# Appendix

### Model parameters

Model parameters for the disease transition and diagnostic parts of the model and their sources are documented in Table 1. Parameters for sensitivity and specificity of the diagnostic tests and their sources were derived from prior publications 1 2 3,4. Parameters for population size and mortality were obtained from the Office for National Statistics5 6, and for dementia prevalence from Alzheimer’s Research U.K. 7 Prevalence of MCI was calculated using the population data and age-specific prevalence estimates from a meta-analysis by Petersen et al. 8 and applied to the English population statistics. Transition probabilities from cognitively normal to MCI and MCI to dementia were obtained from meta-analyses by Gillis et. al 9 and Mitchell and Shiri-Feshki10, respectively.

## Appendix Table 1: Model parameters and sources

|  |  |  |
| --- | --- | --- |
|  | Value | Reference |
| Projected England population (50 years and older) |
|  2020 | 119,344,000 | 5 |
|  2025 | 126,287,000 |
|  2030 | 132,405,000 |
|  2035 | 138,792,000 |
|  2040 | 145,201,000 |
|  2045 | 151,636,000 |
|  2050 | 156,729,000 |
| Initial prevalence  |
|  Cognitively normal  | 85% | 8  |
|  MCI | 9% | 8  |
|  Dementia | 6% | 7  |
|  Proportion of MCI patients with Alzheimer’s disease  | 55% | 11  |
| Annual mortality rate by age group (%)  |
|  50-54 | 0.4 | 6  |
|  55-64 | 0.9 |
|  65-74 | 1.8 |
|  75-84 | 4.5 |
|  85+ | 13.6 |
| Hazard ratio for excess mortality |
|  MCI | 1.43 | 12 |
|  Dementia | 3.26 | 13 14 |
| Annual transition probability  |
|  Cognitively normal to MCI, age 50-54 | 0.010 | 15  |
| Age 55-59 | 0.010 |
| Age 60-64 | 0.015 |
| Age 65-69 | 0.015 |
| Age 70-74 | 0.024 |
| Age 75-79 | 0.026 |
| Age 80-84 | 0.050 |
| Age >=85 | 0.074 |
|  MCI to dementia | 0.065 | 10  |
| Initial and confirmatory tests  |
|  MMSE – Sensitivity  | 0.82 | 2  |
|  MMSE – Specificity  | 0.73 |
|  Blood-based biomarker test (Abeta42/40) – Sensitivity  | 0.89 | 1 |
|  Blood-based biomarker test (Abeta42/40) – Specificity  | 0.69 |
|  Confirmatory cognitive testing – Sensitivity  | 0.95 | Assumption |
|  Confirmatory cognitive testing – Specificity  | 0.95 | Assumption |
|  Confirmatory testing with CSF (pTau/Abeta42) – Sensitivity  | 0.91 | 4  |
|  Confirmatory testing with CSF (pTau/Abeta42) – Specificity  | 0.89 |
|  Confirmatory testing with PET – Sensitivity | 0.92 | 3  |
|  Confirmatory testing with PET – Specificity | 0.95 |

## Appendix Table 2: Overall investment cost over ten years for expanding England’s Alzheimer’s disease diagnostic infrastructure to meet 18-week average wait times target and resulting expansion of services

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  **Fixed cost** | **Variable Cost** | **Total cost** | **Number of added services** | **Share of overall investment** |
| **Memory Assessment Services** |   | £ 6,231,949,898  | £ 6,231,949,898  | 55,446,098 | 39% |
| **PET Scanners** | £ 359,760,493  | £ 2,700,700,149  | £ 3,060,460,642  | 1,937,500 | 19% |
| **CSF Analysis** |   | £ 1,363,493,637  | £ 1,363,493,637  | 1,627,500 | 9% |
| **MRI Scanners** | £ 3,279,790,957  | £ 1,880,204,653  | £ 5,159,995,610  | 46,194,000 | 33% |
| **Total Investment** |   |   | £ 15,815,899,787  |  |   |

## Appendix Table 3: Overall investment cost over ten years for expanding England’s Alzheimer’s disease diagnostic infrastructure to close half of the gap to G7 average levels and resulting expansion of services

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  **Fixed cost** | **Variable Cost** | **Total cost** | **Number of added services** | **Share of overall investment** |
| **Memory Assessment Services** |   | £ 2,111,592,357  | £ 2,111,592,357  | 18,786,986 | 20% |
| **PET Scanners** |  £ 251,010,964  | £ 1,914,379,877  | £ 2,165,390,841  | 1,375,000 | 21% |
| **CSF Analysis** |   | £ 966,506,697  | £ 966,506,697  | 1,155,000 | 9% |
| **MRI Scanners** |  £ 3,279,790,957  | £ 1,880,204,653  | £ 5,159,995,610  | 46,194,000 | 50% |
| **Total Investment** |   |   | £10,403,485,505  |  |   |

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