APPENDIX

The following tables show the distributions and rates used in the AIM model. Full descriptions of the data behind these numbers can be found in **Stover J,** Brown T, Marston M. Updates to the Spectrum/Estimation and Projection Package (EPP) model to estimate HIV trends for adults and children (2012) *Sex Trans Infect* 2012;88:i11-ii16. doi:10.1136/sextrans-2012-050640 and the AIM manual (Futures Institute, AIM: A Computer Program for Making HIV/AIDS Projections and Examining the Demographic and Social Impacts of AIDS, Futures Institute: Glastonbury, CT, January 2014 available at www.FuturesInstitute.org)

Distribution of new infections by CD4 count and age

|  |  |  |
| --- | --- | --- |
| Age at infection | Percent of new infections starting at >500 cells/µl | Percent of new infections starting at 350-500 cells/µl |
| 15-24 | 64.3 | 35.7 |
| 25-34 | 60.7 | 39.3 |
| 35-44 | 58.5 | 41.5 |
| 45+ | 55.2 | 44.8 |

Median time (years) spent in each CD4 category by age

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CD4 Category | 15-24 | 25-34 | 35-44 | 45+ |
| >500 | 8.5 | 6.8 | 5.4 | 4.7 |
| 350-500 | 4.5 | 4.2 | 2.8 | 1.9 |
| 250-349 | 3.4 | 2.2 | 1.7 | 1.2 |
| 200-249 | 2.0 | 0.9 | 0.8 | 0.6 |
| 100-199 | 4.7 | 1.6 | 1.5 | 1.0 |
| 50-99 | 2.9 | 0.7 | 0.7 | 0.5 |

Annual rates of mortality without ART by CD4 count and age

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 15 - 24 | 25 - 34 | 35 - 44 | 45 -54 |
| > 500 | 0.005 | 0.005 | 0.005 | 0.005 |
| 350 - 500 | 0.011 | 0.010 | 0.013 | 0.013 |
| 250 - 349 | 0.026 | 0.026 | 0.036 | 0.032 |
| 200 - 249 | 0.061 | 0.069 | 0.096 | 0.080 |
| 100 - 199 | 0.139 | 0.185 | 0.258 | 0.203 |
| 50 - 99 | 0.321 | 0.499 | 0.691 | 0.513 |
| <50 | 0.737 | 1.342 | 1.851 | 1.295 |

