Economic Evaluation Complete Report  
Hospital V2

NOTE: All bounds on uncertainties are given with a 95.0% confidence interval. The number of runs was determined with a 0.1% tolerance.

For Base (Alternative 0) 100.0 Monte-Carlo simulations were run.

For Alt 1 (Alternative 1) 6400.0 Monte-Carlo simulations were run.

For Alt 2 (Alternative 2) 400.0 Monte-Carlo simulations were run.

The random number seed for these runs was 759190685.

# Analysis Base Information

* Number of Alternatives: 2
* Planning Horizon: 100 years
* Discount Rate: 8%
* Disaster Rate: Every 50 years
* Uncertainty in Disaster Rate: N/A
* Disaster Magnitude: 15% of build cost
* Uncertainty in Disaster Magnitude: Triangular distribution with a min of 5 and a max of 50
* Risk Preference: averse
* Statistical Value of a Life: $7900000

# Summary

|  |  |  |  |
| --- | --- | --- | --- |
|  | Base | Alt 1 | Alt 2 |
| Total Benefits ($) | 0 | 429,465,157 | 434,461,010 |
| (Lower Bound, Upper Bound) ($) | (0; 0) | (423,114,994; 435,764,285) | (428,310,744; 441,259,652) |
| Total Costs ($) | 0 | 85,610,596 | 92,203,526 |
| (Lower Bound, Upper Bound) ($) | (0; 0) | (64,317,033; 148,536,106) | (82,742,354; 211,854,415) |
| Net ($) | 0 | 343,854,560 | 342,257,484 |
| (Lower Bound, Upper Bound) ($) | (0; 0) | (279,803,625; 367,134,057) | (224,271,774; 354,860,796) |
| Net with externalities ($) | 0 | 340,949,964 | 345,125,112 |
| (Lower Bound, Upper Bound) ($) | (0; 0) | (276,899,029; 364,229,461) | (227,139,402; 357,728,424) |
| SIR (%) | 0.00 | 4.39 | 4.01 |
| (Lower Bound, Upper Bound) (%) | (0; 0) | (2; 6) | (1; 5) |
| IRR (%) | --- | 26.17 | 25.08 |
| (Lower Bound, Upper Bound) (%) | (---; ---) | (17.89; 31.85) | (14.04; 27.13) |
| ROI (%) | 0.00 | 5.02 | 4.71 |
| (Lower Bound, Upper Bound) (%) | (0.00; 0.00) | (2.89; 6.69) | (2.05; 5.28) |
| Non-Disaster ROI (%) | 0.00 | 3.17 | 2.92 |
| (Lower Bound, Upper Bound) (%) | (0.00; 0.00) | (1.83; 4.22) | (1.27; 3.25) |

# Base

### Alternative 0

## Fatalities Averted

Number of Statistical Lives Saved: 0.00

Value of Statistical Lives Saved: $0

Description: N/A,,,,,,,,,,,,

## Disaster-Related Benefits

|  |  |  |
| --- | --- | --- |
| Title | Amount ($) | Effective Present Value ($) |
| Response and Recovery Cost Reductions |  | 0 |
| Direct Losses Prevented |  | 0 |
| Indirect Losses Prevented |  | 0 |
| Total |  | 0 |

## Resilience Dividend

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Start Year | Recurrence (Years) | Amount ($) | Effective Present Value ($) |
| One Time Cost Reductions |  |  |  | 0 |
| Recurring Cost Reductions |  |  |  | 0 |
| Total |  |  |  | 0 |

## Costs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Start Year | Recurrence (Years) | Amount ($) | Effective Present Value ($) |
| Direct Costs |  |  |  | 0 |
| Indirect Costs |  |  |  | 0 |
| OMR Costs: One-Time |  |  |  | 0 |
| OMR Costs: Recurring |  |  |  | 0 |
| Total |  |  |  | 0 |

## Externalities

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Start Year | Recurrence (Years) | Amount ($) | Effective Present Value ($) |
| One Time Positive Externalities |  |  |  | 0 |
| Recurring Positive Externalities |  |  |  | 0 |
| One Time Negative Externalities |  |  |  | 0 |
| Recurring Negative Externalities |  |  |  | 0 |
| Total |  |  |  | 0 |

# Alt 1

### Alternative 1

## Fatalities Averted

Number of Statistical Lives Saved: 80.00

Value of Statistical Lives Saved: $82,174,553

Description: N/A,,,,,,,,,,,,

## Disaster-Related Benefits

|  |  |  |
| --- | --- | --- |
| Title | Amount ($) | Effective Present Value ($) |
| Response and Recovery Cost Reductions |  | 4,700,332 |
| Alt 1 R&R Reduction | 18,075,000 | 4,700,332 |
| Direct Losses Prevented |  | 5,851,036 |
| Alt 1 Direct Reduction | 22,500,000 | 5,851,036 |
| Indirect Losses Prevented |  | 65,583,615 |
| Alt 1 Indirect Reduction | 252,200,000 | 65,583,615 |
| Total |  | 76,134,983 |

