	0.16 (0.03, 0.95)	1.44 (0.15, 13.50)
Day 0-7	1	1.86	0.54 (0.14, 2.04)	5.69 (0.61, 52.81)
Day 8-28	0	NA	NA	NA
Age ≥ 65				
Baseline period	4787	8335.26	0.57 (0.56, 0.59)	1.00
First dose				

Day 0-28	93	219.19	0.42 (0.36, 0.50)	0.92 (0.74, 1.14)
Day 0-7	23	63.09	0.36 (0.26, 0.50)	0.79 (0.52, 1.20)
Day 8-28	70	156.10	0.45 (0.38, 0.53)	0.97 (0.76, 1.24)
Second dose				
Day 0-28	93	207.48	0.45 (0.39, 0.52)	0.95 (0.77, 1.19)
Day 0-7	27	59.44	0.45 (0.34, 0.60)	0.97 (0.66, 1.43)
Day 8-28	66	148.03	0.45 (0.37, 0.53)	0.95 (0.74, 1.22)
Third dose				
Day 0-28	70	168.16	0.42 (0.35, 0.50)	0.96 (0.74, 1.24)
Day 0-7	16	48.65	0.33 (0.22, 0.49)	0.77 (0.47, 1.27)
Day 8-28	54	78.13	0.69 (0.60, 0.80)	1.05 (0.79, 1.40)
Fourth dose				
Day 0-28	14	27.83	0.50 (0.35, 0.73)	1.54 (0.81, 2.91)
Day 0-7	2	8.38	0.24 (0.07, 0.80)	0.77 (0.20, 2.96)
Day 8-28	12	19.44	0.62 (0.43, 0.88)	1.98 (0.99, 3.93)
People with COPD				
Baseline period	3078	5353.59	0.57 (0.56, 0.59)	1.00
First dose				
Day 0-28	57	135.36	0.42 (0.35, 0.51)	1.02 (0.77, 1.34)
Day 0-7	11	38.95	0.28 (0.17, 0.47)	0.68 (0.38, 1.25)
Day 8-28	46	96.40	0.48 (0.39, 0.59)	1.15 (0.85, 1.56)
Second dose				
Day 0-28	58	128.19	0.45 (0.37, 0.55)	1.09 (0.82, 1.44)
Day 0-7	15	36.68	0.41 (0.28, 0.60)	0.99 (0.59, 1.66)
Day 8-28	43	91.50	0.47 (0.38, 0.58)	1.12 (0.82, 1.54)
Third dose				
Day 0-28	39	102.52	0.38 (0.30, 0.49)	0.95 (0.66, 1.38)
Day 0-7	6	29.68	0.20 (0.10, 0.41)	0.52 (0.23, 1.15)
Day 8-28	33	72.84	0.45 (0.35, 0.58)	1.16 (0.79, 1.72)
Fourth dose				
Day 0-28	6	16.11	0.37 (0.20, 0.70)	1.49 (0.53, 4.17)
Day 0-7	0	NA	NA	NA
Day 8-28	6	11.17	0.54 (0.31, 0.93)	2.09 (0.75, 5.83)
People with asthma				
Baseline period	1030	1786.81	0.58 (0.55, 0.60)	1.00
First dose				
Day 0-28	24	56.06	0.43 (0.32, 0.58)	1.14 (0.74, 1.76)
Day 0-7	8	16.08	0.50 (0.30, 0.81)	1.32 (0.65, 2.68)
Day 8-28	16	39.98	0.40 (0.27, 0.58)	1.06 (0.63, 1.78)
Second dose				
Day 0-28	23	53.98	0.43 (0.31, 0.58)	1.09 (0.71, 1.68)
Day 0-7	10	15.47	0.65 (0.45, 0.93)	1.65 (0.87, 3.14)
Day 8-28	13	38.50	0.34 (0.22, 0.53)	0.86 (0.49, 1.49)
Third dose				
Day 0-28	20	45.12	0.44 (0.32, 0.61)	1.21 (0.73, 1.99)
Day 0-7	6	13.05	0.46 (0.26, 0.83)	1.28 (0.55, 2.93)
Day 8-28	14	32.07	0.44 (0.29, 0.65)	1.20 (0.68, 2.13)
Fourth dose				
Day 0-28	3	6.56	0.46 (0.20, 1.05)	1.65 (0.48, 5.72)
Day 0-7	1	1.94	0.52 (0.13, 2.02)	1.98 (0.23, 16.93)

