

Comparison of methods and programs for calculating health life expectancies.

Fiona Matthews, **Vikki O'Neill**, Carol Jagger, Pia Wohland

REVES - 29th May 2014

MRC | Biostatistics Unit



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)

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

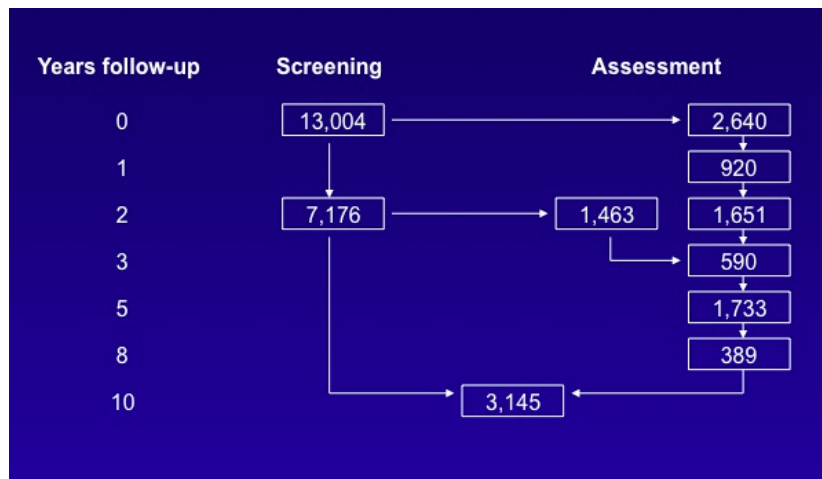
Dates

- ▶ 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



Data summary:

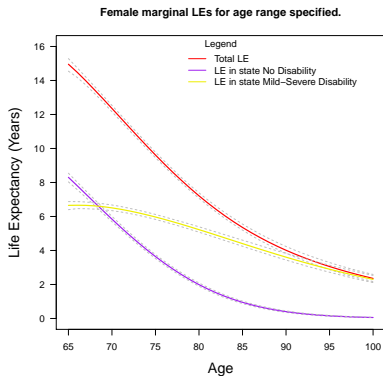
- ▶ Sample size: 13,004
- ▶ Disability free life expectancy
 - ▶ Classifications of Disability:
 - ▶ State 1: No Disability
 - ▶ State 2: Mild to Severe Disability
 - ▶ State 3: Death
- ▶ Cognitive impairment free life expectancy
- ▶ Stroke free life expectancy

For comparing software:

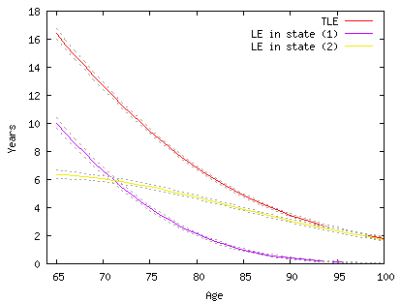
- ▶ Females
- ▶ Sample size: 6,842
- ▶ Youngest age 64, oldest age 103
- ▶ Interval in months between two states (min 1, max 171 months)
- ▶ No missing states at baseline
- ▶ No two events in same month
- ▶ Data right-censored at 12/2005

Disability free life expectancy

ELECT:

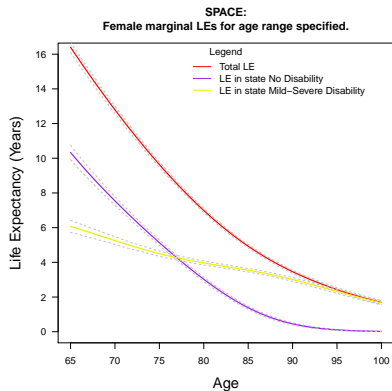


iMaCh:



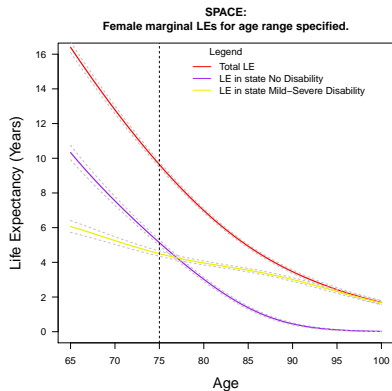
Disability free life expectancy

SPACE:



