Trends in disease and how they will impact on disability in the older population

R. Matthews, C. Jagger & MRC CFAS
Background

- Projections of future numbers with disability often apply current age specific prevalence's to total population projection
- Do not take into account trends in disease
- Models of disablement place disease at the start of the process
Aim

- To use a macro simulation model, linking diseases with disability to determine the future burden of disability in the older population under different scenarios in disease trends
The data - MRC CFAS

- Uses 5 centres
- Stratified random sample aged 65+
- Includes those in institutions
- N=13004 at baseline (1992)
- 2 year follow-up
- Death information from National Death Registry
Measures

Disability

- Inability to perform at least one of: put on shoes or socks, have a bath or all over wash, or transfer to and from bed

Diseases

- **Self reported**: 11 diseases, including diagnosed stroke, CHD and arthritis
- **Diagnostic scales**: cognitive impairment (MMSE 0-21: moderate or severe, 22-25: mild), angina and peripheral vascular disease.
Methods

- **Stage 1: Modelling transitions**
  - Trichotomous logistic regression model linking diseases with onset of disability or death in those NOT disabled at baseline (N=8,693)
  - Observed probabilities of recovery or death by 2 year age group in those disabled at baseline

- **Stage 2: Simulation phase**
  - Applies age-specific prevalence of disability and transition rates to England & Wales population to estimate population by disability 2 years later.

- **DFLE and LE**
  - Life expectancy calculated from abridged life tables
  - DFLE calculated using Sullivan’s method
Simulation model

- **CFAS disability prevalence**
- **Trends in disease prevalence**
- **CFAS disease prevalence**
- **E&W Population Age 65+**
- **Propn dying or becoming disabled**
- **Population 2 yrs on**
- **Future Popn by disability**
- **New 65-66 yr olds**

**Effects of treatments**

\( \beta \)s for onset and death from model
Scenario 1: Population ageing alone

- Age-specific prevalence of diseases, incidence & recovery rates all remain the same.

- Mortality rates continue to fall according to levels set by GAD principal projection.
Scenario 2: Current trends in health continue

- Prevalence of arthritis, stroke, CHD and cognitive impairment **INCREASED** by 2% every 2 years from 2012

- Onset of disability **INCREASED** by 10% from 2012 in those with arthritis, stroke and CHD

- Mortality from Stroke, CHD and mild cognitive impairment **REDUCED** by 5% from 2012
Scenario 3: Improving population health

- Prevalence of arthritis, stroke, CHD, and mild CI **REDUCED** by 2% every 2 years from 2012

- Onset of disability **REDUCED** by 10% in those with arthritis, stroke, CHD and mild CI from 2012

- Mortality **REDUCED** by further 5% in those with stroke, CHD and mild CI from 2015
Scenario 1: Population ageing alone

- Total population aged 65+ years increases from 8.9 million in 2006 to 12.3 million in 2026
- Disabled population increases from 0.9 million to 1.6 million
- Life expectancy increases by 2.6 years at age 65, and 1.7 years at age 85
- Gain in DFLE of 1.5 years at age 65 and 0.6 years at age 85
LE and DFLE at age 65 in 2006 and 2026

<table>
<thead>
<tr>
<th></th>
<th>2006 Ageing only</th>
<th>2026 Ageing only</th>
<th>2006 Current trends continue</th>
<th>2026 Current trends continue</th>
<th>2006 Improved health</th>
<th>2026 Improved health</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFLE</td>
<td>16.4</td>
<td>17.9</td>
<td>16.4</td>
<td>17.2</td>
<td>16.4</td>
<td>18.7</td>
</tr>
<tr>
<td>DLE</td>
<td>1.8</td>
<td>2.9</td>
<td>1.8</td>
<td>3.0</td>
<td>1.8</td>
<td>2.8</td>
</tr>
</tbody>
</table>

DFLE & DLE
### Increases in DLE relative to LE

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Increase from 2006 to 2026 in LE</th>
<th>DFLE</th>
<th>DLE</th>
<th>%DFLE/LE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>At age 65</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ageing only</td>
<td>2.6</td>
<td>1.5</td>
<td>1.1</td>
<td>-4.2</td>
</tr>
<tr>
<td>Current trends continue</td>
<td>2.1</td>
<td>0.8</td>
<td>1.2</td>
<td>-4.9</td>
</tr>
<tr>
<td>Improved health</td>
<td>3.4</td>
<td>2.3</td>
<td>1.0</td>
<td>-3.5</td>
</tr>
<tr>
<td><strong>At age 85</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ageing only</td>
<td>1.7</td>
<td>0.6</td>
<td>1.1</td>
<td>-8.3</td>
</tr>
<tr>
<td>Current trends continue</td>
<td>1.3</td>
<td>0.1</td>
<td>1.2</td>
<td>-11.6</td>
</tr>
<tr>
<td>Improved health</td>
<td>2.3</td>
<td>1.2</td>
<td>1.0</td>
<td>-5.1</td>
</tr>
</tbody>
</table>
Further improvement in health

- Prevalence **REDUCED** by 2, 10, 20 & 50% every 2 years from 2012 for:
  - Arthritis
  - Stroke
  - CHD
  - Cognitive impairment (from 2016)

- Reductions of 10, 20 & 50% in disabling consequences of the diseases
## Increases in DFLE relative to LE

<table>
<thead>
<tr>
<th>REDUCTION in disabling effect/prevalence</th>
<th>Increase from 2006 to 2026 in</th>
<th>LE</th>
<th>DFLE</th>
<th>DLE</th>
<th>%DFLE/LE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At age 65</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disabling effect 10% / Prevalence 2%</td>
<td></td>
<td>3.3</td>
<td>2.3</td>
<td>1.0</td>
<td>-3.1</td>
</tr>
<tr>
<td>Disabling effect 10% / Prevalence 10%</td>
<td></td>
<td>5.2</td>
<td>4.2</td>
<td>1.0</td>
<td>-2.1</td>
</tr>
<tr>
<td>Disabling effect 10% / Prevalence 50%</td>
<td></td>
<td>8.1</td>
<td>7.2</td>
<td>0.8</td>
<td>-0.4</td>
</tr>
<tr>
<td>Disabling effect 50% / Prevalence 50%</td>
<td></td>
<td>8.0</td>
<td>7.2</td>
<td>0.8</td>
<td>0</td>
</tr>
<tr>
<td>At age 85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disabling effect 10% / Prevalence 2%</td>
<td></td>
<td>2.2</td>
<td>1.2</td>
<td>1.0</td>
<td>-5.3</td>
</tr>
<tr>
<td>Disabling effect 10% / Prevalence 10%</td>
<td></td>
<td>3.5</td>
<td>2.6</td>
<td>0.9</td>
<td>0.2</td>
</tr>
<tr>
<td>Disabling effect 10% / Prevalence 50%</td>
<td></td>
<td>5.6</td>
<td>5.0</td>
<td>0.6</td>
<td>7.7</td>
</tr>
<tr>
<td>Disabling effect 50% / Prevalence 50%</td>
<td></td>
<td>5.6</td>
<td>5.0</td>
<td>0.6</td>
<td>7.7</td>
</tr>
</tbody>
</table>
Conclusions

- Life expectancy will continue to rise, but most of extra years spent with disability
- Absolute compression of health is unlikely under any improvement in population health.
- A relative compression of disability could occur at age 85 if key diseases reduced by 10% and a 10% reduction in their disabling effect.
- Severity of disability considered may be important.