Day 8-28	2	4.62	0.43 (0.15, 1.23)	1.48 (0.37, 5.81)

Abbreviations: N, number; IRR, incidence rate ratio; CI, confidence interval; NA, non-applicable

Supplementary Table 4 Subgroup analysis for estimating the association of 28-day respiratory exacerbation after BNT162b2 vaccination[1]

	Number of events	Total person-years	Incidence rate (95% CI)/person-years)	Adjusted IRR (95% CI)
Male				
Baseline period	2673	4714.95	0.57 (0.55, 0.58)	1.00
First dose				
Day 0-28	39	75.29	0.52 (0.42, 0.64)	1.06 (0.77, 1.47)
Day 0-7	9	26.17	0.34 (0.20, 0.58)	0.70 (0.36, 1.37)
Day 8-28	30	49.12	0.61 (0.49, 0.76)	1.25 (0.87, 1.81)
Second dose				
Day 0-28	51	88.96	0.57 (0.48, 0.69)	1.17 (0.88, 1.57)
Day 0-7	13	25.44	0.51 (0.35, 0.75)	1.05 (0.60, 1.82)
Day 8-28	38	63.52	0.60 (0.49, 0.73)	1.21 (0.87, 1.69)
Third dose				
Day 0-28	35	77.05	0.45 (0.36, 0.58)	1.07 (0.74, 1.54)
Day 0-7	9	22.08	0.41 (0.25, 0.67)	0.97 (0.49, 1.90)
Day 8-28	26	54.97	0.47 (0.36, 0.63)	1.11 (0.74, 1.67)
Fourth dose				
Day 0-28	7	12.50	0.56 (0.34, 0.92)	1.53 (0.69, 3.39)
Day 0-7	4	3.66	1.09 (0.91, 1.17)	2.11 (0.88, 3.34)
Day 8-28	3	8.84	0.34 (0.14, 0.85)	1.05 (0.35, 3.19)
Female				
Baseline period	1595	2789.94	0.57 (0.55, 0.59)	1.00
First dose				
Day 0-28	26	58.04	0.45 (0.34, 0.60)	0.94 (0.63, 1.40)
Day 0-7	10	20.00	0.50 (0.32, 0.78)	1.05 (0.56, 1.97)
Day 8-28	16	38.05	0.42 (0.29, 0.61)	0.88 (0.53, 1.44)
Second dose				
Day 0-28	42	68.33	0.61 (0.51, 0.74)	1.28 (0.93, 1.77)
Day 0-7	11	19.54	0.56 (0.38, 0.83)	1.17 (0.64, 2.14)
Day 8-28	31	48.79	0.64 (0.51, 0.79)	1.32 (0.91, 1.91)
Third dose				
Day 0-28	21	60.43	0.35 (0.25, 0.49)	0.86 (0.55, 1.33)
Day 0-7	7	17.35	0.40 (0.23, 0.71)	0.99 (0.46, 2.11)
Day 8-28	14	43.08	0.32 (0.21, 0.50)	0.80 (0.47, 1.36)
Fourth dose				
Day 0-28				NA
Day 0-7	0	NA	NA	NA
Day 8-28	0	NA	NA	NA
Age<65years				
Baseline period	1171	2061.14	0.57 (0.55, 0.59)	1.00
First dose				
Day 0-28	34	68.72	0.49 (0.39, 0.63)	1.03 (0.73, 1.46)
Day 0-7	12	23.76	0.51 (0.34, 0.75)	1.05 (0.59, 1.87)
Day 8-28	22	44.96	0.49 (0.36, 0.66)	1.02 (0.67, 1.56)
Second dose				
Day 0-28	58	82.05	0.71 (0.61, 0.81)	1.44 (0.75, 2.13)
Day 0-7	14	23.46	0.60 (0.43, 0.83)	1.24 (0.73, 2.11)

