Online Appendix

**Manuscript:**

An Adaptable Tool for Modeling the Benefits and Costs of Substance Use Disorder Recovery Programs

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**1. Sensitivity Analysis of Results with respect to the Personal Discount Rate**

In this section we present sensitivity analysis with respect to the personal discount rate () used in calculating the annualized value of a statistical life (VSL). We vary the personal discount rate from 1% to 9%. In the analysis presented, we parameterize our recovery program to be a representative recovery house serving 100 people annually for 20 years in Florida with an operating cost of $500,000 per year, capital costs of $1.34 million, and a success rate of 35%. This parameterization is consistent with the results presented in the manuscript (Table 4).

**Table S1.** Economic net benefits and return on investment across different personal discount rates assumptions assuming a 5-year time lag in benefits.

|  |  |  |
| --- | --- | --- |
| **Personal Discount Rate** | **Net Benefits (4)** | **Return on Investment ($)** |
| 1% | 179,327,260 | 13.87 |
| 3% | 281,629,708 | 21.78 |
| 5% | 404,797,049 | 31.31 |
| 7% | 537,687,324 | 41.59 |
| 9% | 674,225,161 | 52.15 |

**2. Sensitivity Analysis of Results with respect to the Value of a Statistical Life**

In this section we present sensitivity analysis with respect to the value of a statistical life (VSL) used in calculating the annualized VSL. We vary the VSL from $3 million to $13 million. In the analysis presented, we parameterize our recovery program to be a representative recovery house serving 100 people annually for 20 years in Florida with an operating cost of $500,000 per year, capital costs of $1.34 million, and a success rate of 35%. This parameterization is consistent with the results presented in the manuscript (Table 4).

**Table S2.** Economic net benefits and return on investment across different VSL assumptions assuming a 5-year time lag in benefits.

|  |  |  |
| --- | --- | --- |
| **VSL ($ Million)** | **Net Benefits ($)** | **Return on Investment ($)** |
| 3 | 128,137,312 | $9.91 |
| 5 | 179,392,610 | 13.88 |
| 7 | 230,647,908 | 17.84 |
| 9 | 281,903,206 | 21.81 |
| 11 | 333,158,504 | 25.77 |
| 13 | 384,413,802 | 29.74 |

**3. Sensitivity Analysis of Results with respect to the Quality of Life Added from Recovery**

In this section we present sensitivity analysis with respect to the quality of life years (QALY) added due to recovery used in calculating the value of the improved health status of those in recovery. We vary the QALY from 0.05 QALY to 0.30 In the analysis presented, we parameterize our recovery program to be a representative recovery house serving 100 people annually for 20 years in Florida with an operating cost of $500,000 per year, capital costs of $1.34 million, and a success rate of 35%. This parameterization is consistent with the results presented in the manuscript (Table 4).

**Table S3.** Economic net benefits and return on investment across different QALY assumptions assuming a 5-year time lag in benefits.

|  |  |  |
| --- | --- | --- |
| **QALY** | **Net Benefits ($)** | **Return on Investment ($)** |
| 0.05 | 108,848,201 | 8.42 |
| 0.10 | 166,442,037 | 12.87 |
| 0.15 | 224,035,872 | 17.33 |
| 0.20 | 281,629,708 | 21.78 |
| 0.25 | 339,223,544 | 26.24 |
| 0.30 | 396,817,379 | 30.70 |

**4. Sensitivity Analysis of Results with respect to the Percent of Criminal Justice Expenditure Related to SUD**

In this section we present sensitivity analysis with respect to percentage of criminal justice expenditure related to substance use disorder (SUD) in calculated the avoided criminal justice costs of a person in recovery. We vary the percentage of criminal justice expenditure related to SUD from 10% to 50%. In the analysis presented, we parameterize our recovery program to be a representative recovery house serving 100 people annually for 20 years in Florida with an operating cost of $500,000 per year, capital costs of $1.34 million, and a success rate of 35%. This parameterization is consistent with the results presented in the manuscript (Table 4).

**Table S4.** Economic net benefits and return on investment across different percentages of criminal justice expenditure related to SUD assuming a 5-year time lag in benefits.

|  |  |  |
| --- | --- | --- |
| **Percent of CJ Expenditure** | **Net Benefits ($)** | **Return on Investment ($)** |
| 10 | 273,123,222 | 21.13 |
| 20 | 278,794,213 | 21.57 |
| 30 | 284,465,203 | 22.00 |
| 40 | 290,136,194 | 22.44 |
| 50 | 295,807,184 | 22.88 |

**5. Sensitivity Analysis of Results with respect to the Annual Increase in Operating Costs**

In this section we present sensitivity analysis with respect to the assumed annual percentage increase in operating costs. We vary the annual increase in operating costs from 0% to 12%. In the analysis presented, we parameterize our recovery program to be a representative recovery house serving 100 people annually for 20 years in Florida with an operating cost of $500,000 per year, capital costs of $1.34 million, and a success rate of 35%. This parameterization is consistent with the results presented in the manuscript (Table 4).