Alt 1 Direct Reduction: Triangular distribution with a min of 18750000 and a max of 26250000

Alt 1 Direct Reduction: N/A,,,,,,,,,,

Alt 1 Indirect Reduction: Rectangular distribution with a min of 226980000 and a max of 277420000

Alt 1 Indirect Reduction: N/A,,,,,,,,,,

Alt 1 R&R Reduction: Gaussian distribution with variance of 1205000

Alt 1 R&R Reduction: N/A,,,,,,,,,,

## Resilience Dividend

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Start Year | Recurrence (Years) | Amount ($) | Effective Present Value ($) |
| One Time Cost Reductions |  |  |  | -29,739,969 |
| Sale of old hospital | 4 | N/A | 2,000,000 | 1,452,298 |
| Fatalities averted correction Year 1 | 1 | N/A | -6,320,000 | -5,834,095 |
| Fatalities averted correction Year 2 | 2 | N/A | -6,320,000 | -5,385,549 |
| Fatalities averted correction Year 3 | 3 | N/A | -6,320,000 | -4,971,488 |
| Site 1 DRB correction Year 1 | 1 | N/A | -5,855,500 | -5,405,308 |
| Site 1 DRB correction Year 2 | 2 | N/A | -5,855,500 | -4,989,728 |
| Site 1 DRB correction Year 3 | 3 | N/A | -5,855,500 | -4,606,099 |
| Recurring Cost Reductions |  |  |  | 300,895,589 |
| Medical Error Reduction | 4 | 1 | 31,600,000 | 298,327,705 |
| Site 1: Decrease in nosocomial infections (non fatal) | 4 | 1 | 272,000 | 2,567,884 |
| Total |  |  |  | 271,155,620 |

Medical Error Reduction: N/A,,,,,,,

Site 1: Decrease in nosocomial infections (non fatal): N/A,,,,,,,

Sale of old hospital: N/A,,,,,,,

Fatalities averted correction Year 1: N/A,,,,,,,

Fatalities averted correction Year 2: N/A,,,,,,,

Fatalities averted correction Year 3: N/A,,,,,,,

Site 1 DRB correction Year 1: N/A,,,,,,,

Site 1 DRB correction Year 2: N/A,,,,,,,

Site 1 DRB correction Year 3: N/A,,,,,,,

## Costs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Start Year | Recurrence (Years) | Amount ($) | Effective Present Value ($) |
| Direct Costs |  |  |  | 60,300,000 |
| Alt 1 Direct | Start-Up | N/A | 60,300,000 | 60,300,000 |
| Indirect Costs |  |  |  | 18,090,000 |
| Alt 1 Indirect | Start-Up | N/A | 18,090,000 | 18,090,000 |
| OMR Costs: One-Time |  |  |  | 1,452,298 |
| Alt 1 Decommissioning | 4 | N/A | 2,000,000 | 1,452,298 |
| OMR Costs: Recurring |  |  |  | 5,768,298 |
| Alt 1 OMR Recurring | 4 | 1 | 611,000 | 5,768,298 |
| Total |  |  |  | 85,610,596 |

Alt 1 Direct: 25% chance of 44019000, 50% chance of 60300000, and 25% chance of 108540000

Alt 1 Direct: N/A,,,,,,

Alt 1 Indirect: 25% chance of 13205700, 50% chance of 18090000, and 25% chance of 32562000

Alt 1 Indirect: N/A,,,,,,

Alt 1 Decommissioning: 25% chance of 1700000, 50% chance of 2000000, and 25% chance of 3000000

Alt 1 Decommissioning: N/A,,,,,,

Alt 1 OMR Recurring: Gaussian distribution with variance of 50000

Alt 1 OMR Recurring: N/A,,,,,,

## Externalities

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Start Year | Recurrence (Years) | Amount ($) | Effective Present Value ($) |
| One Time Positive Externalities |  |  |  | 0 |
| Recurring Positive Externalities |  |  |  | 0 |
| One Time Negative Externalities |  |  |  | 2,904,596 |
| Worker relocation | 4.0 | N/A | 4,000,000 | 2,904,596 |
| Recurring Negative Externalities |  |  |  | 0 |
| Total |  |  |  | -2,904,596 |

Worker relocation: Worker relocation externality assumes that the hospital does not cover any relocation costs for employees and 1% of employees have to relocate,,,,,,,

# Alt 2

### Alternative 2

## Fatalities Averted

Number of Statistical Lives Saved: 80.00

Value of Statistical Lives Saved: $82,174,553

Description: N/A,,,,,,,,,,,,

## Disaster-Related Benefits

|  |  |  |
| --- | --- | --- |
| Title | Amount ($) | Effective Present Value ($) |
| Response and Recovery Cost Reductions |  | 4,960,378 |
| Alt 2 R&R Reduction | 19,075,000 | 4,960,378 |
| Direct Losses Prevented |  | 7,151,266 |
| Alt 2 Direct Reduction | 27,500,000 | 7,151,266 |
| Indirect Losses Prevented |  | 71,044,582 |
| Alt 2 Indirect Reduction | 273,200,000 | 71,044,582 |
| Total |  | 83,156,227 |

