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Infectious Diseases

Supplementary appendix

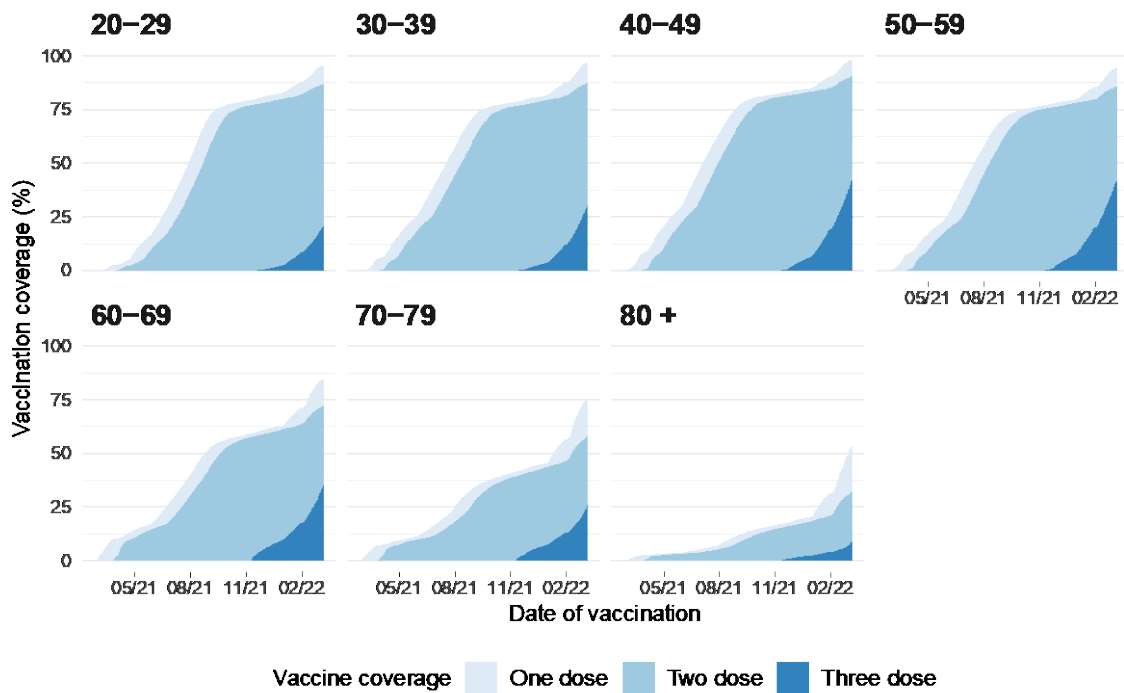
This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

Supplement to: McMenamin ME, Nealon J, Lin Y, et al. Vaccine effectiveness of one, two, and three doses of BNT162b2 and CoronaVac against COVID-19 in Hong Kong: a population-based observational study. *Lancet Infect Dis* 2022; published online July 15. [https://doi.org/10.1016/S1473-3099\(22\)00345-0](https://doi.org/10.1016/S1473-3099(22)00345-0).

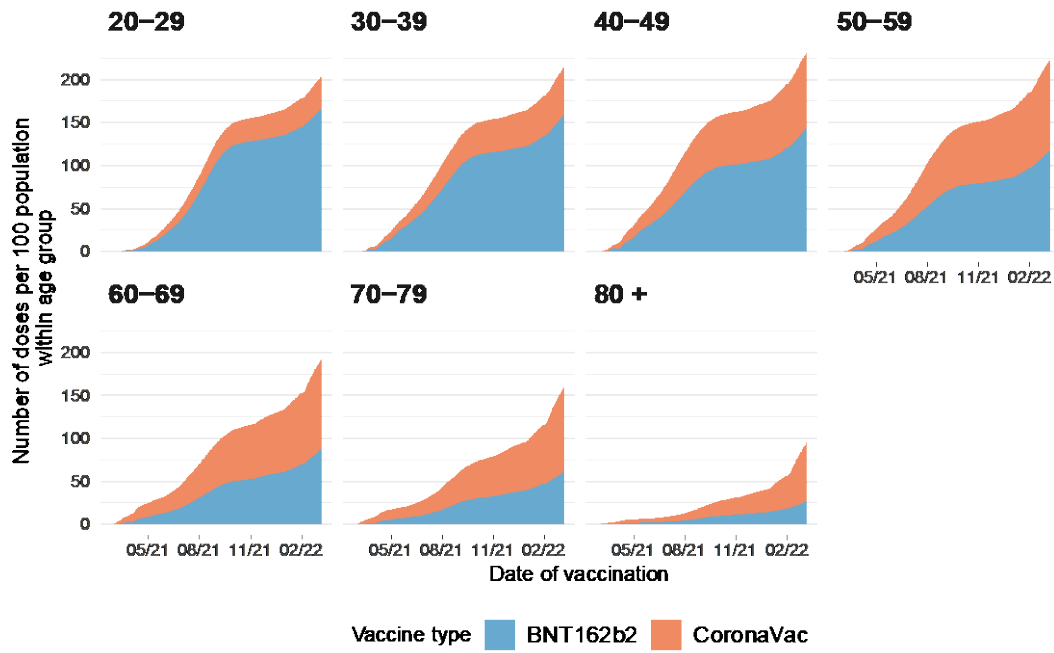
Vaccine effectiveness of two and three doses of BNT162b2 and CoronaVac against COVID-19 in Hong Kong: a population-based observational study - supplementary appendix