Annual mortality rates with ART by CD4 count at treatment initiation

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Asia |  |  |  |  |  |  |  |  |
|  | Male |  |  |  | Female |  |  |  |
|  | 15 - 24 | 25 - 34 | 35 - 44 | 45 -54 | 15 - 24 | 25 - 34 | 35 - 44 | 45 -54 |
| 0-6 months on treatment |  |  |  |  |  |  |  |  |
| > 500 | 0.005 | 0.004 | 0.005 | 0.005 | 0.005 | 0.004 | 0.005 | 0.005 |
| 350 - 499 | 0.011 | 0.010 | 0.013 | 0.013 | 0.011 | 0.010 | 0.012 | 0.013 |
| 250 - 349 | 0.015 | 0.016 | 0.017 | 0.032 | 0.012 | 0.012 | 0.013 | 0.032 |
| 200 - 249 | 0.016 | 0.017 | 0.018 | 0.051 | 0.012 | 0.013 | 0.013 | 0.039 |
| 100 - 199 | 0.020 | 0.021 | 0.023 | 0.066 | 0.015 | 0.016 | 0.017 | 0.050 |
| 50 - 99 | 0.025 | 0.026 | 0.029 | 0.084 | 0.020 | 0.021 | 0.022 | 0.065 |
| < 50 | 0.036 | 0.039 | 0.043 | 0.124 | 0.029 | 0.030 | 0.033 | 0.096 |
| 7-12 months on treatment |  |  |  |  |  |  |  |  |
| > 500 | 0.005 | 0.004 | 0.005 | 0.005 | 0.005 | 0.004 | 0.005 | 0.005 |
| 350 - 499 | 0.010 | 0.010 | 0.011 | 0.013 | 0.005 | 0.007 | 0.005 | 0.013 |
| 250 - 349 | 0.010 | 0.013 | 0.011 | 0.032 | 0.005 | 0.007 | 0.005 | 0.015 |
| 200 - 249 | 0.011 | 0.014 | 0.012 | 0.034 | 0.006 | 0.007 | 0.005 | 0.016 |
| 100 - 199 | 0.012 | 0.016 | 0.013 | 0.039 | 0.006 | 0.008 | 0.007 | 0.019 |
| 50 - 99 | 0.014 | 0.018 | 0.015 | 0.045 | 0.007 | 0.010 | 0.008 | 0.022 |
| < 50 | 0.017 | 0.022 | 0.019 | 0.055 | 0.009 | 0.012 | 0.010 | 0.028 |
| Greater than 12 months on treatment |  |  |  |  |  |  |  |  |
| > 500 | 0.003 | 0.004 | 0.003 | 0.005 | 0.001 | 0.002 | 0.000 | 0.001 |
| 350 - 499 | 0.003 | 0.004 | 0.003 | 0.008 | 0.001 | 0.002 | 0.000 | 0.001 |
| 250 - 349 | 0.003 | 0.004 | 0.003 | 0.008 | 0.001 | 0.002 | 0.000 | 0.001 |
| 200 - 249 | 0.003 | 0.005 | 0.003 | 0.009 | 0.002 | 0.002 | 0.001 | 0.002 |
| 100 - 199 | 0.004 | 0.005 | 0.004 | 0.011 | 0.002 | 0.002 | 0.001 | 0.003 |
| 50 - 99 | 0.005 | 0.006 | 0.004 | 0.013 | 0.002 | 0.003 | 0.001 | 0.004 |
| < 50 | 0.006 | 0.008 | 0.006 | 0.017 | 0.003 | 0.004 | 0.002 | 0.006 |
|  |  |  |  |  |  |  |  |  |
| East Africa |  |  |  |  |  |  |  |  |
|  | Male |  |  |  | Female |  |  |  |
|  | 15 - 24 | 25 - 34 | 35 - 44 | 45 -54 | 15 - 24 | 25 - 34 | 35 - 44 | 45 -54 |
| 0-6 months on treatment |  |  |  |  |  |  |  |  |
| > 500 | 0.005 | 0.004 | 0.005 | 0.005 | 0.005 | 0.004 | 0.005 | 0.005 |
| 350 - 499 | 0.011 | 0.010 | 0.013 | 0.013 | 0.011 | 0.010 | 0.013 | 0.013 |
| 250 - 349 | 0.026 | 0.026 | 0.036 | 0.032 | 0.026 | 0.026 | 0.036 | 0.032 |
| 200 - 249 | 0.061 | 0.069 | 0.064 | 0.067 | 0.061 | 0.054 | 0.045 | 0.046 |
| 100 - 199 | 0.139 | 0.122 | 0.105 | 0.113 | 0.123 | 0.088 | 0.075 | 0.079 |
| 50 - 99 | 0.254 | 0.185 | 0.161 | 0.175 | 0.185 | 0.134 | 0.116 | 0.125 |
| < 50 | 0.464 | 0.339 | 0.297 | 0.327 | 0.339 | 0.247 | 0.215 | 0.236 |
| 7-12 months on treatment |  |  |  |  |  |  |  |  |
| > 500 | 0.005 | 0.004 | 0.005 | 0.005 | 0.005 | 0.004 | 0.005 | 0.005 |