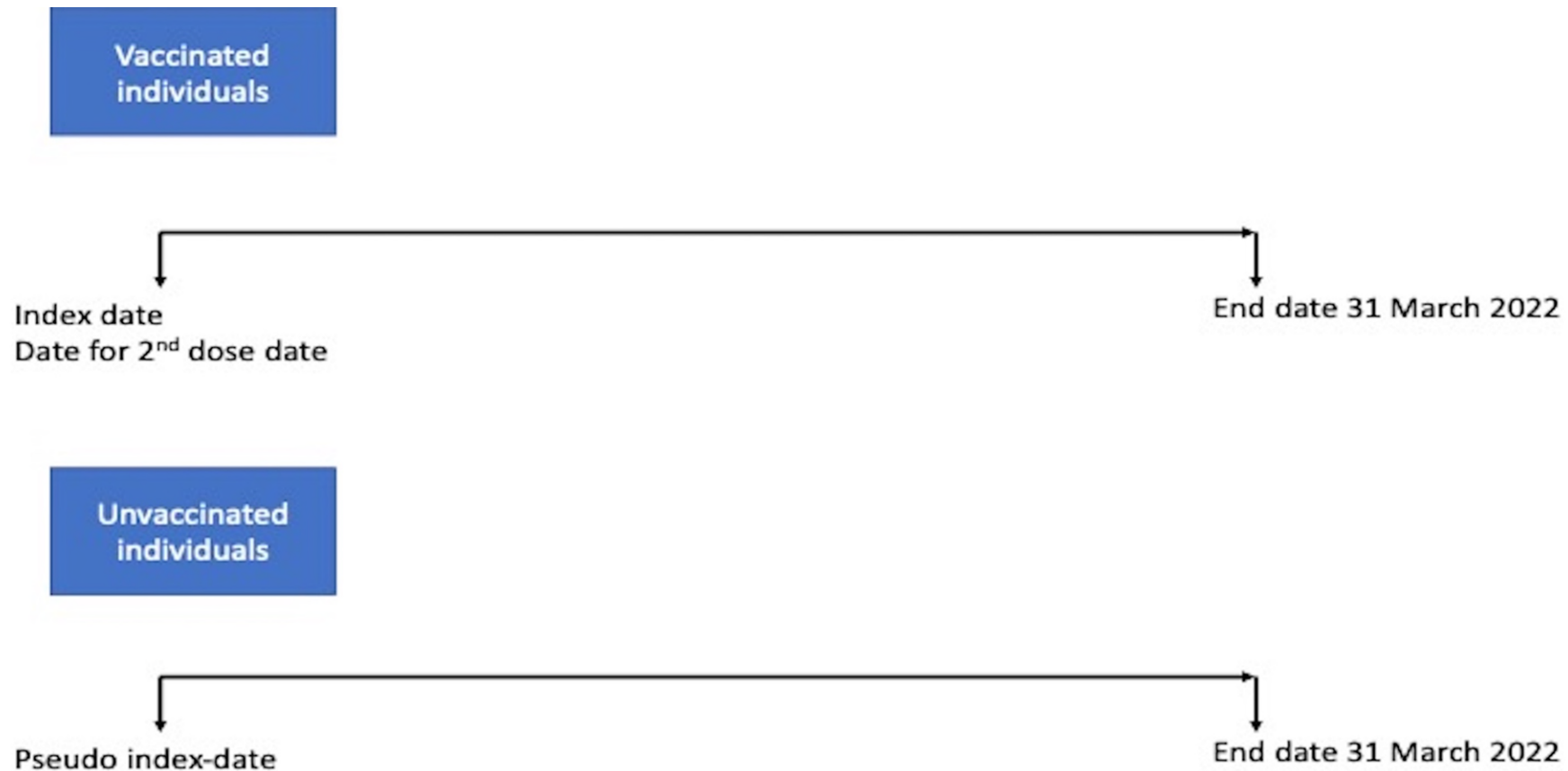|	N		IRR (95% CI)	IRR (95% CI)
Day 8-28	44	58.59	0.74 (0.65, 0.87)	1.55 (0.78, 2.32)
Third dose				
Day 0-28	28	73.79	0.38 (0.28, 0.51)	0.90 (0.61, 1.33)
Day 0-7	10	21.13	0.47 (0.30, 0.74)	1.12 (0.58, 2.13)
Day 8-28	18	52.65	0.34 (0.24, 0.50)	0.80 (0.50, 1.29)
Fourth dose				
Day 0-28	3	6.49	0.46 (0.20, 1.06)	1.53 (0.41, 5.80)
Day 0-7	2	1.90	1.05 (0.92, 1.18)	3.43 (0.67, 17.68)
Day 8-28	1	4.58	0.22 (0.04, 1.24)	0.66 (0.10, 4.66)
Age ≥ 65years				
Baseline period	3097	5443.75	0.57 (0.56, 0.58)	1.00
First dose				
Day 0-28				0.98 (0.68, 1.41)
Day 0-7	7	22.41	0.31 (0.17, 0.58)	0.64 (0.30, 1.36)
Day 8-28	24	42.21	0.57 (0.44, 0.74)	1.16 (0.77, 1.75)
Second dose				
Day 0-28				0.94 (0.66, 1.34)
Day 0-7	10	21.52	0.46 (0.30, 0.73)	0.95 (0.50, 1.78)
Day 8-28	25	53.72	0.47 (0.35, 0.62)	0.94 (0.63, 1.41)
Third dose				
Day 0-28				1.06 (0.71, 1.58)
Day 0-7	6	18.30	0.33 (0.17, 0.63)	0.80 (0.35, 1.80)
