Supplementary Material

*Modeling the **Potential Public Health Impact of Updated COVID-19 Vaccination Strategies in Singapore: Epidemiological Data Update***

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Supplementary Table 1. Singaporean Population and Proportion of the Population at High Risk by Age Group

Age Group	Population Size[a]	Proportion High Risk[b]
6 months to 4 years	160,242	1.70%
5–11 years	285,023	2.62%
12–17 years	248,486	3.62%
18–29 years	589,458	7.90%
30-49 years	1,236,352	24.22%
50-64 years	896,823	40.80%
65-74 years	490,124	59.73%
≥75 years	260,912	75.45%

[a] Singapore department of statistics, 2023 (1)

[b] Clark et al. 2020 (2)

Supplementary Table 2. Infections by Age Group

Age Group	Year 1
6 months to 4 years	19.00%
5–11 years	18.70%
12–17 years	18.90%
18–29 years	23.10%
30-49 years	20.10%
50-64 years	16.60%
65-74 years	14.00%
≥75 years	14.30%

MoH Singapore (3)

Supplementary Table 3. Hospitalization Inputs by Age Group

Parameter	Age (years)							
	6mo-4	**5-11**	**12-17**	**18-29**	**30-49**	**50-64**	**65-74**	**≥75**
Probability infection is symptomatic[a]	100%	100%	100%	100%	100%	100%	100%	100%
Revised: Hospitalization rate among symptomatic patients[b]	2.4%	2.4%	1.4%	1.1%	1.3%	8.5%	35.1%	32.7%
Revised: Critical care/ICU admission rate among hospitalized patients[b]	1.2%	1.2%	4.1%	4.1%	4.1%	2.7%	2.5%	2.5%
Ventilation rate among hospitalized patients on normal ward[c]	0.0%	0.0%	0.0%	2.7%	13.1%	20.5%	19.9%	19.3%
Ventilation rate among ICU patients[c]	0.0%	0.0%	0.0%	100%*	93.4%	74.6%	59.5%	53.2%

Abbreviations: ICU =intensive care unit; IMV = invasive mechanical ventilation

* High percentage is a consequence of very small sample size. This is due to low covid rates in Singapore and is consistent with other sampling periods

[a] Ngiam, 2021 (4)

[b] MoH Singapore, 2021 (5)

[c] MoH Singapore (3)

Supplementary Table 4. Mortality Inputs by Age Group

Parameter	Age (years)							
	6mo-4	**5-11**	**12-17**	**18-29**	**30-49**	**50-64**	**65-74**	**≥75**
Revised: Probability of death among hospitalized patients[a]	0.1%	0.1%	0.3%	0.3%	0.3%	0.6%	0.6%	0.6%
Probability of death among outpatients[b]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] MoH, 2023 (5)

[b] Assumption

Supplementary Table 5. Post-COVID Condition Probability by Age Group and Vaccination Status

Parameter	Probabilities*
Probability of long-COVID among asymptomatic patients: susceptible	19.85%
Probability of long-COVID among outpatient cases: susceptible	19.85%
Probability of long-COVID among inpatient cases: susceptible	29.83%
Probability of long-COVID among asymptomatic patients: vaccinated	13.86%
Probability of long-COVID among outpatient cases: vaccinated	13.86%
Probability of long-COVID among inpatient cases: vaccinated	21.65%

* Values have been calculated by combining the base long-covid probability (16.8%) with the odds ratio for long covid given vaccination (0.65) and odds ratio for long covid given hospitalisation (1.71).