| 350 - 499 | 0.011 | 0.010 | 0.013 | 0.013 | 0.011 | 0.010 | 0.013 | 0.012 |
| 250 - 349 | 0.026 | 0.026 | 0.026 | 0.025 | 0.025 | 0.017 | 0.016 | 0.013 |
| 200 - 249 | 0.040 | 0.028 | 0.027 | 0.027 | 0.026 | 0.018 | 0.017 | 0.014 |
| 100 - 199 | 0.049 | 0.034 | 0.034 | 0.034 | 0.032 | 0.022 | 0.021 | 0.020 |
| 50 - 99 | 0.060 | 0.042 | 0.042 | 0.044 | 0.040 | 0.027 | 0.027 | 0.026 |
| < 50 | 0.082 | 0.059 | 0.060 | 0.064 | 0.055 | 0.039 | 0.039 | 0.040 |
| Greater than 12 months on treatment |  |  |  |  |  |  |  |  |
| > 500 | 0.005 | 0.004 | 0.005 | 0.002 | 0.005 | 0.003 | 0.002 | 0.000 |
| 350 - 499 | 0.011 | 0.007 | 0.006 | 0.002 | 0.008 | 0.003 | 0.002 | 0.000 |
| 250 - 349 | 0.014 | 0.008 | 0.007 | 0.003 | 0.008 | 0.004 | 0.003 | 0.000 |
| 200 - 249 | 0.014 | 0.008 | 0.007 | 0.004 | 0.009 | 0.004 | 0.003 | 0.000 |
| 100 - 199 | 0.018 | 0.011 | 0.010 | 0.007 | 0.011 | 0.006 | 0.005 | 0.001 |
| 50 - 99 | 0.022 | 0.014 | 0.013 | 0.011 | 0.014 | 0.008 | 0.007 | 0.003 |
| < 50 | 0.031 | 0.021 | 0.021 | 0.019 | 0.020 | 0.013 | 0.012 | 0.009 |
|  |  |  |  |  |  |  |  |  |
| Eastern Europe |  |  |  |  |  |  |  |  |
|  | Male |  |  |  | Female |  |  |  |
|  | 15 - 24 | 25 - 34 | 35 - 44 | 45 -54 | 15 - 24 | 25 - 34 | 35 - 44 | 45 -54 |
| 0-6 months on treatment |  |  |  |  |  |  |  |  |
| > 500 | 0.004 | 0.004 | 0.002 | 0.000 | 0.002 | 0.001 | 0.002 | 0.000 |
| 350 - 499 | 0.005 | 0.004 | 0.003 | 0.000 | 0.002 | 0.002 | 0.003 | 0.000 |
| 250 - 349 | 0.006 | 0.005 | 0.004 | 0.000 | 0.003 | 0.002 | 0.003 | 0.000 |
| 200 - 249 | 0.007 | 0.006 | 0.005 | 0.001 | 0.003 | 0.003 | 0.004 | 0.001 |
| 100 - 199 | 0.011 | 0.010 | 0.011 | 0.007 | 0.007 | 0.006 | 0.010 | 0.006 |
| 50 - 99 | 0.016 | 0.016 | 0.020 | 0.016 | 0.012 | 0.012 | 0.018 | 0.014 |
| < 50 | 0.030 | 0.030 | 0.046 | 0.041 | 0.027 | 0.027 | 0.043 | 0.038 |
| 7-12 months on treatment |  |  |  |  |  |  |  |  |
| > 500 | 0.005 | 0.004 | 0.005 | 0.005 | 0.005 | 0.004 | 0.005 | 0.005 |
| 350 - 499 | 0.010 | 0.010 | 0.012 | 0.013 | 0.008 | 0.010 | 0.009 | 0.013 |
| 250 - 349 | 0.011 | 0.013 | 0.013 | 0.020 | 0.009 | 0.011 | 0.010 | 0.016 |
| 200 - 249 | 0.011 | 0.014 | 0.013 | 0.022 | 0.009 | 0.011 | 0.011 | 0.017 |
| 100 - 199 | 0.014 | 0.017 | 0.016 | 0.027 | 0.011 | 0.014 | 0.013 | 0.021 |
| 50 - 99 | 0.016 | 0.020 | 0.019 | 0.032 | 0.013 | 0.016 | 0.015 | 0.025 |
| < 50 | 0.020 | 0.025 | 0.024 | 0.041 | 0.017 | 0.020 | 0.020 | 0.033 |
| Greater than 12 months on treatment |  |  |  |  |  |  |  |  |
| > 500 | 0.004 | 0.004 | 0.003 | 0.004 | 0.003 | 0.003 | 0.002 | 0.003 |
| 350 - 499 | 0.004 | 0.005 | 0.004 | 0.005 | 0.003 | 0.004 | 0.003 | 0.003 |
| 250 - 349 | 0.004 | 0.005 | 0.004 | 0.005 | 0.003 | 0.004 | 0.003 | 0.003 |
| 200 - 249 | 0.004 | 0.005 | 0.004 | 0.006 | 0.003 | 0.004 | 0.003 | 0.004 |
| 100 - 199 | 0.005 | 0.006 | 0.006 | 0.008 | 0.004 | 0.005 | 0.004 | 0.006 |
| 50 - 99 | 0.006 | 0.008 | 0.007 | 0.010 | 0.005 | 0.006 | 0.005 | 0.008 |
| < 50 | 0.008 | 0.010 | 0.009 | 0.014 | 0.007 | 0.008 | 0.007 | 0.011 |
