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MAX PLANCK INSTITUTE
FOR DEMOGRAPHIC RESEARCH

IMPRS-PHDS elective course

Multistate Models: Analysis from event histories and panel data

Course organizer: Jutta Gampe

Start: 23 May 2022
End: 27 May 2022
Location: Max Planck Institute for Demographic Research, Rostock, Germany

Instructors:

- Jutta Gampe, MPIDR
- Hein Putter, Leiden University Medical Center
- Ardo van den Hout, University College London

Course description

The life course of individuals can be conceived as a sequence of transitions between different states, for example

- from being healthy to being ill, possibly recovering, and finally to death or
- from living in parental home to living alone, cohabiting with a partner, with or without children, to perhaps living in an institution until death.

The aim of life course analysis is to understand the timing and sequence of transitions as well as the risk factors that accelerate or slow down transitions. Multistate models are the statistical framework to analyze life course patterns and to study and predict resulting population dynamics.

In this 4.5-days course the participants will be introduced to the concepts of multistate models and will learn how to estimate the essential quantities in the two most frequently encountered data situations: Event-histories, for which the exact times of transitions are known, and panel data, where observations are only made in (more or less) regular intervals, leading to interval-censored data.

The course will start with a brief recap of standard survival analysis on which many of the concepts in multistate modeling are based. Moving beyond two-state models the core concepts will be introduced. Besides the estimation of the key parameters, the transition intensities, derived quantities, such as expected lengths of stay in particular states, will be discussed. Selecting and validating well-fitting models, assessing uncertainty of estimates and illustrative presentation of results will also be covered.

There will be an opportunity for participants to present own research ideas within the scope of multistate models.

Organization

On-site course at MPIDR. At the moment we expect that the course will be held on-site at the MPIDR. This on-site course will be a mix of lectures and computer practicals, with about five hours of teaching per day, as indicated in the detailed schedule below. We will use the statistical software R.

Streaming option. The lectures will also be streamed live to allow online participation, at least in some limited fashion, as highlighted in the detailed schedule below. The stream will be available at https://media.demogr.mpg.de and online participants should please select "MPIDR live stream". Note that online participants will be able to watch the lectures but there will be no further interactive component. Online participants do not need to submit an application for the course, their exercises will not be supervised by the course instructors, they will not be asked to submit a take-home assignment, and they will not receive a certificate of attendance. However, to allow participants who cannot be on site to also pose questions and ask for clarification, there will be a session on Friday, May 27, that is devoted to questions that will be collected beforehand. Questions should be submitted via email to mstate@demogr.mpg.de by Thursday, May 26, 17:00 CEST.

Detailed Schedule

All times are listed in CEST (Central European Summer Time) which is the local time in Rostock during the course.

Monday, May 23

- 10:00 – 10:45 --- Orientation; Course intro
- 11:15 – 12:30 --- Recap Survival Analysis + Competing Risk I (lecture to be presented by Jutta; *to be streamed*)
- 13:30 – 14:45 --- Competing Risks II (lecture to be presented by Jutta; *to be streamed*)
- 15:15 – 16:30 --- Practice Time

Tuesday, May 24

- 09:30 – 10:45 --- Multistate Models, Exact Times I (lecture to be presented by Hein; *to be streamed*)
- 11:15 – 12:30 --- Multistate Models, Exact Times II (lecture to be presented by Hein; *to be streamed*)
- 13:30 – 14:45 --- Practice Time

Wednesday, May 25

- 09:30 – 10:45 --- Multistate Models, Exact Times III (lecture to be presented by Hein; *to be streamed*)
- 11:15 – 12:30 --- Multistate Models, Exact Times IV (lecture to be presented by Hein; *to be streamed*)
- 13:30 – 14:45 --- Practice Time
- 15:15 – 16:30 --- Multistate Models, Panel Data I (lecture to be presented by Ardo; *to be streamed*)

Thursday, May 26

- 09:30 – 10:45 --- Multistate Models, Panel Data II (lecture to be presented by Ardo; *to be streamed*)
- 11:15 – 12:30 --- Practice Time
- 13:30 – 14:45 --- Multistate Models, Panel Data III (lecture to be presented by Ardo; *to be streamed*)
- 15:15 – 16:30 --- Multistate Models, Panel Data IV (lecture to be presented by Ardo; *to be streamed*)
- 16:45 – 18:00 --- Practice Time
- Evening: Joint dinner

Friday, May 27

- 09:30 – 10:45 --- Q&A Time (send in questions by Thursday, May 26, 17:00 CEST); Extensions and Supplements; *to be streamed*
- 11:15 – 12:30 --- On-site Participants' Projects

Course prerequisites

Participants should have a good working knowledge of standard survival analysis and be familiar with the software R. Students are expected to bring their own laptops with the most recent version of R and an appropriate editor (e.g. Rstudio) installed.

Examination

Only students who will attend the on-site course in Rostock can obtain a certificate on the basis of a take-home assignment which will be handed out towards the end of the course.

General readings

- Putter, Fiocco, Geskus (2007). Tutorial in biostatistics: competing risks and multi-state models. *Statistics in Medicine*. https://doi.org/10.1002/sim.2712
- van den Hout (2016). *Multi-State Survival Models for Interval-Censored Data*. Chapman & Hall/CRC Monographs on Statistics and Applied Probability

- A list with additional references will be distributed to the participants. Slides and R-code used in the lectures will be made accessible, too.

Admission

- Course attendance is limited to doctoral students enrolled in IMPRS-PHDS, MPIDR scientific staff, and a few selected guests.
- A maximum of 25 participants will be admitted to attend the on-site course at MPIDR.

Questions about the course should be directed to phds@demogr.mpg.de.