**Table S5.** Economic net benefits and return on investment across different annual percentage increases in operating costs assuming a 5-year time lag in benefits.

|  |  |  |
| --- | --- | --- |
| **Annual Increase in Operating Costs (%)** | **Net Benefits ($)** | **Return on Investment ($)** |
| 0 | 286,554,392 | 35.81 |
| 2 | 285,147,339 | 30.30 |
| 4 | 283,740,287 | 26.23 |
| 6 | 282,333,234 | 23.10 |
| 8 | 280,926,182 | 20.61 |
| 10 | 279,519,129 | 18.59 |
| 12 | 278,112,076 | 16.91 |

**6. Sensitivity Analysis of Results with respect to the Location of the Recovery Program**

In this section we present sensitivity analysis with respect to the location of the recovery program. We present results from a selection of different states that vary in their SUD incidence, size, and geographic location. In the analysis presented, we parameterize our recovery program to be a representative recovery house serving 100 people annually for 20 years with an operating cost of $500,000 per year, capital costs of $1.34 million, and a success rate of 35%. This parameterization is consistent with the results presented in the manuscript (Table 4).

**Table S6.** Economic net benefits and return on investment across different program locations assuming a 5-year time lag in benefits.

|  |  |  |
| --- | --- | --- |
| **State** | **Net Benefits ($)** | **Return on Investment ($)** |
| Alabama | 276,720,479 | 21.41 |
| Alaska | 292,011,220 | 22.59 |
| Arizona | 279,835,732 | 21.65 |
| Arkansas | 275,484,154 | 21.31 |
| California | 287,565,102 | 22.24 |
| Colorado | 277,260,836 | 21.45 |
| Connecticut | 281,300,736 | 21.76 |
| Delaware | 285,614,982 | 22.09 |
| Florida | 281,629,708 | 21.78 |
| Georgia | 279,852,229 | 21.65 |
| Hawaii | 282,582,526 | 21.86 |
| Idaho | 276,798,515 | 21.41 |
| Illinois | 279,529,734 | 21.62 |
| Indiana | 276,678,014 | 21.40 |
| Iowa | 275,204,759 | 21.29 |
| Kansas | 278,785,046 | 21.56 |
| Kentucky | 277,241,074 | 21.45 |
| Louisiana | 280,255,747 | 21.68 |
| Maine | 278,193,792 | 21.52 |
| Maryland | 284,947,408 | 22.04 |
| Massachusetts | 280,710,323 | 21.71 |
| Michigan | 278,402,204 | 21.54 |
| Minnesota | 282,406,831 | 21.85 |
| Mississippi | 278,029,131 | 21.51 |
| Missouri | 277,408,584 | 21.46 |
| Montana | 279,193,596 | 21.60 |
| Nebraska | 279,194,336 | 21.60 |
| Nevada | 280,095,486 | 21.67 |
| New Hampshire | 279,019,972 | 21.58 |
| New Jersey | 286,825,624 | 22.19 |
| New Mexico | 280,829,878 | 21.72 |
| New York | 290,448,873 | 22.47 |
| North Carolina | 278,968,584 | 21.58 |
| North Dakota | 281,523,321 | 21.78 |
| Ohio | 279,585,758 | 21.63 |
| Oklahoma | 277,155,044 | 21.44 |
| Oregon | 279,468,458 | 21.62 |
| Pennsylvania | 283,468,993 | 21.93 |
| Rhode Island | 281,574,734 | 21.78 |
| South Carolina | 274,872,199 | 21.26 |
| South Dakota | 279,099,047 | 21.59 |
| Tennessee | 278,630,064 | 21.55 |
| Texas | 280,197,719 | 21.67 |
| Utah | 276,348,778 | 21.38 |
| Vermont | 279,810,921 | 21.64 |
| Virginia | 279,898,560 | 21.65 |
| Washington | 277,450,562 | 21.46 |
| West Virginia | 282,575,042 | 21.86 |
| Wisconsin | 278,984,118 | 21.58 |
| Wyoming | 285,376,134 | 22.07 |

**7. State Specific Avoided Criminal Justice Costs**

In this section, we present the per person with a SUD state specific avoided criminal justice costs calculated within the manuscript.