Appendix Table 1 Definitions for severe and critical-to-fatal cases

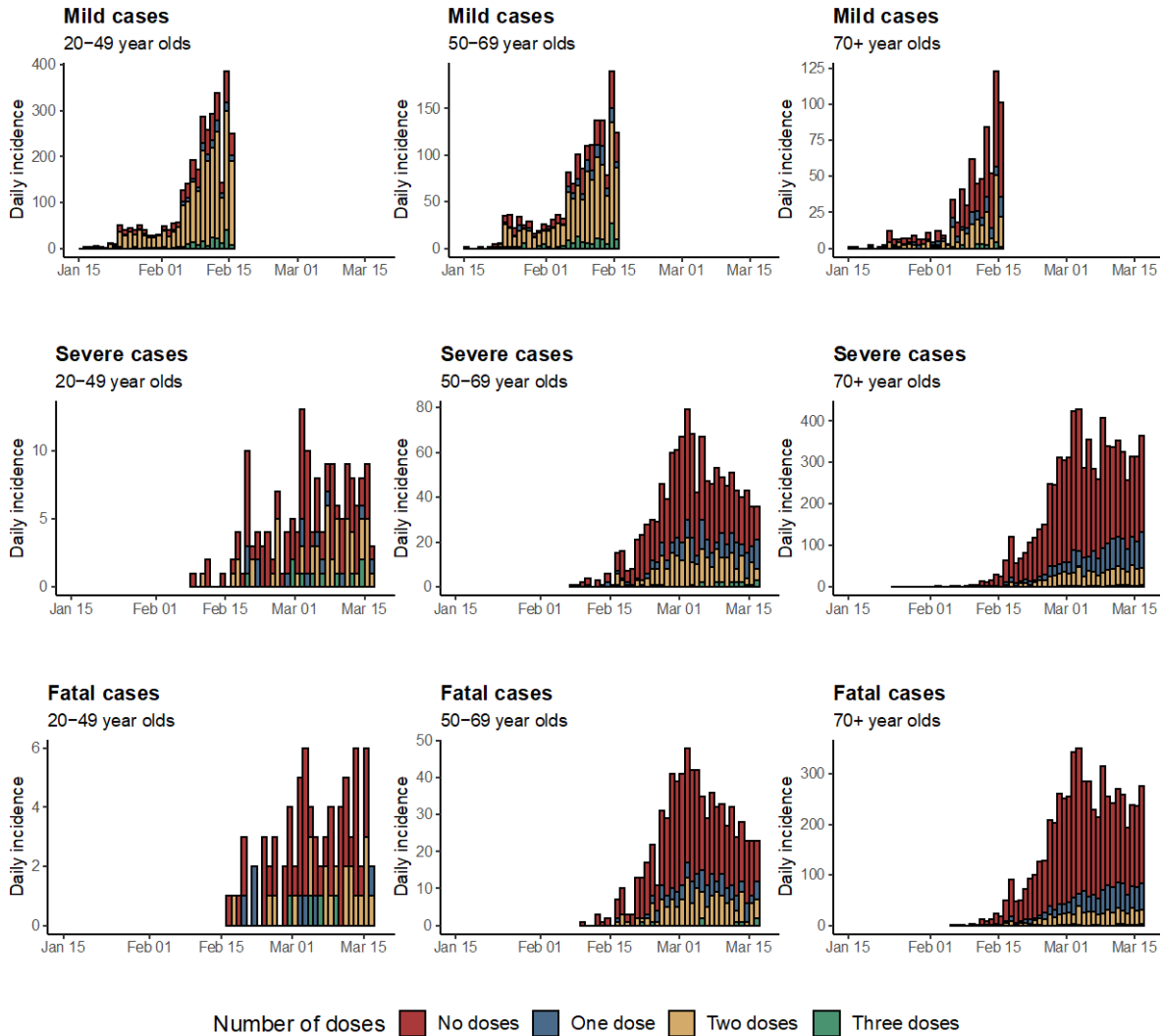
Outcome	Classification	Criteria
Fatal disease		Death with 28 days of a positive COVID test
Severe/fatal disease	Critical-to-fatal cases	Patient in Intensive Care Unit, or intubated, or require Extracorporeal Membrane Oxygenation (ECMO), or in shock
	Serious cases	Fatal outcome within 28 days of a positive test result Require oxygen supplement of 3 Litres per minute or more
Mild/moderate disease	Mild-to-moderate cases	Not being classified as either serious or critical as their worst condition during hospitalization, and not experiencing a fatal outcome within 28 days of a positive test