|  |  |  |  |  |  |  |  |  |
| Latin America and Caribbean |  |  |  |  |  |  |  |  |
|  | Male |  |  |  | Female |  |  |  |
|  | 15 - 24 | 25 - 34 | 35 - 44 | 45 -54 | 15 - 24 | 25 - 34 | 35 - 44 | 45 -54 |
| 0-6 months on treatment |  |  |  |  |  |  |  |  |
| > 500 | 0.000 | 0.001 | 0.001 | 0.003 | 0.000 | 0.001 | 0.001 | 0.003 |
| 350 - 499 | 0.000 | 0.001 | 0.001 | 0.003 | 0.000 | 0.001 | 0.001 | 0.003 |
| 250 - 349 | 0.021 | 0.006 | 0.010 | 0.014 | 0.014 | 0.004 | 0.007 | 0.008 |
| 200 - 249 | 0.025 | 0.008 | 0.013 | 0.017 | 0.017 | 0.005 | 0.008 | 0.011 |
| 100 - 199 | 0.052 | 0.017 | 0.028 | 0.041 | 0.036 | 0.011 | 0.019 | 0.027 |
| 50 - 99 | 0.098 | 0.033 | 0.054 | 0.080 | 0.067 | 0.022 | 0.037 | 0.054 |
| < 50 | 0.249 | 0.084 | 0.140 | 0.211 | 0.171 | 0.057 | 0.096 | 0.144 |
| 7-12 months on treatment |  |  |  |  |  |  |  |  |
| > 500 | 0.005 | 0.004 | 0.005 | 0.005 | 0.005 | 0.004 | 0.005 | 0.005 |
| 350 - 499 | 0.011 | 0.010 | 0.011 | 0.013 | 0.009 | 0.010 | 0.008 | 0.012 |
| 250 - 349 | 0.013 | 0.015 | 0.012 | 0.018 | 0.010 | 0.011 | 0.009 | 0.013 |
| 200 - 249 | 0.014 | 0.016 | 0.013 | 0.020 | 0.011 | 0.012 | 0.010 | 0.014 |
| 100 - 199 | 0.018 | 0.021 | 0.018 | 0.027 | 0.014 | 0.016 | 0.013 | 0.020 |
| 50 - 99 | 0.023 | 0.027 | 0.023 | 0.035 | 0.018 | 0.020 | 0.017 | 0.026 |
| < 50 | 0.032 | 0.037 | 0.032 | 0.051 | 0.025 | 0.028 | 0.024 | 0.038 |
| Greater than 12 months on treatment |  |  |  |  |  |  |  |  |
| > 500 | 0.005 | 0.004 | 0.004 | 0.005 | 0.004 | 0.004 | 0.003 | 0.003 |
| 350 - 499 | 0.005 | 0.006 | 0.005 | 0.006 | 0.004 | 0.005 | 0.003 | 0.003 |
| 250 - 349 | 0.006 | 0.007 | 0.005 | 0.006 | 0.004 | 0.005 | 0.004 | 0.004 |
| 200 - 249 | 0.006 | 0.007 | 0.006 | 0.007 | 0.005 | 0.005 | 0.004 | 0.005 |
| 100 - 199 | 0.008 | 0.010 | 0.008 | 0.011 | 0.006 | 0.007 | 0.006 | 0.007 |
| 50 - 99 | 0.011 | 0.012 | 0.010 | 0.015 | 0.008 | 0.009 | 0.007 | 0.010 |
| < 50 | 0.015 | 0.018 | 0.015 | 0.022 | 0.012 | 0.013 | 0.011 | 0.016 |
|  |  |  |  |  |  |  |  |  |
| Southern Africa |  |  |  |  |  |  |  |  |
|  | Male |  |  |  | Female |  |  |  |
|  | 15 - 24 | 25 - 34 | 35 - 44 | 45 -54 | 15 - 24 | 25 - 34 | 35 - 44 | 45 -54 |
| 0-6 months on treatment |  |  |  |  |  |  |  |  |
| > 500 | 0.005 | 0.004 | 0.005 | 0.005 | 0.005 | 0.004 | 0.005 | 0.005 |
| 350 - 499 | 0.011 | 0.010 | 0.013 | 0.013 | 0.011 | 0.010 | 0.013 | 0.013 |
| 250 - 349 | 0.026 | 0.026 | 0.036 | 0.032 | 0.026 | 0.026 | 0.036 | 0.032 |
| 200 - 249 | 0.061 | 0.056 | 0.059 | 0.059 | 0.053 | 0.043 | 0.044 | 0.043 |
| 100 - 199 | 0.111 | 0.093 | 0.098 | 0.104 | 0.087 | 0.072 | 0.075 | 0.078 |
| 50 - 99 | 0.181 | 0.152 | 0.162 | 0.176 | 0.141 | 0.119 | 0.126 | 0.135 |
| < 50 | 0.397 | 0.337 | 0.360 | 0.401 | 0.312 | 0.264 | 0.282 | 0.312 |
| 7-12 months on treatment |  |  |  |  |  |  |  |  |
| > 500 | 0.005 | 0.004 | 0.005 | 0.005 | 0.005 | 0.004 | 0.005 | 0.005 |
| 350 - 499 | 0.011 | 0.010 | 0.013 | 0.013 | 0.011 | 0.010 | 0.013 | 0.013 |