Day 8-28	22	45.39	0.48 (0.36, 0.65)	1.17 (0.75, 1.82)
Fourth dose				
Day 0-28				0.86 (0.31, 2.36)
Day 0-7	2	3.64	0.55 (0.22, 1.39)	1.58 (0.42, 5.88)
Day 8-28	2	8.67	0.23 (0.07, 0.78)	0.74 (0.18, 3.00)
People with COPD				
Baseline period	2031	3587.39	0.57 (0.55, 0.58)	1.00
First dose				
Day 0-28	22	41.08	0.54 (0.40, 0.71)	1.23 (0.79, 1.91)
Day 0-7	7	14.13	0.50 (0.29, 0.84)	1.15 (0.54, 2.44)
Day 8-28	15	26.95	0.56 (0.40, 0.78)	1.27 (0.75, 2.14)
Second dose				
Day 0-28	29	47.62	0.56 (0.49, 0.76)	1.41 (0.95, 2.08)
Day 0-7	6	13.62	0.44 (0.24, 0.80)	1.02 (0.45, 2.30)
Day 8-28	23	34.00	0.68 (0.54, 0.85)	1.55 (0.98, 2.41)
Third dose				
Day 0-28	15	39.71	0.38 (0.25, 0.56)	1.00 (0.57, 1.73)
Day 0-7	6	11.38	0.57 (0.30, 0.91)	1.39 (0.60, 3.24)
Day 8-28	9	28.33	0.32 (0.19, 0.54)	0.83 (0.42, 1.63)
Fourth dose				
Day 0-28	4	5.89	0.68 (0.39, 1.18)	3.11 (0.89, 10.81)
Day 0-7	3	1.79	1.68 (1.25, 2.11)	8.54 (0.77, 16.31)
Day 8-28	1	4.10	0.24 (0.04, 1.34)	1.49 (0.20, 11.28)