**Table S7.** Per person with a SUD avoided criminal justice costs calculated within the manuscript for each state.

|  |  |
| --- | --- |
| **State** | **Avoided Criminal Justice Cost** |
| Alabama | $2,587.78 |
| Alaska | $5,240.01 |
| Arizona | $3,556.96 |
| Arkansas | $2,248.67 |
| California | $5,098.59 |
| Colorado | $2,939.88 |
| Connecticut | $2,804.76 |
| Delaware | $3,802.22 |
| Florida | $3,686.84 |
| Georgia | $3,560.65 |
| Hawaii | $3,805.30 |
| Idaho | $2,951.70 |
| Illinois | $3,042.09 |
| Indiana | $2,201.24 |
| Iowa | $2,039.11 |
| Kansas | $3,085.81 |
| Kentucky | $2,426.59 |
| Louisiana | $3,132.23 |
| Maine | $2,121.87 |
| Maryland | $4,253.94 |
| Massachusetts | $2,399.27 |
| Michigan | $2,837.82 |
| Minnesota | $3,591.14 |
| Mississippi | $2,893.49 |
| Missouri | $2,572.14 |
| Montana | $2,948.00 |
| Nebraska | $2,856.52 |
| Nevada | $3,748.36 |
| New Hampshire | $2,422.92 |
| New Jersey | $4,430.01 |
| New Mexico | $3,771.17 |
| New York | $4,722.92 |
| North Carolina | $3,282.59 |
| North Dakota | $3,223.27 |
| Ohio | $2,969.23 |
| Oklahoma | $2,651.01 |
| Oregon | $3,062.28 |
| Pennsylvania | $3,637.56 |
| Rhode Island | $3,117.34 |
| South Carolina | $2,263.16 |
| South Dakota | $2,230.39 |
| Tennessee | $3,067.37 |
| Texas | $3,757.34 |
| Utah | $3,024.77 |
| Vermont | $2,336.28 |
| Virginia | $3,440.04 |
| Washington | $2,782.19 |
| West Virginia | $3,051.14 |
| Wisconsin | $2,963.34 |
| Wyoming | $4,319.90 |

**8. State Specific Avoided Healthcare Costs**

In this section, we present the per person with a SUD state specific avoided healthcare costs calculated within the manuscript.

**Table S8.** Per person with a SUD avoided healthcare costs calculated within the manuscript for each state.

|  |  |
| --- | --- |
| **State** | **Avoided Healthcare Costs** |
| Alabama | $2,817.01 |
| Alaska | $4,141.12 |
| Arizona | $2,657.94 |
| Arkansas | $2,834.61 |
| California | $3,126.33 |
| Colorado | $2,605.43 |
| Connecticut | $3,791.12 |
| Delaware | $3,915.58 |
| Florida | $2,994.59 |
| Georgia | $2,658.55 |
| Hawaii | $3,123.90 |
| Idaho | $2,473.38 |
| Illinois | $3,093.25 |
| Indiana | $3,192.51 |
| Iowa | $2,971.52 |
| Kansas | $2,855.86 |
| Kentucky | $3,113.58 |
| Louisiana | $3,191.90 |
| Maine | $3,666.06 |
| Maryland | $3,290.25 |
| Massachusetts | $4,043.08 |
| Michigan | $3,004.30 |
| Minnesota | $3,292.38 |
| Mississippi | $2,851.61 |
| Missouri | $3,011.59 |
| Montana | $3,099.92 |
| Nebraska | $3,191.60 |
| Nevada | $2,534.09 |
| New Hampshire | $3,579.85 |
| New Jersey | $3,602.61 |
| New Mexico | $2,702.26 |
| New York | $4,251.92 |
| North Carolina | $2,706.82 |
| North Dakota | $3,430.50 |
| Ohio | $3,180.67 |
| Oklahoma | $2,866.79 |
| Oregon | $3,057.12 |
| Pennsylvania | $3,522.17 |
| Rhode Island | $3,549.80 |
| South Carolina | $2,660.98 |
| South Dakota | $3,792.94 |
| Tennessee | $2,834.01 |
| Texas | $2,551.70 |
| Utah | $2,283.36 |
| Vermont | $3,872.17 |
| Virginia | $2,791.21 |
| Washington | $2,812.46 |
| West Virginia | $3,876.12 |
| Wisconsin | $3,030.11 |
| Wyoming | $3,335.79 |

1. Fletcher Group, Inc., 601 Meyers Baker Road, London, KY 40741 [↑](#footnote-ref-1)