MODULE SPECIFICATION

Academic Year (student cohort covered by specification)	2021-22
Module Code	2402
Module Title	Statistical Methods in Epidemiology
Module Organiser(s)	Professor Katherine Fielding, Dr Sophie Sarrassat and Dr Eric Ohuma
Faculty	Epidemiology and Population Health
FHEQ Level	Level 7
Credit Value	**CATS:** 15 **ECTS:** 7.5
HECoS Code	101031 : 101335 : 100962
Term of Delivery	Term 2
Mode of Delivery	For 2021-22, this module is currently planned as a mixture of online and face to face teaching. Teaching will comprise a combination of live and interactive activities (synchronous learning) as well as recorded or self-directed study (asynchronous learning).
Mode of Study	Full-time
Language of Study	English
Pre-Requisites	Students need to have a good grasp of the material covered in the Term 1 modules - Statistics for EPH (module code 2021) and Extended Epidemiology (module code 2007) - in order to benefit from this module. In particular, students should be familiar with the three major epidemiological study designs, with the concepts of confounding and effect modification/interaction, with the interpretation of confidence intervals and statistical tests, and with the basic data handling commands in Stata. Students who have not attended Term 1 modules in Extended Epidemiology and Statistics for EPH are strongly recommended to review the equivalent distance learning modules EPM101 (Fundamentals of Epidemiology) and EPM102 (Statistics for Epidemiology) prior to the start of this module. See https://webcal.am.lshtm.ac.uk/moodlesite/start.html
Accreditation by Professional Statutory and Regulatory Body	Not currently accredited by any other body
Module Cap (indicative number of students)	280 students
Target Audience	This module is primarily intended for students who have attended the Term 1 modules (1) Statistics for EPH (module code 2021) and (2) Extended Epidemiology (module code 2007),

	and who wish to acquire further skills in the analysis and interpretation of epidemiological studies.
Module Description	This module equips students with the skills needed to analyse and interpret data from cohort, case-control and cross-sectional studies. The module is assessed through an analysis and reporting exercise of data.
Duration	5 weeks at 2.5 days per week
Timetabling slot	Slot C2
Last Revised (e.g. year changes approved)	August 2021

Programme(s) This module is linked to the following programme(s)	**Status**
MSc Epidemiology	Compulsory
MSc Medical Statistics	Compulsory
MSc Veterinary Epidemiology	Compulsory
MSc Control of Infectious Diseases	Recommended
MSc Public Health	Recommended
MSc Public Health (Environment & Health)	Recommended
MSc Public Health (Health Economics)	Recommended
MSc Public Health (Health Promotion)	Recommended
MSc Public Health (Health Services and Management)	Recommended
MSc Public Health (Health Services Research)	Recommended
MSc Public Health for Development	Recommended

Module Aim and Intended Learning Outcomes

Overall aim of the module
The overall module aim is to: • Equip students with the skills needed to analyse and interpret data from cohort, case-control and cross-sectional studies, using cross-tabulation, stratification and regression methods.

Module Intended Learning Outcomes
Upon successful completion of the module a student will be able to: 1. Explain the key statistical and epidemiological concepts which underlie the analysis of epidemiological data 2. Perform analyses of data arising from epidemiological studies, using appropriate computer software (the software used throughout will be Stata, though R-scripts will be made available for some practical sessions) 3. Investigate and assess confounding and effect modification (interaction) in epidemiological data 4. Interpret appropriately the results of these analyses, taking into account study design issues 5. Write a clear report presenting and interpreting the results of an analysis of epidemiological data

Indicative Syllabus

Session Content
The module covers the following topics: • Cohort studies: analysis of rates using stratification to investigate confounding and interaction; simple survival analysis (Kaplan-Meier, log rank test); introduction to Poisson and Cox regression • Case-control studies: design issues including selection of controls and matching; analysis of studies using stratification to investigate confounding and interaction. • Likelihood theory • Logistic regression for the analysis of case-control, cross-sectional and fixed-length cohort studies • Reporting of results

Teaching and Learning

Notional Learning Hours

Type of Learning Time	Number of Hours	Expressed as Percentage (%)
Contact time	38.5	26
Directed self-study	1.5	1
Self-directed learning	70	47
Assessment, review and revision	40	27
Total	**150**	**100**

Student contact time refers to the tutor-mediated time allocated to teaching, provision of guidance and feedback to students. This time includes activities that take place in face-to-face contexts such as lectures, computer and non-computer practical classes as well as where tutors are available for one-to-one discussions. Student contact time also includes tutor-mediated activities that take place in online environments, which may be synchronous (using real-time digital tools such as Zoom or Blackboard Collaborate Ultra) or asynchronous (using digital tools such as tutor-moderated discussion forum often delivered through the School's virtual learning environment, Moodle).

The division of notional learning hours listed above is indicative and is designed to inform students as to the relative split between interactive (online or on-campus) and self-directed study.