[1] No cases after 28 days following each dose in the asthma group. Abbreviations: N, number; IRR, incidence rate ratio; CI, confidence interval; NA, non-applicable.

Supplementary Table 5 Subgroup analysis for the association of two doses of CoronaVac and BNT162b2 on the risk of COVID-related mortality, COVID-related hospitalisation, and COVID-related severe complications

	Total number of people	Number of events	IPTW-adjusted HR (95% CI)	VE (95% CI)
COVID-related mortality				
Male				
Unvaccinated	12938	685 (5.29)	1.00	1.00
CoronaVac	51774	232 (0.45)	0.23 (0.19, 0.27)	77% (73%, 81%)
BNT162b2	38502	51 (0.13)	0.09 (0.07, 0.11)	91% (89%, 93%)
Female				
Unvaccinated	11686	431 (3.69)	1.00	1.00
CoronaVac	56649	159 (0.28)	0.18 (0.15, 0.22)	82% (78%, 85%)
BNT162b2	44821	12 (0.03)	0.03 (0.02, 0.05)	97% (95%, 98%)
Age<65				
Unvaccinated	10190	64 (0.63)	1.00	1.00
CoronaVac	51684	26 (0.05)	0.23 (0.14, 0.36)	77% (64%, 86%)
BNT162b2	60265	12 (0.02)	0.09 (0.05, 0.17)	91% (83%, 95%)
Age ≥ 65				
Unvaccinated	14434	1052 (7.29)	1.00	1.00
CoronaVac	56739	365 (0.64)	0.25 (0.22, 0.29)	75% (71%, 78%)
BNT162b2	23058	51 (0.22)	0.08 (0.07, 0,10)	92% (90%, 93%)
People with COPD				
Unvaccinated	3399	252 (7.41)	1.00	1.00
CoronaVac	12344	83 (0.67)	0.26 (0.19, 0.36)	74% (64%, 81%)
BNT162b2	4451	11 (0.25)	0.10 (0.06, 0.15)	90% (85%, 94%)
People with asthma				
Unvaccinated	2467	57 (2.31)	1.00	1.00
CoronaVac	11640	21 (0.18)	0.19 (0.10, 0.34)	81% (66%, 90%)
BNT162b2	9467	6 (0.06)	0.11 (0.06, 0.21)	89% (79%, 94%)
Respiratory failure				
Unvaccinated	1443	122 (8.45)	1.00	1.00
CoronaVac	3021	29 (0.96)	0.31 (0.19, 0.51)	69% (49%, 81%)
BNT162b2	1231	6 (0.49)	0.15 (0.08, 0.27)	85% (73%, 92%)
COVID-related hospitalisation				
Male				
Unvaccinated	12938	1125 (8.70)	1.00	1.00
CoronaVac	51774	2155 (4.16)	0.91 (0.88, 0.94)	9% (6%, 12%)
BNT162b2	38502	806 (2.09)	0.62 (0.58, 0.67)	38% (33%, 42%)
Female				
Unvaccinated	11686	828 (7.09)	1.00	1.00
CoronaVac	56649	1720 (3.40)	0.90 (0.81, 0.99)	10% (1%, 19%)
BNT162b2	44821	628 (1.40)	0.56 (0.52, 0.61)	44% (39%, 48%)
Age<65				
Unvaccinated	10190	248 (2.43)	1.00	1.00
CoronaVac	51684	884 (1.71)	0.91 (0.72, 1.12)	9% (-12%, 28%)
BNT162b2	60265	657 (1.09)	0.90 (0.88, 0.92)	10% (8%, 12%)
Age ≥ 65				
Unvaccinated	14434	1705 (11.80)	1.00	1.00