Appendix Figure 1 Vaccination coverage in Hong Kong for first, second and third doses of either BNT162b2 or CoronaVac vaccines by age group since the beginning of vaccination programme in Feb 2021



Appendix Figure 2 Number of doses administered over time throughout the vaccination programme in Hong Kong by vaccine type and age group. Note: Administration of CoronaVac vaccine started on February 26, 2021 and administration of BNT162b2 started on March 10, 2021



Appendix Figure 3 Daily incidence mild/moderate, severe/fatal and fatal cases by age group and vaccination status, where mild was the worst recorded condition by HA and severe disease was defined as ever having been listed as ‘Serious’ or ‘Critical’ by HA during hospitalisation or experiencing fatal COVID-19

Appendix Table 2. Overall absolute and relative vaccine effectiveness estimates for two or three dose schedules of either BNT162b2 and CoronaVac vaccines against mild/moderate infection, severe/fatal disease and death between 31 Dec 2021 and 16 Mar 2022 in Hong Kong, where estimates are obtained using a negative binomial rate model to estimate incidence rate ratio (IRR), and VE is defined as $1 - \text{IRR}$.

	Two doses	Three doses	
	VE (%)	VE (%)	rVE of three vs two doses
Mild/moderate disease			
All ages	15.8 (7.6, 23.3)	59.9 (53.4, 65.6)	50.4 (43.7, 56.5)
20-49	38.4 (30.0, 45.7)	68.2 (60.7, 74.3)	48.2 (38.1, 56.9)
50-69	None ^a	39.3 (23.0, 52.4)	48.3 (37.4, 57.6)
70 +	None ^a	67.0 (48.5, 80.0)	68.3 (49.5, 81.1)
Severe/fatal disease			
All ages	84.6 (82.4, 86.6)	97.9 (97.3, 98.4)	82.0 (76.9, 86.1)
20-49	96.1 (94.4, 97.3)	98.2 (96.6, 99.1)	51.2 (6.3, 77.0)
50-69	88.5 (85.6, 90.8)	98.6 (97.8, 99.1)	86.0 (78.0, 91.5)
70 +	74.5 (69.4, 78.8)	97.2 (95.9, 98.1)	82.4 (75.7, 87.5)
Mortality			
All ages	85.9 (83.5, 88.0)	98.6 (98.0, 99.0)	85.6 (80.1, 89.8)
20-49	97.3 (95.5, 98.4)	98.8 (97.0, 99.6)	53.6 (-24.8, 86.6)
50-69	90.6 (87.9, 92.7)	99.3 (98.6, 99.7)	91.0 (82.5, 96.0)
70 +	77.6 (72.7, 81.7)	97.9 (96.8, 98.7)	84.5 (77.2, 89.8)

^a No evidence of protection based on a negative or very small positive point estimate and wide confidence intervals.

Appendix Table 3. Vaccine effectiveness by dose (one, two, three) and vaccine type (CoronaVac, BNT162b2) in all ages and within age categories (mild/moderate: 20-59, ≥ 60 ; severe/fatal, fatal: 20-59, 60-69, 70-79, ≥ 80 years) against COVID-19 related mild/moderate disease, severe/fatal disease and death: sensitivity analysis stratifying by calendar week instead of calendar day