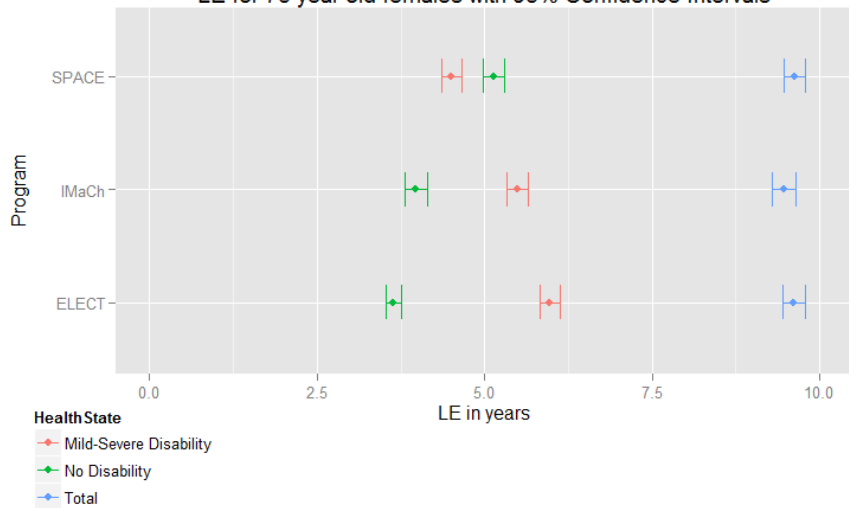
Disability free life expectancy

SPACE:



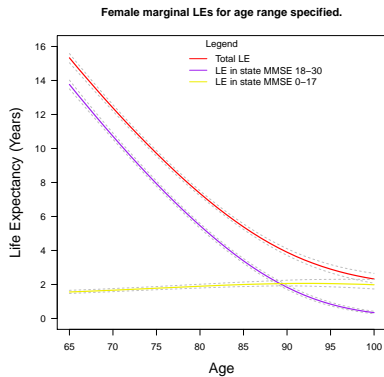
Disability: Comparison

LE for 75 year old females with 95% Confidence Intervals

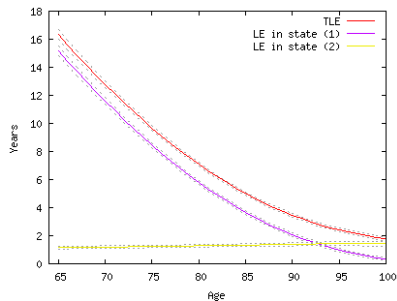


Cognitive Impairment

ELECT:

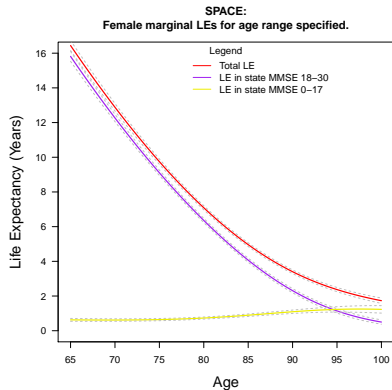


iMaCh:



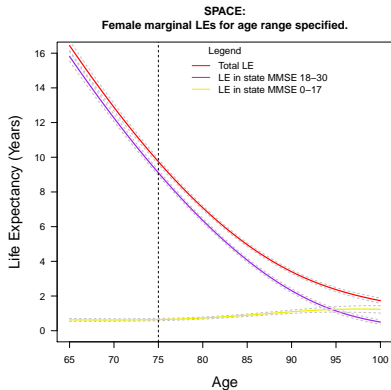
Cognitive Impairment

SPACE:

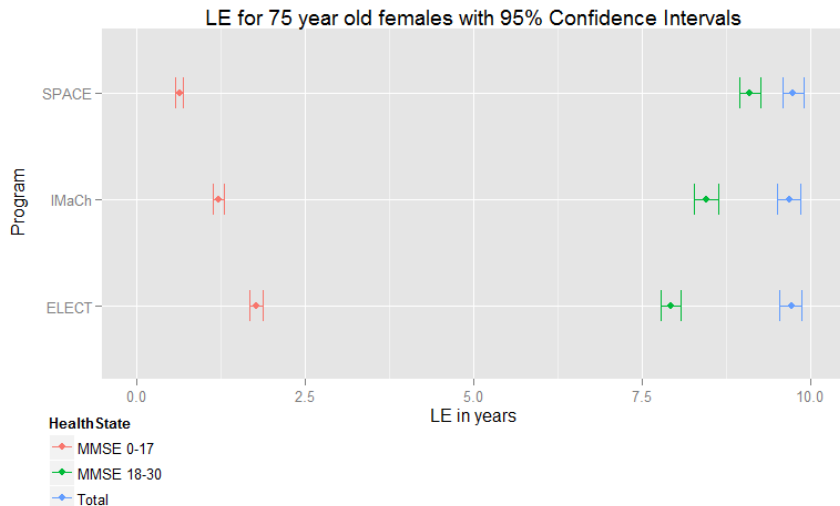


Cognitive Impairment

SPACE:



Cognitive Impairment: Comparison



Summary

Software:	iMaCh	SPACE	ELECT	GLSMT	LxPct 2
Common disorder	✓	✓	✓	✓	—
No recovery	✗	✓	✓	✓	—
Rare recovery	✓	✓	✓	✓	—
Uneven observations	✓	✓	✓	✓	—
Right censored data	✓	✗	✓	✗	—
More than two waves	✓	✓	✓	✗	—
Flexibility	★★★	★	★	★★★	★
Useability	★★★	★	★	★	★★★

Questions

Thanks for listening.

Questions?