Teaching and Learning Strategy
The teaching and learning strategy is based on a combination of lectures followed by computer or non-computer practical sessions. In the practical sessions students have the opportunity to apply the concepts and methods covered in the lectures. The practicals provide students with "hands on" experience in analysing and interpreting epidemiological data using data sets drawn from research work of staff in the Faculty of Epidemiology & Population Health. These include both high- and low-income country studies. For each practical, students are provided with detailed solutions to the tasks set, enabling them to check their understanding of the material. Three optional review lectures (in weeks 2 to 4) cover the material from the previous weeks' lectures and questions raised by students. Towards the end of the taught component of the module students are asked to undertake an analysis of a dataset and prepare an outline of a report (bullet points, dummy tables, key discussion points). These are then discussed in a plenary lecture. The assessment task, which comes at the end of the module and involves analysing a dataset to address an epidemiological research question and writing a brief report of their findings, provides students with an important opportunity to consolidate their learning across the whole module.

Assessment

Assessment Strategy
For their summative assessment, students are asked to undertake a data analysis exercise, similar to that which they undertake towards the end of the taught component of the module. Students are provided with an epidemiological dataset and a specific research question. They are asked to analyse the dataset to address the research question and to prepare a brief report describing their analysis strategy and the results they obtained, and to discuss their results in the light of the methods used to obtain and analyse the data. The assessment task requires students to demonstrate: the ability to select and apply appropriate statistical methods to a specific problem, including the investigation of confounding and effect modification; the ability to present their analysis strategy and results in an appropriate way; the ability to interpret their findings appropriately in light of the study design and research question. The assessment task thus gives students an opportunity to consolidate their learning and requires students to apply their learning across the whole of the module.

Summative Assessment

Assessment Type	Assessment Length (i.e. Word Count, Length of presentation in minutes)	Weighting (%)	Intended Module Learning Outcomes Tested
Coursework	1400 words of text plus a maximum of 3 tables or figures	100%	1 to 5.

Resitting assessment
Resits will accord with the LSHTM's Resits Policy

Resources

Indicative reading list

1. ASA statement on P-values published in 2016

Ronald L. Wasserstein & Nicole A. Lazar (2016) The ASA's Statement on p-Values: Context, Process, and Purpose, The American Statistician, 70:2, 129-133, DOI: 10.1080/00031305.2016.1154108

To link to this article: http://dx.doi.org/10.1080/00031305.2016.1154108

Supplemental material; by various authors can be found at: http://www.tandfonline.com/doi/full/10.1080/00031305.2016.1154108

2. Comment in Nature on “statistical significance”

Amrhein V, Greenland S, McShane B (2019) Retire statistical significance. Nature 567:305-307. URL: https://www.nature.com/magazine-assets/d41586-019-00857-9/d41586-019-00857-9.pdf

3. Article giving advice on number of decimal places to use

Cole TJ (2015) Too many digits: the presentation of numerical data. Archives of Diseases of Childhood. URL: http://adc.bmj.com/content/early/2015/04/15/archdischild-2014-307149.short

4. Article on presenting model results in tables

Westreich D & Greenland S (2013) The Table 2 Fallacy: Presenting and Interpreting Confounder and Modifier Coefficients. American Journal of Epidemiology, 177: 292-298. URL: https://academic.oup.com/aje/article-lookup/doi/10.1093/aje/kws412

5. References on case-control studies

Rodrigues L, Kirkwood BR (1990) Case-control designs in the study of common diseases: updates on the demise of the rare disease assumption and the choice of sampling scheme for controls. International Journal of Epidemiology, 19:205-213. doi: 10.1093/ije/19.1.205

Pearce NE (1993) What does the odds ratio estimate in a case-control study? International Journal of Epidemiology, 22:1189-1192. DOI: 10.1093/ije/22.6.1189

Vandenbroucke JP, Pearce N (2012) Incidence rates in dynamic populations. International Journal of Epidemiology, 41: 1472-1479. doi: 10.1093/ije/dys142

Vandenbroucke JP, Pearce N (2012) Case-control studies: basic concepts. International Journal of Epidemiology, 41: 1480-1489. doi: 10.1093/ije/dys147

Teaching for Disabilities and Learning Differences

The module-specific site on Moodle gives students access to lecture notes and copies of the slides used during the lecture. Where appropriate, lectures are recorded and made available on Moodle. All materials posted on Moodle, including computer-based sessions, have been made accessible where possible.

LSHTM Moodle is accessible to the widest possible audience, regardless of specific needs or disabilities. More detail can be found in the Moodle Accessibility Statement which can also be found within the footer of the Moodle pages. All students have access to "SensusAccess" software which allows conversion of files into alternative formats.

Student Support Services can arrange learning or assessment adjustments for students where needed. Details and how to request support can be found on the LSHTM Disability Support pages.