





## PHDS – Population Health Course Outline

<b>Coordinators</b>	Jonas Schöley Marcus Ebeling	 <a href="mailto:schoeley@demogr.mpg.de">schoeley@demogr.mpg.de</a>  <a href="mailto:ebeling@demogr.mpg.de">ebeling@demogr.mpg.de</a>
<b>Date</b>	November 18-29, 2024	
<b>Time</b>	10am to 4pm CET with lunch break from 12 to 2pm	
<b>Location</b>	In person @ MPIDR room 005 with <a href="#">Zoom</a> option and Nextcloud repository Zoom Meeting-ID: 944 7854 5582 Passcode: 088614	

### Course description

This intensive two-week course introduces key substantive and methodological topics in population health. Participants will be exposed to various research areas and methods within population health, with experts on mortality trends, fertility, family dynamics, migration, aging, data visualization, causal inference, sequence analysis, and multistate methodology coming together to give a 360-degree view of the current research and methods landscape.

### Organization

The course will take place in person at MPIDR with a Zoom stream available.

Each day covers one topic taught by a domain expert. Depending on the topic and the instructor, the lecture format varies and may include a coding session, or group work. Lecture materials will be made available at least two days before the corresponding session in a Nextcloud folder. In general, students should expect to spend about 6-8 hours of effort per day on the course (lectures, discussions, readings, exercises).

### Course prerequisites

Students are expected to have basic knowledge of R. Participants need a laptop or desktop computer with current versions of R and [RStudio](#) installed. Instructions on how to download and install R can be found in “A (very) short introduction to R” by Torfs and Brauer (2014): <https://cran.r-project.org/doc/contrib/Torfs+Brauer-Short-R-Intro.pdf>.

### Examination

Active participation in all classes is required to earn the course certificate. No grades will be given beyond a pass/fail.

### General readings

To be announced. Instructors will typically assign one or two core readings, and several optional readings to develop a deeper understanding of the topic. The readings will be made available with the course materials.

## Week 1 Topics in Population Health

### Population Health in an Era of Continuous Improvement Nov 18, 10am to 4pm CET

Marcus Ebeling  [ebeling@demogr.mpg.de](mailto:ebeling@demogr.mpg.de)

Materials will be available in Nextcloud by Nov 15

The lecture offers an overview of key issues in population health through a demographic lens. We will explore the intersection of demography with public health and epidemiology, and how factors such as age, sex, and socioeconomic status shape health outcomes. We will discuss some general methodological considerations and data issues. We conclude the course by developing a map of challenges and opportunities presented by continuous progress in healthcare.

### Fertility and Health I Nov 19, 10am to 4pm CET

D. Susie Lee  [lee@demogr.mpg.de](mailto:lee@demogr.mpg.de)

Alessandro Di Nallo  [dinallo@demogr.mpg.de](mailto:dinallo@demogr.mpg.de)

Zafer Büyükkeçeci  [bueyuekkececi@demogr.mpg.de](mailto:bueyuekkececi@demogr.mpg.de)

Materials will be available in Nextcloud by Nov 15

In this module, we ask why & how fertility can be a window into population health, and vice versa. Although health is often viewed with regards to sexuality & reproductive health when it comes to fertility, bulk of research reveals that health is related to the broader process of human reproduction in an intricate and dynamic way. Moreover, such relationships unfold across the life course – early life health having a formative impact on fecundity and later life fertility, whereas reproductive history having implications for later health and even mortality. We invite everyone to exciting questions explored at the intersection of fertility and health. In the first part, we will introduce a general framework and related theories for studying the fertility-health nexus, and then showcase some example research topics and methods for examining the nexus.

### Fertility and Health II Nov 20, 10am to 1:30pm CET

D. Susie Lee  [lee@demogr.mpg.de](mailto:lee@demogr.mpg.de)

Ricarda Duerst  [duerst@demogr.mpg.de](mailto:duerst@demogr.mpg.de)

Materials will be available in Nextcloud by Nov 18

Susie Lee will present an example of the research on Fertility and Health at the MPIDR. Specifically, we will learn about the recently launched ERC Synergy project BIOSFER which aims to investigate how social, biological and psychological forces produce the emerging fertility patterns in young adults in Nordic countries, and to what extent the fertility decline and polarization can be attributed to social vs. biomedical factors. In particular, we will focus on how the BIOSFER project uses bio-social data and inter-disciplinary approaches to understand the past, present and future of fertility through the lens of health. To further develop our view into the figure, Ricarda Duerst will give a guest lecture on fertility forecasting using the Finnish data.

*Note the Süßmilch Lecture at 2pm in the Auditorium.*



### **Family Dynamics, and Health Inequalities** Nov 21, 10am to 4pm CET

Philipp Dierker  [dierker@demogr.mpg.de](mailto:dierker@demogr.mpg.de)

Materials will be available in Nextcloud by Nov 19

In this course, we will explore the interplay between family dynamics and health. We will discuss prominent theoretical approaches, such as the marital resource model and the crisis model. Additionally, we will examine how to address the phenomena of selection and causation in both theory and method. Some empirical papers will be presented, with a focus on longitudinal studies that utilize panel data analysis methods. Furthermore, we will evaluate the advantages and disadvantages of survey and register data for analyzing typical questions in the field of family and health inequalities. The second part of the course offers a brief introduction to the field of sociogenomics, specifically the use of genetic data in social science research. We will cover both twin model approaches and analyses using polygenic indices. There will also be a hands-on component, where participants will use R to create basic twin models.