	One dose		Two doses		Three doses	
	BNT162b2	CoronaVac	BNT162b2	CoronaVac	BNT162b2	CoronaVac
Mild/moderate disease						
20-59 years	None ^a	None ^a	None ^a	None ^a	74.1 (46.5, 87.4)	58.4 (16.2, 79.5)
≥ 60 years	None ^a	None ^a	None ^a	None ^a	78.3 (41.0, 92.6)	49.3 (-27.5, 80.5)
Severe/fatal disease						
20-59 years	97.0 (92.9, 98.9)	77.5 (60.8, 87.4)	96.7 (94.8, 97.9)	93.2 (89.1, 95.9)	99.0 (97.8, 99.6)	99.3 (98.1, 99.8)
60-69 years	56.2 (-18.6, 84.1)	59.1 (10.7, 81.5)	89.4 (75.7, 95.4)	79.0 (56.3, 89.9)	99.1 (96.5, 99.8)	98.1 (94.2, 99.4)
70-79 years	70.3 (29.7, 87.8)	32.0 (-34.7, 65.8)	89.3 (76.3, 95.3)	70.4 (44.2, 84.3)	99.4 (97.5, 99.9)	96.6 (90.9, 98.8)
≥ 80 years	70.7* (62.2, 77.8)	40.3* (35.3, 44.9)	85.9* (82.5, 88.8)	62.7* (59.0, 66.1)	94.5 (78.6, 98.7)	95.2* (92.3, 97.2)
Mortality						
20-59 years	97.9 (93.5, 99.5)	81.0 (63.3, 90.5)	97.6 (95.6, 98.7)	94.7 (90.6, 97.1)	99.5 (98.5, 99.9)	99.7 (98.8, 99.9)
60-69 years	62.0 (-21.3, 88.5)	67.7 (25.3, 86.3)	91.6 (79.9, 96.5)	82.6 (61.6, 92.2)	99.2 (96.1, 99.9)	99.4 (96.9, 99.9)
70-79 years	83.6 (51.4, 94.8)	48.3 (-17.8, 77.5)	90.8 (87.2, 93.6)	71.7 (43.1, 85.9)	99.2 (97.4, 99.9)	97.8 (92.7, 99.4)
≥ 80 years	73.7* (64.9, 80.9)	46.0* (40.9, 50.8)	88.2* (84.8, 91.0)	67.1* (63.3, 70.5)	94.5 (75.8, 98.9)	95.9* (92.9, 97.8)

*No evidence of overdispersion resulting in a Poisson model fit

^a No evidence of protection based on a negative or very small positive point estimate and wide confidence intervals.

Appendix Table 4. Vaccine effectiveness by dose (one, two, three) and vaccine type (CoronaVac, BNT162b2) in all ages and within age categories (mild/moderate: 20-59, ≥ 60 ; severe/fatal, fatal: 20-59, 60-69, 70-79, ≥ 80 years) against COVID-19 related mild/moderate disease, severe/fatal disease and death: sensitivity analysis assuming 7 days between vaccination and immune response

	One dose		Two doses		Three doses	
	BNT162b2	CoronaVac	BNT162b2	CoronaVac	BNT162b2	CoronaVac
Mild/moderate disease						
20-59 years	25.0 (7.1, 39.9)	22.3 (1.8, 39.1)	31.6 (22.5, 39.5)	21.5 (10.4, 31.2)	65.8 (57.4, 72.7)	43.3 (30.5, 53.9)
≥ 60 years	None ^a	None ^a	None ^a	None ^a	65.0 (46.6, 78.1)	20.1 (-6.3, 40.8)
Severe/fatal disease						
20-59 years	88.6 (80.5, 93.9)	58.8 (42.3, 70.9)	96.0 (94.4, 97.1)	90.5 (87.1, 93.1)	97.9 (96.4, 98.9)	98.1 (96.3, 99.2)
60-69 years	62.2 (40.9, 76.5)	33.8 (9.1, 52.0)	89.8 (85.2, 93.1)	76.7 (68.4, 82.9)	98.5 (96.6, 99.4)	96.0 (93.0, 97.9)
70-79 years	56.9 (35.4, 71.8)	-1.2 (-31.1, 22.2)	88.6 (83.3, 92.3)	68.3 (59.1, 75.6)	98.3 (96.2, 99.4)	94.6 (91.0, 96.9)
≥ 80 years	62.2 (42.6, 75.4)	17.6 (-6.3, 36.3)	86.0 (79.2, 90.7)	49.5 (33.9, 61.5)	96.0 (92.0, 98.2)	95.9 (92.7, 97.8)
Mortality						
20-59 years	91.9 (82.5, 96.9)	63.0 (43.2, 76.5)	96.6 (94.8, 97.9)	92.6 (88.9, 95.2)	98.5 (96.7, 99.4)	98.9 (97.1, 99.7)
60-69 years	66.0 (42.9, 80.6)	49.5 (28.0, 65.0)	92.0 (87.6, 95.0)	82.6 (75.5, 87.7)	98.5 (96.3, 99.6)	98.9 (96.4, 99.6)
70-79 years	68.4 (48.4, 81.3)	20.2 (-7.9, 41.3)	91.4 (86.6, 94.7)	72.0 (62.5, 79.2)	99.0 (97.1, 99.8)	96.7 (93.5, 98.5)
≥ 80 years	69.4 (51.6, 81.0)	22.6 (-1.6, 41.1)	89.7 (83.9, 93.5)	55.4 (40.2, 66.8)	96.4 (92.3, 98.5)	96.8 (93.9, 98.4)

^a No evidence of protection based on a negative or very small positive point estimate and wide confidence intervals.