

PHDS – Population Health Course Outline

Coordinators	Jonas Schöley  schoeley@demogr.mpg.de Silvia Loi  loi@demogr.mpg.de
Date	November 13-24, 2023
Time	10am to 4pm CET with lunch break from 12 to 2pm
Location	In person @ MPIDR room 005 with Zoom option and Nextcloud repository Zoom Meeting-ID: 997 1515 3278 Passcode: 641642

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, socio-economic differentials, intersectionality, family dynamics, migration, aging, causal inference, and multistate methodology coming together to give a 360-degree view of the current research 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 the latest 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>.

If you don't have sufficient knowledge about R, you can use the following websites to familiarize yourself with the program: swirlstats.com, coursera.org/course/rprog, stats.idre.ucla.edu/r.

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 13, 10am to 4pm CET

Marcus Ebeling  ebeling@demogr.mpg.de

Materials will be available in Nextcloud latest by Nov 9

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.

Intersectionality, Cumulative Disadvantage & Health Nov 14, 10am to 4pm CET

Jo Mhairi Hale  Jo.Hale@st-andrews.ac.uk

Materials will be available in Nextcloud latest by Nov 9

In this session, we will employ theories of intersectionality and cumulative (dis)advantage to explain health disparities over the life course. We will look at some examples in papers by Jo with various other Max-Planckers and learn about various methods to investigate how racial/ethnic, nativity, socio-economic, and gender identities intersect to affect health/wealth outcomes.

Fertility and Health Nov 15, 10am to 4pm CET

D. Susie Lee  lee@demogr.mpg.de

Materials will be available in Nextcloud latest by Nov 13

This course aims to show why fertility status can be a window into overall health, and vice versa. Although health is often viewed only with regards to reproductive health when it comes to fertility, bulk of research reveals an intricate relationship between health and broader family formation processes. Moreover, such relationship unfolds across the life course – early life health has a formative impact on fecundity and later life fertility, whereas reproductive history predicts later health and mortality. We will 1) present key lines of research around the fertility-health nexus, and 2) discuss theories, methods, and highly interdisciplinary approaches that are useful for examining the nexus. To demonstrate exciting agenda for studying the fertility-health nexus from bio-social perspectives, we 3) introduce the recently launched ERC-funded project BIOSFER, which aims to investigate how social, biological and psychological forces produce the emerging fertility patterns in young adults, and to what extent the fertility decline and polarization can be attributed to social vs. biomedical factors.

Genetics, Family Dynamics, and Health Inequalities Nov 16, 10am to 4pm CET

Maria Gueltzow  gueltzow@demogr.mpg.de

Philipp Dierker  dierker@demogr.mpg.de

Materials will be available in Nextcloud latest by Nov 14

Studying genetics and family dynamics adds an important perspective to health (inequalities) research. Especially due to the increasing complexity of life courses and deviation from traditional partnership and fertility behavior, the relationship between family and health is of great interest. Furthermore, genetic factors play an important role in explaining many health outcomes. By incorporating genetics into health inequalities research, we can gain more insight into how certain health outcomes arise.

The course will be separated into two parts:

1. **Genetics:** The first part of this course provides a broad introduction into genetics and health (inequalities). We will cover some basic information on genetics and then move onto how genetics can be useful in health research. We will furthermore reflect on the potential and the setbacks of using genetic data to study health inequalities.
2. **Family dynamics:** The second part of this course provides an overview of the interplay of family dynamics and health, with a particular focus on partnership transitions, which can be both predictors and outcomes of health. In doing so, we consider both the mechanisms of individual transitions and the phenomenon of accumulated transitions over the life course. Additionally, we will briefly discuss different (especially longitudinal) quantitative methods that may be helpful in answering related research questions.

Migration and Health Nov 17, 10am to 4pm CET

Silvia Loi  loi@demogr.mpg.de

Materials will be available in Nextcloud latest by Nov 15

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

Multistate Models I Nov 20, 10am to 4pm CET

Christian Dudel  dudel@demogr.mpg.de

Materials will be available in Nextcloud latest by Nov 16

Many social processes can be represented by individuals being in, and transitioning between, states. Statistical modelling of such processes can be done using multistate models. Multistate models are becoming an increasingly popular tool for social scientists, as they provide many quantities to describe longitudinal data in general and life course trajectories in particular. For instance, multistate models are commonly used to estimate healthy life expectancy, i.e., the average lifetime spent in good health.

In this course we provide a mostly non-technical introduction to discrete-time multistate models, 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. This equips them with the skills and tools needed to use and implement multistate models in their own research.

Multistate Models II Nov 21, 10am to 4pm CET

Christian Dudel  dudel@demogr.mpg.de

Materials will be available in Nextcloud latest by Nov 16

Predictive Modeling Nov 22, 10am to 4pm CET

Jonas Schöley  schoeley@demogr.mpg.de

Materials will be available in Nextcloud latest by Nov 20

In population health prediction takes many forms: we may be interested in the future development of fertility, the future care home demand, the infant mortality in regions of the world without reliable data collection. We may ask “what-if” questions that require prediction for a scenario that never happened: How many deaths without COVID-19? How many deaths without the summer heat wave? These questions are concerned with the prediction of an outcome. The focus is on the left-hand side of the regression equation, not on the interpretation of coefficients. In this seminar I will demonstrate the predictive modeling workflow: formulation of a prediction model, out-of-sample model validation, and simulation-based uncertainty quantification and propagation. We will discuss a range of applications for predictive modeling within the context of population health.

Introduction to Causality Nov 23, 10am to 4pm CET

Angelo Lorenti  lorenti@demogr.mpg.de

Materials will be available in Nextcloud latest by Nov 21

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 24, 10am to 4pm CET

Jonas Schöley  schoeley@demogr.mpg.de

Materials will be available in Nextcloud latest by Nov 22

MPIDR 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 Marcus Ebeling

10:45-11:30 Marília Nepomuceno

11:30-12:15 Henrik-Alexander Schubert

Lunch break until 13:30

13:30-14:15 Diego Alburez-Gutierrez

14:15-15:00 Christian Dudel

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 makes sure the speaker and the discussion ends on time. Each speaker has a slot of 45 minutes maximum of which you should allow for at least 10 minutes discussion time.