### **Migration and Health** Nov 22, 10am to 4pm CET

Silvia Loi  [loi@demogr.mpg.de](mailto:loi@demogr.mpg.de)

Materials will be available in Nextcloud by Nov 20

We will focus on native-immigrant health disparities, starting with an introduction to the basic concepts, terminology, and literature on migration and health. We will describe how every phase of the migration experience is associated with different health risks, from the decision to migrate in the origin country to the arrival in the receiving country (and eventually to the return migration in later life). We will then cover key issues, core theories, and hypotheses commonly used to explain native-immigrant health disparities. We will cover “the healthy immigrant effect” and “the salmon bias,” as well as the process of deterioration of immigrant health over time, the “immigrant-native health convergence process,” and the mechanisms behind it. We will continue illustrating health disparities across immigrant generations. Last, we will focus on the intersection between ageing, health and migration.

## **Week 2 Methods in Population Health**

### **Life Course Analysis I** Nov 25, 10am to 4pm CET

Christian Dudel  [dudel@demogr.mpg.de](mailto:dudel@demogr.mpg.de)

Carla Rowold  [rowold@demogr.mpg.de](mailto:rowold@demogr.mpg.de)

Materials will be available in Nextcloud by Nov 22

Life courses can be represented as sequences of states, with individuals transitioning back and forth between states. For instance, individuals’ labor market trajectories can consist of episodes of employment, unemployment, inactivity, and retirement. In this course, we will study two methods which allow to study such life course data: multistate modelling and sequence analysis. Multistate models are a family of statistical approaches enabling researchers to describe life courses and to understand what is driving differences in life course trajectories, such as socio-economic differences. Sequence analysis is a rich toolbox focusing on identifying common types of life course trajectories as well as comparing life course differentiation across subgroups. It also comes with a rich set of visualization tools. In this course we provide a mostly non-technical introduction to (discrete-time) multistate models and sequence analysis, their theoretical foundations and assumptions, and their empirical estimation with R. Students will be guided through all steps required to generate some of the key outputs of discrete-time multistate models, such as state expectancies and clusters of sequences. This equips them with the skills and tools needed to use and implement multistate models and sequence analysis in their own research.

**Life Course Analysis II** Nov 26, 10am to 4pm CET

Christian Dudel  [dudel@demogr.mpg.de](mailto:dudel@demogr.mpg.de)

Carla Rowold  [rowold@demogr.mpg.de](mailto:rowold@demogr.mpg.de)

Materials will be available in Nextcloud by Nov 22

**Data visualization** Nov 27, 10am to 4pm CET

Jonas Schöley [schoeley@demogr.mpg.de](mailto:schoeley@demogr.mpg.de)

Materials will be available in Nextcloud by Nov 25

The aim of the course is to empower participants to think critically about the design of data visualizations. Participants learn that effective visualizations are not merely produced, but designed. Using examples, we will discuss design goals and associated trade-offs. Participants will be introduced into the basics of visual perception theory and how it applies to the design of effective visualizations. We will conclude with a pen & paper design challenge and subsequent discussion.

**Introduction to Causality** Nov 28, 10am to 4pm CET

Angelo Lorenti  [lorenti@demogr.mpg.de](mailto:lorenti@demogr.mpg.de)

Materials will be available in Nextcloud by Nov 26

Research questions often require causal explanations, but it's common practice to use the term 'association' instead of explicitly referencing 'causal effects' when defining the effects of interest. In this introduction to causality, we will present the potential outcome framework to enhance our understanding of how research designs can support causal reasoning. We will also elucidate the essential assumptions required for identifying causal effects. We will introduce causal methods, such as inverse probability treatment weighting, and explore some practical applications.

**PHDS PopHealth Conference** Nov 29, 10am to 4pm CET

Jonas Schöley  [schoeley@demogr.mpg.de](mailto:schoeley@demogr.mpg.de)

Materials will be available in Nextcloud by Nov 27

MPIDR and guest researchers are going to show you their work in progress and you are going to discuss it. Here's the schedule:

*Room 005, in person*

10:00-10:45 Steffen Peters

10:45-11:30 Rosanna Gualdi

11:30-12:15 Megan Evans

*Lunch break until 13:30*

13:30-14:15 TBA

14:15-15:00 TBA

The afternoon is free.

You will be split into five groups, each group assigned to one speaker. You are expected to read the draft of your assigned speaker and prepare questions for a discussion. The drafts can be found on Nextcloud in the folder for the corresponding course day. Each group names one discussant – this is the person who asks the questions, leads the discussion and ensures the speaker and the discussion end on time. Each speaker has a slot of 45 minutes maximum of which you should allow for at least 10 minutes discussion time.