Disability in later life: causes, consequences and future prospects

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Supporting partner
- Department for Work and Pensions

MAP2030

Mortality trends and their implications (WP1)
Changing family units & kinship structure (WP3)
Household & family resources (WP4)

Future disease patterns & their implications for disability in later life (WP2)
Projections of pensions, incomes, savings, care (paid & unpaid); expenditure on pensions & long-term care (WP5)
WHY ARE DISEASE AND DISABILITY IMPORTANT AND HOW DO WE PREDICT FUTURE POPULATIONS?

Background

- Growing numbers of frail and disabled older people
- Focus on quality of extra years lived
  - Ability to self care
- Population indicators such as disability free life expectancy (DFLE) more important
Background – disease and disability

- Disease at start of disability process
- Major causes:
  - Acute & chronic diseases
  - Sensory problems, arthritis, incontinence, dementia & depression
- Considerable temporal trends in disabling conditions

The data - MRC CFAS

- Uses 5 centres
- Stratified random sample aged 65+
- Includes those in institutions
- N=13004 at baseline (1995)
- 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.
**Transition model**

- 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
- Future enhancements:
  - Different severity levels of disability

**Simulation model**

- Applies age-specific prevalence of disability as and transition rates to England & Wales population to estimate population by disability 2 years later.
- Future enhancements:
  - Gender specific projections
  - Extend projections to 2034

**Simulation model (2)**

- CFAS disability prevalence
- Trends in disease prevalence
- CFAS disease prevalence
- E&W Population Age 65+
- Proportion dying or becoming disabled
- Population 2 yrs on
- Future Popn by disability
- Effects of treatments
- New 65-66 yr olds
- Propn dying or becoming disabled
What affects prevalence?

- Incidence
- Cure
- Risk factors
- Early detection
- Prevalence
- Non-curative treatment
- Increased severity
- Death

Literature review

Systematic review in disease areas for good evidence of:

- Important risk factors
  - Association with disease, disability or survival with disease
  - Risk factor trends
- Potentially effective preventative strategies and treatments
  - Beneficial effect upon disease incidence, disease-specific disability or survival with disease

How might disease impact on future disability?
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.

Ageing alone

Comparison between 2006 and 2026:
- Total population increases from 8.9m to 12.3m
- Disabled population increases from 0.9m to 1.6m
- Numbers with disease increase by 40-60%:
  - arthritis increase from 4.7m to 6.5m
  - CHD increase from 2.0m to 2.8m
  - stroke increase from 0.7m to 1.0m
  - dementia increase from 0.8m to 1.3m

Size of disabled population: Ageing alone
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

Increases in disability and disease

<table>
<thead>
<tr>
<th></th>
<th>Ageing only</th>
<th>Current trends continue</th>
<th>Improved health</th>
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</thead>
<tbody>
<tr>
<td>Increase in millions (%) from 2006 to 2026 in:</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Total population</td>
<td>3.48 (39%)</td>
<td>3.34 (38%)</td>
<td>3.69 (42%)</td>
</tr>
<tr>
<td>Disabled population</td>
<td>0.70 (82%)</td>
<td>0.80 (94%)</td>
<td>0.62 (73%)</td>
</tr>
<tr>
<td>Arthritis</td>
<td>1.87 (40%)</td>
<td>1.81 (39%)</td>
<td>2.00 (43%)</td>
</tr>
<tr>
<td>CHD</td>
<td>0.80 (40%)</td>
<td>0.77 (38%)</td>
<td>0.85 (42%)</td>
</tr>
<tr>
<td>Stroke</td>
<td>0.32 (48%)</td>
<td>0.33 (49%)</td>
<td>0.32 (48%)</td>
</tr>
<tr>
<td>Dementia</td>
<td>0.51 (63%)</td>
<td>0.53 (65%)</td>
<td>0.51 (63%)</td>
</tr>
</tbody>
</table>
LE, DFLE and DLE in 2006 under ageing only

LE, DFLE, DLE and %DFLE/LE in 2006 under ageing only

Increases in DFLE relative to LE

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
Disabled population under further health improvements

