**Table 1. Input parameters for a model-based analysis of COVID-19 vaccination in South Africa.**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Base case value (Range)** | **Sources** |
| **Initial state** |  |  |
| Age distribution, % |  | 1 |
| <20 years | 37 |  |
| 20-59 years | 54 |  |
| ≥60 years | 9 |  |
| Initial health state distribution, % |  |  |
| Susceptible | 69.9 (49.9-89.9) | Assumption |
| Infected with SARS-CoV-2 | 0.1 | Assumptiona |
| Recovered (prior immunity) | 30 (10-50) | 2–5 |
| **Transmission dynamics** |  |  |
| Effective reproduction number, Re | 1.4 (1.1-1.8) | 6 |
| Relative reduction in onward transmission rate among vaccinated individuals, % | 0 (0-50) | Assumption |
| **Hospital and ICU care** |  |  |
| Resource availabilities |  |  |
| Hospital beds, daily, n | 119,400 | 7 |
| ICU beds, daily, n | 3,300 | 7 |
| Costs |  |  |
| Hospitalization, daily, USD | 154 (77-309) | 8–10 |
| ICU care, daily, USD | 1,751 (875-3,502) | 9–11 |
| **Vaccination program** |  |  |
| Vaccine doses, millions |  |  |
| Pfizer-BioNTech mRNA BNT162b2 | 4.5 (4.5-20) | 12,13 |
| Johnson & Johnson / Janssen Ad26.COV2.S | 2 (2-30) | 14 |
| Vaccinations per day, n | 150,000 (50,000-150,000) | 15,16 |
| Time to rollout start, days | 0 (0-60) | Assumption |
| Vaccination cost per dose, USD | 14.81 | 9,10,12,17–19 |
| Vaccine uptake among those eligible, % | 85 (50-85) | Assumption |
| **Vaccine effectiveness** |  |  |
| Pfizer-BioNTech mRNA BNT162b2 (1-dose regimen) |  |  |
| Effectiveness in preventing SARS-CoV-2 infection, % | 59 (23-59) | 21,22 |
| Effectiveness in preventing symptomatic COVID-19 disease, % | 62 (25-62) | 21,22 |
| Effectiveness in preventing severe COVID-19 disease requiring hospitalization, % | 80 (32-80) | 21,22 |
| Time to effectiveness, days | 14 | 23 |
| Pfizer-BioNTech mRNA BNT162b2 (2-dose regimen) |  |  |
| Effectiveness in preventing SARS-CoV-2 infection, % | 71 (28-71) | 21,22 |
| Effectiveness in preventing symptomatic COVID-19 disease, % | 75 (30-75) | 22 |
| Effectiveness in preventing severe COVID-19 disease requiring hospitalization, % | 97 (39-97) | 22 |
| Dosing interval, days | 21 | 23 |
| Time to effectiveness, days | 14 | 22 |
| Johnson & Johnson / Janssen Ad26.COV2.S (single-dose) |  |  |
| Effectiveness in preventing SARS-CoV-2 infection, % | 49 (20-49) | Assumption |
| Effectiveness in preventing symptomatic COVID-19 disease, % | 52 (21-52) | 24 |
| Effectiveness in preventing severe COVID-19 disease requiring hospitalization, % | 86 (34-86) | 24 |
| Time to effectiveness, days | 14 | 24 |

Re: effective reproduction number. ICU: intensive care unit. USD: United States dollars.

Ranges reflect values examined in analyses of alternative vaccination program strategies and in sensitivity analyses of different vaccine characteristics and epidemic growth scenarios.

aInitial prevalence of each state of infection and disease are in Table S1.

**Figure 1:** Vaccine coverage by age group under different supply scenarios (grid columns) and vaccination strategies (grid rows). The stacked bar graph in each panel depicts the proportion of each age group receiving either a 2-dose regimen of Pfizer (blue), a 1-dose regimen of Pfizer (purple), or a 1-dose regimen of J&J (red).

