Comparison of methods and programs for calculating health life expectancies.

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Outline

- Software used to calculate health expectancies
- Worked example - CFAS Data
  - ADL
  - MMSE
- Summary
Longitudinal software

- **iMaCh**: A maximum likelihood computer program using Interpolation of Markov Chains
- **SPACE**: Stochastic Population Analysis for Complex Events
- **GLSMT**: Gibbs Sampler for Multistate Life Tables Software
- **ELECT**: Estimation of Life Expectancies using Continuous-Time multi-state models
- **LXPCT 2**: Multistate Life Expectancy Calculator
Longitudinal methods

- Discrete multi-state models
- Continuous multi-state models
- Increment decrement life tables
Longitudinal methods

- Discrete multi-state models → iMaCh, SPACE, GLSMT
- Continuous multi-state models → ELECT
- Increment decrement life tables → LXPCT_2
Summary

iMaCh:

- euroreves.ined.fr/imach/
- Latest version 0.98k
- Standalone package
- Designed for flexibility and simplicity
- Multiple living states, multiple absorbing states (not attempted!)
- Needs recovery
- Data - one line per person

SPACE:

- cdc.gov/nchs/data_access/space.htm
- Wrapper available from authors
- Runs from within SAS
- Designed for complex population sampling
- Can do semi-Markov Models (dependent on time in state)
- Data - Multiple lines, one per time point
Summary

**ELECT:**
- ucl.ac.uk/~ucakadl/indexELECT.html
- Builds from MSM in R
- Designed for continuous time multi-state models
- Data - multiple lines per person, one per state
- 3 state model (ELECT only, MSM more flexible)
- Flexible covariates, both stratification and adjustment

**GLSMT:**
- Request programme from Authors
- Based in R
- Designed to undertake Bayesian MSM
- Data - one line, two waves, one per transition (start, end)
- Lots of covariate flexibility (stratification)
Summary

LXPCT_2:

- http://ideas.repec.org/c/boc/bocode/s453001.html
- Stata ADO file
- Needs age specific transitions
- iMaCh or MSM can provide these
- Flexible number of states (both living and absorbing)
- Covariates handled by stratification
- No confidence intervals
Dates

- Continuous age (any measure)
- Month and year
- Age (single years)
- Age (months)
- One year or five year intervals
Dates

- Continuous age (any measure) → ELECT
- Month and year → iMaCh
- Age (single years) → SPACE, LXPCT_2
- Age (months) → SPACE work ongoing
- One year or five year intervals → GLSMT
MRC Cognitive Function and Ageing study

Years follow-up | Screening | Assessment
---|---|---
0 | 13,004 | 2,640
1 | 7,176 | 920
2 | 1,463 | 1,651
3 | 590 | 1,733
5 | 389 | 
8 | 3,145 | 
10 | | 

Numbers represent participants at each follow-up point.
Data summary:

- Sample size: 13,004
- Disability free life expectancy
  - Classifications of Disability:
    - State 1: No Disability
    - State 2: Mild to Severe Disability
    - State 3: Death
- Cognitive impairment free life expectancy
- Stroke free life expectancy
For comparing software:

- Females
- Sample size: 6,842
- Youngest age 64, oldest age 103
- Interval in months between two states (min 1, max 171 months)
- No missing states at baseline
- No two events in same month
- Data right-censored at 12/2005
Disability free life expectancy

**ELECT:**

<table>
<thead>
<tr>
<th>Age</th>
<th>Life Expectancy (Years)</th>
</tr>
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<tbody>
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<tr>
<td>100</td>
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</tr>
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</table>

**Legend**
- Total LE
- LE in state No Disability
- LE in state Mild−Severe Disability

**Female marginal LEs for age range specified.**

**iMaCh:**

<table>
<thead>
<tr>
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</thead>
<tbody>
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</tr>
</tbody>
</table>

**Legend**
- TLE
- LE in state (1)
- LE in state (2)
Disability free life expectancy

**Legend**
- Total LE
- LE in state No Disability
- LE in state Mild–Severe Disability

**Female marginal LEs for age range specified.**

<table>
<thead>
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<th>Life Expectancy (Years)</th>
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Disability free life expectancy

**Female marginal LEs for age range specified.**

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</tbody>
</table>

**Legend**
- Total LE
- LE in state No Disability
- LE in state Mild–Severe Disability
Disability: Comparison

LE for 75 year old females with 95% Confidence Intervals

Program
- SPACE
- IMaCh
- ELECT

Health State
- Mild-Severe Disability
- No Disability
- Total

LE in years
Cognitive Impairment

**ELECT:**

Female marginal LEs for age range specified.

**iMaCh:**

Legend
- Total LE
- LE in state MMSE 18–30
- LE in state MMSE 0–17
Space:

Female marginal LEs for age range specified.
Female marginal LEs for age range specified.

Legend
- Total LE
- LE in state MMSE 18–30
- LE in state MMSE 0–17

Life Expectancy (Years)

Age
Cognitive Impairment: Comparison

LE for 75 year old females with 95% Confidence Intervals

Program

Health State

- MMSE 0-17
- MMSE 18-30
- Total
## Summary

<table>
<thead>
<tr>
<th>Software:</th>
<th>iMaCh</th>
<th>SPACE</th>
<th>ELECT</th>
<th>GLSMT</th>
<th>LxPct 2</th>
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<td>★</td>
<td>★★★</td>
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</table>
Thanks for listening.

Questions?