Total population under further health improvements

Increases in DFLE relative to LE

<table>
<thead>
<tr>
<th>REDUCTION in disabling effect/prevalence</th>
<th>Increase from 2006 to 2026 in</th>
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<tbody>
<tr>
<td></td>
<td>LE</td>
<td>DFLE</td>
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<tr>
<td>At age 65</td>
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<tr>
<td>Disabling effect 10% / Prevalence 2%</td>
<td>2.3</td>
<td>2.3</td>
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<tr>
<td>Disabling effect 10% / Prevalence 10%</td>
<td>5.2</td>
<td>4.2</td>
</tr>
<tr>
<td>Disabling effect 50% / Prevalence 10%</td>
<td>5.1</td>
<td>7.2</td>
</tr>
<tr>
<td>Disabling effect 50% / Prevalence 50%</td>
<td>9.2</td>
<td>7.2</td>
</tr>
<tr>
<td>At age 85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disabling effect 10% / Prevalence 2%</td>
<td>2.2</td>
<td>1.0</td>
</tr>
<tr>
<td>Disabling effect 10% / Prevalence 10%</td>
<td>4.5</td>
<td>2.6</td>
</tr>
<tr>
<td>Disabling effect 50% / Prevalence 10%</td>
<td>5.6</td>
<td>5.0</td>
</tr>
<tr>
<td>Disabling effect 50% / Prevalence 50%</td>
<td>9.6</td>
<td>5.6</td>
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Increases in DFLE relative to LE
Conclusions (1)

- 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.

Conclusions (2)

- Ageing alone will produce 82% increase in numbers with significant disability and 40-60% increases in numbers with key diseases
- Improving population health results more older people overall and reductions in the prevalence of diseases barely contain the effects of population ageing on disability.
- If current trends continue there will be a 94% increase in numbers with disability and numbers with stroke and dementia will increase.

WHAT EFFECT DOES THIS HAVE ON THE NEED FOR LTC AND EXPENDITURE?
**MAP2030**

- Mortality trends and their implications (WP1)
- Future disease patterns & their implications for disability in later life (WP2)
- Changing family units & kinship structure (WP3)
- Projections of pensions, incomes, savings, care (paid & unpaid); expenditure on pensions & long-term care (WP5)
- Household & family resources (WP4)

**PSSRU MODEL**

The PSSRU model aims to make projections of:

- Numbers of disabled older people
- Long-term care services and disability benefits
- Long-term care expenditure: public and private
- Social care workforce

A macro-simulation, cell-based model.

**Linking the two models**

- The age-specific prevalence of disability from the epidemiological model are incorporated in the PSSRU model for all projection years.
- The new disability scenarios substitute for the "base" assumption of constant age-specific prevalence of disability.
CENTRAL PSSRU BASE CASE

- Official principal population projection, by age, gender, and marital status
- Unchanged age-specific disability rates
- No change in patterns of formal and informal care
- Unit costs rise by 2% per year in real terms (but constant for non-staff, non-capital costs)
- No change in financing system from current system in England

Future long-term care expenditure

<table>
<thead>
<tr>
<th>% of Gross Domestic Product</th>
<th>2006</th>
<th>2007</th>
<th>2012</th>
<th>2017</th>
<th>2022</th>
<th>2027</th>
<th>2032</th>
<th>2042</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant Disability prevalence</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Constant Illness prevalence</td>
<td></td>
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<tr>
<td>Improved health</td>
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<tr>
<td>Continuation of previous trends</td>
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Projected number of service users and long-term care expenditure.

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2042</th>
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</thead>
<tbody>
<tr>
<td>Home care</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant Disability prevalence</td>
<td>23000</td>
<td>614000</td>
</tr>
<tr>
<td>Constant Illness prevalence</td>
<td>644000</td>
<td>628000</td>
</tr>
<tr>
<td>Improved health</td>
<td>663000</td>
<td></td>
</tr>
<tr>
<td>Total LTC Expenditure (Billion)</td>
<td></td>
<td></td>
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<tr>
<td>Institutional care</td>
<td>52000</td>
<td>779000</td>
</tr>
<tr>
<td>Constant Disability prevalence</td>
<td>875000</td>
<td>1098000</td>
</tr>
<tr>
<td>Constant Illness prevalence</td>
<td>978000</td>
<td>1968000</td>
</tr>
<tr>
<td>Improved health</td>
<td>798000</td>
<td>1968000</td>
</tr>
<tr>
<td>Continuation of previous trends</td>
<td>938000</td>
<td>1968000</td>
</tr>
</tbody>
</table>

LTC Expenditure as% of GDP

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2042</th>
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<tbody>
<tr>
<td>Home care</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5%</td>
<td>3.4%</td>
<td>3.9%</td>
</tr>
<tr>
<td>Institutional care</td>
<td></td>
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<tr>
<td>3.6%</td>
<td>4.2%</td>
<td>4.2%</td>
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Conclusions

- The PSSRU model's base case scenario of constant age-specific disability prevalence assumes, implicitly, a decline in the prevalence, the disabling consequences and/or duration of chronic illnesses, in the context of increased life expectancy.

- Unless there is strong evidence that points in the direction of such declines, constant age-specific prevalence of disability is an optimistic (instead of neutral) assumption.

- Improvements in the future health of older people would have a substantial impact on future care needs and associated expenditure.

Future linkages

- Gender specific outputs from SIMPOP

- Use of standardised disability measure equivalent for all surveys with different severity levels

- Link with WP1 for different life expectancy variants