

Fundamental concepts in medical statistics

Intermediate level course in Medical Statistics arranged by the Centre for Intervention Science in Maternal and Child Health (CISMAC; <https://www.uib.no/en/cismac>) and Makerere School of Public Health (<https://chs.mak.ac.ug/programs/school-public-health>) in collaboration with the Centre for Fertility and Health (<https://www.fhi.no/en/more/research-centres/Centre-for-fertility-and-health>) at the Norwegian Institute of Public Health, and the HKDir-funded NORPART project “Improving Health Professional Education and capacity in Experimental epidemiology – (HePEd)”.

Venue: The course will be hosted by the School of Public Health, Makerere University (Coordinator: Dr. Victoria Nankabirwa) and held at Mulago Guest house (<https://mulagoquesthouse.com>).

Dates: 07.06.2023 at 9AM – 13.06.2023 at 4 PM

Faculty

Håkon K. Gjessing, PhD (<https://scholar.google.com/citations?user=H9TbeTIAAAAJ&hl=en>) is a Principal Investigator at the Centre for Fertility and Health, a Norwegian Research Council Center of Excellence located at the Norwegian Institute of Public Health, and an adjunct Professor of Biostatistics at the Department of Global Public Health and Primary Care, University of Bergen. He has also held positions at the University of Oslo and the University of Chicago.

Gjessing has a PhD in Probability Theory from the University of Bergen, and his research interests have centered on statistical methodology, with a particular focus on biostatistics, medical statistics, and genetic statistics. He has authored and co-authored about 150 scientific research papers in a wide range of journals, including NEJM, Jama, BMJ, Lancet, and Nature Communications, as well as written a graduate statistics textbook on survival analysis, published in 2008 by Springer. He has been Editor-in-Chief for a high-ranking Wiley international statistics journal. Gjessing has also been responsible for developing the official Norwegian system for ultrasound pregnancy dating, as well as other pregnancy care systems with national coverage.

Gjessing has decades of teaching experience in Medical Statistics at all levels, and loves communicating the principles and practicalities of statistical research methods to non-statisticians and statisticians alike, in an intuitive and accessible way.

Co-facilitators: [Ronald Senyonga](#), [Hans Steinsland](#), [Ramachandran Thiruvengadam](#)

Course Content

The course is intended for graduate students as well as researchers who have some previous knowledge of - and experience with - statistical methods applied to clinical and epidemiological

research. While we will briefly recap some basic topics such as significance testing, confidence intervals, linear regression and correlation, etc., the course will have a broader scope and provide an introduction to a number of important and useful techniques for analyzing clinical and epidemiological research data.

The course will closely integrate lectures, where concepts will be introduced and explained in an intuitive fashion, with hands-on practical exercises on relevant data using the Stata® software.

We will cover four types of multiple regression analyses: linear regression, binomial regression, Poisson regression, and Cox regression. For the binomial regression, we will show how to obtain estimates of odds ratio, relative risk, and risk difference by choosing different “link” functions, and discuss advantages and disadvantages with the different effect measures. For the Poisson regression, we will show how it can be used as a very effective modeling tool for count data, and how it relates to both binomial- and Cox regressions. We will also show how to obtain measures such as standardized mortality ratios (SMRs).

For survival and other time-to-event data we will introduce basic concepts, show the Kaplan-Meier estimator and how to use Cox regression. We will also touch on more advanced topics such as the Additive Hazards model for more detailed analyses than what Cox regression provides.

The course will cover some basic methodology for analyzing randomized controlled trials (RCTs), including sample size calculations to obtain sufficient statistical precision and power, and handling of baseline covariate imbalances. Also, modeling and interpretation of interactions between exposure and other covariates will be discussed in detail, the effect measure modification being assessed on a multiplicative as well as on an additive scale.

In addition, we will briefly cover topics such as problems with multiple testing and p-hacking, the use of weight variables in Stata (frequency weights, sampling weights), and how to, using robust standard errors in Stata, handle simple correlated data situations from e.g. cluster-randomization or family data and from repeated measurements in the same individuals.

At the end of the week participants should be able to:

- Recognize situations where linear, binomial, and Poisson regression models are appropriate.
- Know how to interpret results and effect measures from each of these models.
- Be familiar with survival and other time-to-event data, be aware of challenges related to censoring data, and how to analyze such data using standard survival analysis techniques.
- Be familiar with basic principles behind RCTs and how to analyze such data, as well as avoiding common pitfalls.
- Have a basic understanding of sample size calculations to achieve sufficient statistical precision and power in a study.
- Learn how to apply some useful Stata techniques such as weighting and robust standard errors.

Who can attend and how?

PhD students, postdoctoral fellows and faculty members with a background in medicine, epidemiology, biology, dentistry, statistics, mathematics, social and health sciences. If recommended by their institutions, also Masters students that hold adequate competence in epidemiology and/or statistics will be considered as course participants.

Course textbook

“Medical Statistics: A Textbook for the Health Sciences”, 5th Edition, by Walter, Campbell, and Machin (2021). <https://amzn.eu/d/hqmMitt>

Registration

Do you wish to participate please send an email request to Mr. Ivan Mutyaba here: imutyaba@musph.ac.ug. Tel: +256754524705. You can also address Dr. Victoria Nankabirwa, Email: vnankabirwa@musph.ac.ug for other questions you may have.

There will be a maximum of 30 participants, of which minimum 15 will be from Uganda. If the course is overbooked, priority will be given to applicants who are affiliated with Makerere University, the University of Bergen (esp. CISMACH, BCEPS (<https://www.uib.no/bceps>) or other units at the Department of Global Public Health and Primary Care (<https://www.uib.no/en/globpub>), the Norwegian Institute of Public health] (<https://www.fhi.no>), Innlandet Hospital Trust (<https://sykehuset-innlandet.no/om-oss/jobb-i-sykehuset-innlandet/innlandet-hospital-trust>), and/or the Norwegian Research School of Global Health (<https://www.ntnu.edu/nrsg>).

Prerequisites and pre-course studies

- A basic familiarity with the topics covered in “Medical Statistics: A Textbook for the Health Sciences”, 5th Edition, by Walter, Campbell, and Machin (2021). <https://amzn.eu/d/hqmMitt>
- Practical experience with analyzing medical research data and using statistical software, in particular Stata®.
- Laptop PC or Mac with Stata® installed.
- A good command of English.

Teaching language: English

Course fee: None