| 250 - 349 | 0.024 | 0.026 | 0.032 | 0.032 | 0.018 | 0.023 | 0.024 | 0.030 |
| 200 - 249 | 0.026 | 0.033 | 0.034 | 0.045 | 0.019 | 0.025 | 0.025 | 0.032 |
| 100 - 199 | 0.032 | 0.042 | 0.043 | 0.058 | 0.024 | 0.032 | 0.032 | 0.042 |
| 50 - 99 | 0.041 | 0.052 | 0.055 | 0.075 | 0.031 | 0.040 | 0.041 | 0.056 |
| < 50 | 0.058 | 0.075 | 0.080 | 0.111 | 0.045 | 0.058 | 0.061 | 0.084 |
| Greater than 12 months on treatment |  |  |  |  |  |  |  |  |
| > 500 | 0.005 | 0.004 | 0.005 | 0.005 | 0.005 | 0.004 | 0.005 | 0.004 |
| 350 - 499 | 0.009 | 0.010 | 0.010 | 0.010 | 0.006 | 0.007 | 0.006 | 0.005 |
| 250 - 349 | 0.009 | 0.012 | 0.011 | 0.011 | 0.006 | 0.008 | 0.007 | 0.006 |
| 200 - 249 | 0.010 | 0.013 | 0.012 | 0.013 | 0.007 | 0.009 | 0.008 | 0.007 |
| 100 - 199 | 0.013 | 0.017 | 0.016 | 0.019 | 0.009 | 0.012 | 0.011 | 0.011 |
| 50 - 99 | 0.017 | 0.022 | 0.022 | 0.027 | 0.012 | 0.016 | 0.015 | 0.018 |
| < 50 | 0.025 | 0.032 | 0.033 | 0.044 | 0.019 | 0.024 | 0.024 | 0.031 |
|  |  |  |  |  |  |  |  |  |
| West Africa |  |  |  |  |  |  |  |  |
|  | Male |  |  |  | Female |  |  |  |
|  | 15 - 24 | 25 - 34 | 35 - 44 | 45 -54 | 15 - 24 | 25 - 34 | 35 - 44 | 45 -54 |
| 0-6 months on treatment |  |  |  |  |  |  |  |  |
| > 500 | 0.003 | 0.001 | 0.000 | 0.000 | 0.003 | 0.001 | 0.000 | 0.000 |
| 350 - 499 | 0.004 | 0.002 | 0.000 | 0.000 | 0.004 | 0.001 | 0.000 | 0.000 |
| 250 - 349 | 0.006 | 0.003 | 0.002 | 0.000 | 0.006 | 0.003 | 0.001 | 0.000 |
| 200 - 249 | 0.009 | 0.006 | 0.004 | 0.001 | 0.008 | 0.005 | 0.004 | 0.001 |
| 100 - 199 | 0.026 | 0.020 | 0.019 | 0.021 | 0.024 | 0.019 | 0.018 | 0.019 |
| 50 - 99 | 0.062 | 0.052 | 0.052 | 0.063 | 0.059 | 0.049 | 0.049 | 0.059 |
| < 50 | 0.227 | 0.195 | 0.200 | 0.255 | 0.215 | 0.185 | 0.189 | 0.241 |
| 7-12 months on treatment |  |  |  |  |  |  |  |  |
| > 500 | 0.005 | 0.004 | 0.001 | 0.000 | 0.005 | 0.001 | 0.000 | 0.000 |
| 350 - 499 | 0.009 | 0.005 | 0.002 | 0.000 | 0.006 | 0.002 | 0.000 | 0.000 |
| 250 - 349 | 0.011 | 0.006 | 0.004 | 0.002 | 0.007 | 0.003 | 0.001 | 0.000 |
| 200 - 249 | 0.013 | 0.008 | 0.005 | 0.003 | 0.009 | 0.004 | 0.002 | 0.000 |
| 100 - 199 | 0.023 | 0.015 | 0.012 | 0.013 | 0.016 | 0.010 | 0.007 | 0.006 |
| 50 - 99 | 0.036 | 0.025 | 0.021 | 0.025 | 0.025 | 0.017 | 0.013 | 0.015 |
| < 50 | 0.065 | 0.047 | 0.041 | 0.054 | 0.047 | 0.033 | 0.029 | 0.036 |
| Greater than 12 months on treatment |  |  |  |  |  |  |  |  |
| > 500 | 0.005 | 0.002 | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.000 |
| 350 - 499 | 0.006 | 0.002 | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.000 |
| 250 - 349 | 0.008 | 0.003 | 0.001 | 0.000 | 0.004 | 0.001 | 0.000 | 0.000 |
| 200 - 249 | 0.009 | 0.005 | 0.002 | 0.000 | 0.006 | 0.002 | 0.000 | 0.000 |
| 100 - 199 | 0.016 | 0.010 | 0.007 | 0.006 | 0.011 | 0.006 | 0.003 | 0.001 |
| 50 - 99 | 0.026 | 0.017 | 0.014 | 0.016 | 0.018 | 0.011 | 0.008 | 0.008 |
| < 50 | 0.049 | 0.034 | 0.029 | 0.037 | 0.035 | 0.024 | 0.020 | 0.024 |

