UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Big Data in Public Health

2526-2-FDS01Q043-FDS01Q04301

Aims

This course aims to provide the basic concepts of epidemiology that are at the basis of a proper methodological approach to a research project in public health. The student will be able to deal with data in public health particularly focusing on several aspects including study design, data managment and analysis. The student will be able to implement design strategies on registries and administrative health data. The student will be able to calculate quality/performance indicators.

Learning Objectives according to Dublin Descriptors (DdD)

1. Knowledge and understanding
   Understand the basic concepts of epidemiology and of study design.
   Know the advantages and possible pitfalls of the use of administrative health data for outcome research.
   Understand the issues of censored data and know possible methods of analysis.

2. Applied knowledge and understanding
   Use R statistical software to deal with data in public health
   Calculate incidence and association measures also in the presence of censored data.
   Implement design strategies on registries and administrative health data.
   Calculate quality/performance indicators.
   Interpret model outputs.

3. Autonomy of judgment
   Develop the ability to choose appropriate statistical methods.
   Critically assess the limitations and assumptions of models, and recognize potential sources of bias.
   Critically assess the statistical methods used in medical literature.

4. Communication skills

   Present and discuss the analyses done on Electronic Health Data

5. Ability to learn
   Explore current literature and critically assess emerging methodologies or real-world applications

Contents

Population epidemiology. Study designs. Survival analysis. Statistical methods with application to registries and administrative health data.

Detailed program

Basics in population epidemiology. Study designs: advanced designs to combine data from different sources (registry data, biomarkers, biobanks, surveys). Survival analysis: survival estimate and Cox model regression. Record linkage approaches and statistical methods with application to registries and administrative health data. Examples of Quality/performance indicators, outcome research with administrative data, system of indicators to evaluate the appropriateness of clinical pathways in chronic diseases.

Prerequisites

Descriptive and inferential statistics. Use of the software R (https://cran.r-project.org/).

Teaching form

Lectures with the use of active methodologies (such as microsimulations) will be interspersed with computer labs in supervised small groups activities. Critical reading of methodological public health papers.

- 2 2-hour lectures conducted in in-person delivery mode;
- 3 2-hour lectures conducted in a remote (asynchronous) delivery mode;
- 5 lectures of 3 hours conducted in delivery mode in the initial part that is aimed at engaging students interactively in the later part.

Textbook and teaching resource

Kenneth J. Rothman Sander Greenland, Timothy L. Lash . Modern Epidemiology. Lippincott Williams & Wilkins; 3 ed.

Eric Vittinghoff, David V. Glidden, Stephen C. Shiboski, Charles E. McCulloch. Regression Methods in Biostatistics Linear, Logistic, Survival, and Repeated Measures Models. Statistics for Biology and Health book series. Springer; 2 edition (March 6, 2012)

Marie Reilly "Beyond classic epidemiological designs" https://www.routledge.com/Controlled-Epidemiological-Studies/Reilly/p/book/9780367186784 Chapman & Hall/CRC Biostatistics Series 2023

Semester

second semester

Assessment method

Final questionnaire with closed answer to evaluate the preparation on the overall program (80% of the overall grade of the module).

Final project exercise on data to test the ability of the student in the application of research methodology in public health to be done independently at home. The appropriatness of analyses and their presentation will be evaluated (20% of the overall grade of the module).

For non-attending students only: practical exam on the application of the R functions seen in class to solve an exercise (passed/ not passed).

No in-process evidence.

Office hours

Tuesday 10-12 with appointment.

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION | GENDER EQUALITY