Diagram

Description automatically generated

**Table 3A: One-way sensitivity analysis on the effectiveness of 1 dose Pfizer (supply scenario: 4.5 million doses Pfizer, 2 million doses J&J)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Scenario / Strategy** | **Vaccine coverage, %** | **Cumulative infections, n** | **Cumulative deaths, n** | **Years-of-life lost, n** | **Total cost to healthcare system, $** |
| Base case |  |  |  |  |  |
| 1 dose Pfizer or 1 dose J&J for all ages | 11 | 16,778,700 | 26,500 | 576,600 | 1,573,534,000 |
| 2 dose Pfizer or 1 dose J&J for all ages | 7 | 18,118,200 | 35,700 | 768,600 | 1,595,359,900 |
| 2 dose Pfizer if ≥60y, 2 dose Pfizer or 1 dose J&J if <60y | 7 | 18,118,200 | 35,700 | 768,600 | 1,595,359,900 |
| 2 dose Pfizer if ≥60y, 1 dose Pfizer or 1 dose J&J if <60y | 7 | 18,118,200 | 35,700 | 768,600 | 1,595,359,900 |
| No vaccination | -- | 21,082,700 | 91,800 | 1,612,100 | 1,735,130,600 |
| Effectiveness of 1 dose Pfizer 80% of base case |  |  |  |  |  |
| 2 dose Pfizer or 1 dose J&J for all ages | 7 | 17,896,800 | 31,800 | 668,100 | 1,555,213,300 |
| 2 dose Pfizer if ≥60y, 2 dose Pfizer or 1 dose J&J if <60y | 7 | 17,896,800 | 31,800 | 668,100 | 1,555,213,300 |
| 2 dose Pfizer if ≥60y, 1 dose Pfizer or 1 dose J&J if <60y | 7 | 17,896,800 | 31,800 | 668,100 | 1,555,213,300 |
| 1 dose Pfizer or 1 dose J&J for all ages | 11 | 17,254,200 | 33,000 | 660,400 | 1,591,097,300 |
| No vaccination | -- | 21,082,700 | 91,800 | 1,612,100 | 1,735,130,600 |
| Effectiveness of 1 dose Pfizer 60% of base case |  |  |  |  |  |
| 2 dose Pfizer or 1 dose J&J for all ages | 7 | 17,939,700 | 35,900 | 750,000 | 1,599,035,100 |
| 2 dose Pfizer if ≥60y, 2 dose Pfizer or 1 dose J&J if <60y | 7 | 17,939,700 | 35,900 | 750,000 | 1,599,035,100 |
| 2 dose Pfizer if ≥60y, 1 dose Pfizer or 1 dose J&J if <60y | 7 | 17,939,700 | 35,900 | 750,000 | 1,599,035,100 |
| 1 dose Pfizer or 1 dose J&J for all ages | 11 | 17,876,200 | 45,800 | 902,500 | 1,623,481,600 |
| No vaccination | -- | 21,082,700 | 91,800 | 1,612,100 | 1,735,130,600 |
| Effectiveness of 1 dose Pfizer 40% of base case |  |  |  |  |  |
| 2 dose Pfizer or 1 dose J&J for all ages | 7 | 18,146,100 | 37,600 | 769,300 | 1,673,646,400 |
| 2 dose Pfizer if ≥60y, 2 dose Pfizer or 1 dose J&J if <60y | 7 | 18,146,100 | 37,600 | 769,300 | 1,673,646,400 |
| 2 dose Pfizer if ≥60y, 1 dose Pfizer or 1 dose J&J if <60y | 7 | 18,146,100 | 37,600 | 769,300 | 1,673,646,400 |
| 1 dose Pfizer or 1 dose J&J for all ages | 11 | 18,712,000 | 48,500 | 920,400 | 1,708,297,000 |
| No vaccination | -- | 21,082,700 | 91,800 | 1,612,100 | 1,735,130,600 |