Epidemiological parameter values in the Goals model

|  |  |  |
| --- | --- | --- |
| Parameter | Value | Source |
| Transmission of HIV per act (female to male) | 0.0011 | Baggeley *et al[[1]](#endnote-1).*, Gray *et al.* |
| Multiplier on transmission per act for   * Male to female * Presence of STI * MSM contacts | 1.0  8  2.6 | Galvin and Cohen[[2]](#endnote-2), 2.2-11.3  Powers *et a.l[[3]](#endnote-3).* 5.1-8.2  Vittinghoff *et al[[4]](#endnote-4).* |
| Relative infectiousness by stage of infection   * Primary infection * Asymptomatic * Symptomatic * On ART | 9 –  40  1  7  0.04 – 0.08 | Boily *et a.l[[5]](#endnote-5).* 9.17 (4.47-18.81)  Pinkerton[[6]](#endnote-6)  Reference stage  Boily *et al6.* 7.27 (4.45-11.88)  Cohen *et al.[[7]](#endnote-7)*  Attia *et al.[[8]](#endnote-8)* |
| Efficacy in reducing HIV transmission   * Condom use * Male circumcision * PrEP * Microbicide | 0.8  0.6  0.55 – 0.73  0.6 | Weller and Davis[[9]](#endnote-9)  Auvert *et al[[10]](#endnote-10)*, Gray *et al*. (2007)[[11]](#endnote-11), Bailey *et al*.[[12]](#endnote-12)  Grant *et al.[[13]](#endnote-13)*  Partners PrEP Study  Abdool Karim *et al.[[14]](#endnote-14)* |

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