	N	Events (%)	HR (95% CI)	VE (95% CI)
CoronaVac	56739	2991 (5.27)	0.72 (0.62, 0.83)	28% (17%, 38%)
BNT162b2	23058	777 (3.37)	0.67 (0.62, 0.71)	33% (29%, 38%)
People with COPD				
Unvaccinated	3399	422 (12.42)	1.00	1.00
CoronaVac	12344	723 (5.86)	0.73 (0.69, 0.80)	27% (20%, 31%)
BNT162b2	4451	150 (3.37)	0.67 (0.58 0.77)	33% (23%, 42%)
People with asthma				
Unvaccinated	2467	137 (5.55)	1.00	1.00
CoronaVac	11640	349 (3.00)	0.82 (0.70, 0.96)	18% (4%, 30%)
BNT162b2	9467	147 (1.55)	0.71 (0.58, 0.86)	29% (14%, 44%)
Respiratory failure				
Unvaccinated	1443	194 (13.44)	1.00	1.00
CoronaVac	3021	212 (7.02)	0.78 (0.65, 0.91)	22% (9%, 55%)
BNT162b2	1231	56 (4.55)	0.72 (0.56, 0.92)	28% (8%, 44%)
COVID-related severe complications				
Male				
Unvaccinated	12938	109 (0.84)	1.00	1.00
CoronaVac	51774	129 (0.25)	0.71 (0.55, 0.92)	29% (8%, 45%)
BNT162b2	38502	45 (0.12)	0.38 (0.28, 0.51)	62% (49%, 72%)
Female				
Unvaccinated	11686	56 (0.48)	1.00	1.00
CoronaVac	56649	54 (0.10)	0.57 (0.38, 0.86)	43% (14%, 72%)
BNT162b2	44821	16 (12.7)	0.33 (0.22, 0.52)	67% (48%, 78%)
Age<65				
Unvaccinated	10190	23 (0.23)	1.00	1.00
CoronaVac	51684	36 (0.07)	0.83 (0.72, 0.94)	17% (6%, 28%)
BNT162b2	60265	24 (0.04)	0.53 (0.33, 0.85)	47% (15%, 67%)
Age ≥ 65				
Unvaccinated	14434	142 (0.98)	1.00	1.00
CoronaVac	56739	147 (0.26)	0.73 (0.57, 0.95)	27% (5%, 43%)
BNT162b2	23058	37 (0.16)	0.42 (0.32, 0.56)	58% (44%, 68%)
People with COPD				
Unvaccinated	3399	29 (0.85)	1.00	1.00
CoronaVac	12344	31 (0.25)	0.70 (0.51, 0.89)	30% (11%, 49%)
BNT162b2	4451	11 (0.25)	0.67 (0.39, 0.91)	33% (9%, 61%)
People with asthma				
Unvaccinated	2467	13 (0.53)	1.00	1.00
CoronaVac	11640	11 (0.09)	0.43 (0.19, 0.99)	67% (1%, 81%)
BNT162b2	9467	5 (0.05)	0.21 (0.08, 0.58)	79% (42%, 92%)
Respiratory failure				
Unvaccinated	1443	25 (1.73)	1.00	1.00
CoronaVac	3021	8 (0.26)	0.41 (0.16, 0.67)	59% (33%, 84%)
BNT162b2	1231	5 (0.41)	0.54 (0.24, 0.86)	46% (14%, 76%)

Abbreviations: N, number; IPTW, inverse probability treatment weight; HR, hazard ratio; VE, vaccine effectiveness; CI, confidence interval; COPD, chronic obstructive pulmonary disease; COVID, coronavirus disease; NA, non-applicable.

Supplementary Figure 1: Study design for the cohort study.[1]

[1]Pseudo index date for unvaccinated individuals is defined as follows: Randomly selected unvaccinated individuals with the same age and sex were matched to each vaccinated individual, assigning the second dose vaccination date from vaccinated individuals to matched unvaccinated individuals, serving as the pseudo-index date for the unvaccinated individuals. People with COPD and asthma were defined before the index date for vaccinated individuals and the pseudo-index date for unvaccinated individuals. People in the unvaccinated individuals who died before the pseudo-index date were excluded.