Short Course:
Introduction to Biostatistics for Clinical and Public Health Study

Synopsis

This short course introduces clinical and public health researchers to biostatistics as applied to public health and management studies. Biostatistics is the science of describing, summarising and analysing health-related data. It is essential to understand biostatistics in order to design, conduct and interpret health-related research. The basic principles and methods used in biostatistics are covered in this short course. This includes the technical qualifications necessary for analysing and interpreting data on a descriptive and bivariate level. Topics include: classification of health data; summarizing data using simple statistical methods and graphical presentation; sampling distributions, quantifying uncertainty in results from a sample; statistical distributions; comparing two/more groups/methods using cconfidence intervals and hypothesis tests (p-values); assessing the association between an outcome and an exposure using the chi-squared test; risk comparisons (RR & OR); prediction of an event or identifying risk factors for an event of interest where the event is measured on a continuous scale or a binary scale (yes/no); sample size calculations.

Attendees will be very briefly introduced to the computerised statistical package, SPSS. However, if you are not proficient in using SPSS, I would recommend you to register for the SPSS short course (http://www.med.monash.edu.au/sphpm/shortcourses/spss.html) In the SPSS short course theory will be complemented by the use of applied examples and exercises to enhance understanding and facilitate development of practical skills.

Learning Objectives/Outcomes

- Discuss classification of data, various epidemiological studies, and method of data collection for evaluating research question in the concerned Epidemiological Studies.
- Summarize data (using graphical display and descriptive statistics) that has been collected from the concerned populations.
- Discuss the probability distributions for variables collected in public health studies (Application Level) and evaluate the sampling variability (uncertainty) in data analysis results
- Discuss the statistical significance of a hypothesis about the study population based on sample data (normality assumption holds) and evaluate the difference between two groups.
- Formulate boundary values for parameters in the study population and evaluate the precision in its estimates based on sample data (normality assumption holds).
- Evaluate the difference between more than two groups based on sample data where data in each group follows the normal distribution.
- Evaluate the difference between two or more groups when normality assumption does not hold or data is ordinal or discrete.
- Explain the relationship between an outcome (continuous scale) and exposures and identify the truly independent exposures for the outcome of interest.
- Evaluate the risk that an event (binary) will occur given a particular exposure, compared to the risk of the event occurring in the absence of that exposure.
- Explain the relationship between a binary event and exposures and identify the truly independent exposures for the event of interest.
- Evaluate the association between event (categorical) and exposure where either or both can have multiple categories.
- Power analysis and sample size calculation.

Schedule

Day	Lecture/Activities	
1	**Modules 1-3: Key Concepts in Public Health and Clinical Studies** • Classify data and explain study design and sampling methods • Use a statistical software package to present data using relevant graphs and summary statistics • Measure sampling error or uncertainty in data analysis results • Be familiarize with the normal and t-distributions and their use in public health research	Case Study 1
2	**Modules 4-8: Statistical Methods for Analysing Continuous Data** • Formulate research hypotheses in the context of comparing two or more groups and evaluate the hypothesis using relevant statistical methods • Describe the relationship between an outcome and multiple exposures, and predict the outcome from the knowledge of these exposures • Use a specific statistical software package for hypothesis testing as well as for evaluating relationship b/w an outcome and one or multiple exposure(s)	Case Studies 2 & 3
3	**Modules 9-11: Statistical Methods for Analysing Categorical Data** • Formulate research hypotheses in the context of relationship b/w a binary event and exposure/s • Assess the statistical significance of relationship b/w an binary event and an exposure • Estimate the magnitude of the association b/w an exposure and a binary event • Describe the relationship between a binary event and multiple exposures, and then predict the event. • Use a specific statistical software package for evaluating the relationship b/w an event and one or multiple exposure(s)	Case Studies 4 & 5
3	**Module 12: Sample size calculation** • Discuss the importance of power analysis in a public health study. • Calculate an optimum sample size for the study.	