**Table 3B: One-way sensitivity analysis on the effectiveness of 1 dose Pfizer (supply scenario: 9 million doses Pfizer, 4 million doses J&J)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Scenario / Strategy** | **Vaccine coverage, %** | **Cumulative infections, n** | **Cumulative deaths, n** | **Years-of-life lost, n** | **Total cost to healthcare system, $** |
| Base case |  |  |  |  |  |
| 1 dose Pfizer or 1 dose J&J for all ages | 22 | 12,182,200 | 15,600 | 294,100 | 1,179,434,800 |
| 2 dose Pfizer if ≥60y, 2 dose Pfizer or 1 dose J&J if <60y | 15 | 14,911,500 | 18,500 | 394,500 | 1,400,894,700 |
| 2 dose Pfizer if ≥60y, 1 dose Pfizer or 1 dose J&J if <60y | 15 | 14,911,500 | 18,500 | 394,500 | 1,400,894,700 |
| 2 dose Pfizer or 1 dose J&J for all ages | 14 | 15,092,400 | 22,200 | 477,100 | 1,466,633,700 |
| No vaccination | -- | 21,082,700 | 91,800 | 1,612,100 | 1,735,130,600 |
| Effectiveness of 1 dose Pfizer 80% of base case |  |  |  |  |  |
| 2 dose Pfizer if ≥60y, 2 dose Pfizer or 1 dose J&J if <60y | 15 | 15,148,500 | 18,600 | 385,100 | 1,500,033,200 |
| 2 dose Pfizer if ≥60y, 1 dose Pfizer or 1 dose J&J if <60y | 15 | 15,148,500 | 18,600 | 385,100 | 1,500,033,200 |
| 1 dose Pfizer or 1 dose J&J for all ages | 22 | 13,707,300 | 20,000 | 377,600 | 1,444,735,100 |
| 2 dose Pfizer or 1 dose J&J for all ages | 14 | 15,085,400 | 20,300 | 414,900 | 1,470,463,400 |
| No vaccination | -- | 21,082,700 | 91,800 | 1,612,100 | 1,735,130,600 |
| Effectiveness of 1 dose Pfizer 60% of base case |  |  |  |  |  |
| 2 dose Pfizer if ≥60y, 2 dose Pfizer or 1 dose J&J if <60y | 15 | 15,273,400 | 18,300 | 387,100 | 1,479,381,800 |
| 2 dose Pfizer if ≥60y, 1 dose Pfizer or 1 dose J&J if <60y | 15 | 15,273,400 | 18,300 | 387,100 | 1,479,381,800 |
| 2 dose Pfizer or 1 dose J&J for all ages | 14 | 15,183,400 | 25,600 | 497,600 | 1,553,410,400 |
| 1 dose Pfizer or 1 dose J&J for all ages | 22 | 15,086,200 | 26,500 | 466,500 | 1,630,119,200 |
| No vaccination | -- | 21,082,700 | 91,800 | 1,612,100 | 1,735,130,600 |
| Effectiveness of 1 dose Pfizer 40% of base case |  |  |  |  |  |
| 2 dose Pfizer if ≥60y, 2 dose Pfizer or 1 dose J&J if <60y | 15 | 15,191,300 | 19,900 | 427,100 | 1,406,440,300 |
| 2 dose Pfizer if ≥60y, 1 dose Pfizer or 1 dose J&J if <60y | 15 | 15,191,300 | 19,900 | 427,100 | 1,406,440,300 |
| 2 dose Pfizer or 1 dose J&J for all ages | 14 | 15,411,700 | 26,900 | 522,900 | 1,549,215,600 |
| 1 dose Pfizer or 1 dose J&J for all ages | 22 | 16,333,300 | 41,100 | 722,100 | 1,689,026,800 |
| No vaccination | -- | 21,082,700 | 91,800 | 1,612,100 | 1,735,130,600 |

**Base case effectiveness, 5 million doses Pfizer, 2 million doses J&J**

Cumulative number of people with at least one dose

Chart

Description automatically generated

Cumulative infections

Chart

Description automatically generated

Cumulative mortality

Chart, line chart

Description automatically generated

**Base case effectiveness, 9 million doses Pfizer, 4 million doses J&J**

Cumulative number of people with at least one dose

Chart

Description automatically generated

Cumulative infections

Chart, line chart

Description automatically generated

Cumulative deaths

Chart

Description automatically generated