Li et al. 2023 (6)

Supplementary Table 6. Adverse Event Probabilities and Associated Costs

Adverse Events	Probabilities	Costs[a]
Myocarditis	0.00033%[a]	SGD 12,235[c]
Pericarditis	0.00024%[a]	SGD 5,548[c]
Myoperiocarditis	0.00017%[a]	SGD 5,548[c]
Acute allergic reaction requiring hospitalisation	0.00014%[a]	SGD 3,014[c]
Disseminated intravascular coagulation	0.00013%[a]	SGD 4,481[c]
Cerebral venous sinus thrombosis with thrombocytopenia	0.00011%[a]	SGD 5[c]
Capillary leak syndrome	0.00011%[a]	SGD 3,363[c]
Guillain-Barre syndrome	0.00011%[a]	SGD 5,636[c]
Pulmonary embolism	0.00011%[a]	SGD 9,703[c]
Acute myocardial infarction	0.00000%[b]	SGD 4,481[c]

Costs inflated to 2024 prices

[a] Hause et al. 2021 (7)

[b] Pfizer: Klen 2021 (8)

[c] HCUP 2018 (9)

Supplementary Table 7. Treatment Costs

Parameter	Value	Source
Price of test	SGD 104	Covid-19 Tests in Singapore (10) (Average of test price)
Number of tests used for asymptomatic patients	2.00	Assumed to be 2 tests: one for diagnosis and one to confirm that case has been treated.
Number of tests used per case in outpatient care	2.00	Assumed to be 2 tests: one for diagnosis and one to confirm that case has been treated.
Number of tests used per case in inpatient care	2.00	Assumed to be 2 tests: one for diagnosis and one to confirm that case has been treated.
Number of tests used per case in ICU care	2.00	Assumed to be 2 tests: one for diagnosis and one to confirm that case has been treated.
Unit cost of GP visit	SGD 31	Medical costs guideline (11)
OTC pain medication	SGD 6.79	Watson Singapore (assumed to be price of pain medication) (12)

Costs inflated to 2024 prices

Supplementary Table 8. Hospitalization Costs

Parameter	Value
Revised: Total cost of treatment for an inpatient admission without ventilation (normal ward)[ab]	SGD 5,338
Revised: Total cost of treatment for an inpatient admission with ventilation (normal ward)[c]	SGD 5,338
Revised: Cost of treatment for an ICU admission for patients not on ventilation[ab]	SGD 16,411
Revised: Cost of treatment for an ICU admission for patients on ventilation[c]	SGD 16,411

Costs inflated to 2024 prices

[a] Chew SY et al. (13)

[b] Inpatient charges (2021) Tan Tock Seng Hospital (14).

[c] Assumed to be the same as cost of treatment for an ICU admission for patients not on ventilation.

Supplementary Table 9. Long COVID Costs

Parameter	Value	Source
Number of GP visits for PASC	6.00	A Neglected Burden: The Ongoing Economic Costs of COVID-19 in Singapore (15)
Cost of specialist visit for PASC	SGD 112	Medical costs guideline (11)
Cost of hospitalization PASC	SGD 5,338	Assumed to be the cost of inpatient admission without ventilation (same as global)
Working time lost for long covid (days) – Susceptible	26	Assumption
Working time lost for long covid (days) – Vaccinated	7	Assumption

Costs inflated to 2024 prices

Supplementary Table 10. Workforce Participation Rate and Labor Cost

Parameter	Age (years)							
	6mo-4	5-11	12-17	18-29	30-49	50-64	65-74	≥75
Workforce participation rate[a]	0.00%	0.00%	7.38%	62.08%	88.44%	74.18%	36.19%	21.10%
Labor cost per week (SYR)	SGD 0	SGD 0	SGD 169	SGD 701	SGD 1,327	SGD 883	SGD 581	SGD 581

Costs inflated to 2024 prices

Labour force in Singapore 2022. Manpower Research and Statistics Department (16)

Supplementary Table 11. Education Participation

Parameter	Value	Source
Value of a lost school day	SGD 31.86	Department of Statistics Singapore (17)
Schooldays lost outpatient	10	Assumed the same as working days lost
Schooldays lost for inpatient without ventilation (normal ward)	8	
Schooldays lost for inpatient admission with ventilation (normal ward)	8	
Schooldays lost for ICU admission for patients not on ventilation	16	
Schooldays lost for ICU admission for patients on ventilation	111	

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