Alt 2 Direct Reduction: Triangular distribution with a min of 22916666.67 and a max of 32083333.33

Alt 2 Direct Reduction: N/A,,,,,,,,,,

Alt 2 Indirect Reduction: Rectangular distribution with a min of 248363636 and a max of 298036364

Alt 2 Indirect Reduction: N/A,,,,,,,,,,

Alt 2 R&R Reduction: Gaussian distribution with variance of 1271667

Alt 2 R&R Reduction: N/A,,,,,,,,,,

## Resilience Dividend

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Start Year | Recurrence (Years) | Amount ($) | Effective Present Value ($) |
| One Time Cost Reductions |  |  |  | -31,123,389 |
| Sale of old hospital | 4 | N/A | 2,000,000 | 1,452,298 |
| Fatalities averted correction Year 1 | 1 | N/A | -6,320,000 | -5,834,095 |
| Fatalities averted correction Year 2 | 2 | N/A | -6,320,000 | -5,385,549 |
| Fatalities averted correction Year 3 | 3 | N/A | -6,320,000 | -4,971,488 |
| Site 2 DRB correction Year 1 | 1 | N/A | -6,395,500 | -5,903,791 |
| Site 2 DRB correction Year 2 | 2 | N/A | -6,395,500 | -5,449,886 |
| Site 2 DRB correction Year 3 | 3 | N/A | -6,395,500 | -5,030,878 |
| Recurring Cost Reductions |  |  |  | 300,253,618 |
| Site 2: Medical Error Reduction | 4 | 1 | 15,800,000 | 149,163,853 |
| Site 2: Decrease in nosocomial infections (non fatal) | 4 | 1 | 204,000 | 1,925,913 |
| Site 2: Decrease in travel distance | 4 | 1 | 15,800,000 | 149,163,853 |
| Total |  |  |  | 269,130,230 |

Site 2: Medical Error Reduction: N/A,,,,,,,

Site 2: Decrease in nosocomial infections (non fatal): N/A,,,,,,,

Site 2: Decrease in travel distance: N/A,,,,,,,

Sale of old hospital: N/A,,,,,,,

Fatalities averted correction Year 1: N/A,,,,,,,

Fatalities averted correction Year 2: N/A,,,,,,,

Fatalities averted correction Year 3: N/A,,,,,,,

Site 2 DRB correction Year 1: N/A,,,,,,,

Site 2 DRB correction Year 2: N/A,,,,,,,

Site 2 DRB correction Year 3: N/A,,,,,,,

## Costs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Start Year | Recurrence (Years) | Amount ($) | Effective Present Value ($) |
| Direct Costs |  |  |  | 65,670,000 |
| Alt 2 Direct | Start-Up | N/A | 65,670,000 | 65,670,000 |
| Indirect Costs |  |  |  | 19,700,000 |
| Alt 2 Indirect | Start-Up | N/A | 19,700,000 | 19,700,000 |
| OMR Costs: One-Time |  |  |  | 1,452,298 |
| Alt 2 OMR One-Time | 4 | N/A | 2,000,000 | 1,452,298 |
| OMR Costs: Recurring |  |  |  | 5,381,228 |
| Alt 2 OMR Recurring | 4 | 1 | 570,000 | 5,381,228 |
| Total |  |  |  | 92,203,526 |

Alt 2 Direct: 25% chance of 58446300, 50% chance of 65670000, and 25% chance of 157608000

Alt 2 Direct: N/A,,,,,,

Alt 2 Indirect: 25% chance of 17533890, 50% chance of 19700000, and 25% chance of 47282400

Alt 2 Indirect: N/A,,,,,,

Alt 2 OMR One-Time: 25% chance of 1700000, 50% chance of 2000000, and 25% chance of 3000000

Alt 2 OMR One-Time: N/A,,,,,,

Alt 2 OMR Recurring: Gaussian distribution with variance of 30000

Alt 2 OMR Recurring: N/A,,,,,,

## Externalities

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Start Year | Recurrence (Years) | Amount ($) | Effective Present Value ($) |
| One Time Positive Externalities |  |  |  | 0 |
| Recurring Positive Externalities |  |  |  | 2,867,628 |
| Crime reduction | 4.0 | 1.0 | 303,750 | 2,867,628 |
| One Time Negative Externalities |  |  |  | 0 |
| Recurring Negative Externalities |  |  |  | 0 |
| Total |  |  |  | 2,867,628 |

Crime reduction : Crime reduction externality assumes the hospital will help increase community safety reducing the violent crime rate of the surrounding area by 2%,,,,,,,