

Software investigation.

The InHALE project comparison of methods and programs for estimation of healthy life expectancies consisted of evaluation of a number of software packages using similar data to understand differences and similarities between the packages.

The plan was to investigate iMaCh, SPACE and ELECT as they are the most widely used. However additional software packages were found (GLSMT and LXPCT_2) and were also evaluated.

- iMaCh (euroreves.ined.fr/imach/): A maximum likelihood computer program using Interpolation of Markov Chains
- SPACE (cdc.gov/nchs/data_access/space.htm): Stochastic Population Analysis for Complex Events
- GLSMT: Gibbs Sampler for Multistate Life Tables Software
- ELECT (ucl.ac.uk/~ucakadl/indexELECT.html): Estimation of Life Expectancies using Continuous-Time multi-state models
- LXPCT 2 (ideas.repec.org/c/boc/bocode/s453001.html): Multistate Life Expectancy Calculator

Different software packages used different underlying statistical methodology:

- Discrete multi-state models → iMaCh, SPACE, GLSMT
- Continuous multi-state models → ELECT
- Increment decrement life tables → LXPCT 2

The main questions to be addressed within the proposal:

1. Which software (or method) provides the most robust estimates of HALE in the presence of missing data or unequal time intervals.
2. Do different longitudinal methods provide similar estimates
3. Evaluate the accuracy and ease of use of the software

Scenarios used were

1. Cognitive impairment free life expectancy (rare and increasing prevalence)
2. Disability free life expectancy (disease with recovery)
3. Stroke free life expectancy (no recovery)

The majority of the investigation used data from the MRC Cognitive Function and Ageing study (www.cfas.ac.uk). This is a longitudinal population based study of 13,004 individuals in England and Wales where ten years of follow-up information was available together with mortality information. This study enables all three scenarios to be investigated as the information was available for all individuals on all three outcomes. The data was also amenable to investigate the difference questions initially addressed.

Results of the scenarios within the grant.

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

The output of the software investigation was a workshop at Reves which was well attended and provided researchers with understanding of the different packages and their strengths and weaknesses. This was the culmination of the effort that saw the software itself be updated based on feedback from the InHALE project. The user guides for both iMaCh and ELECT were also updated based on feedback from the InHALE project.

Core differences between the results seen in the three packages were still seen despite attempting as much as possible to create data sets that were as identical possible for software generated for such different processes. Every software package had different measures even for the measure of time (whether it was month and year, age in single years, age in months, age or one year, however these differences should not have

Conclusions:

- Results were different between the software packages that were not explained by data differences. More work is needed to understand the differences.
- iMaCh was the easiest package to learn and run