EPIDEMIOLOGY 2 - ANALYTICAL EPIDEMIOLOGY

Instructors
Joseph Ntaganira, MD, DTM, MPH, PhD
Full Professor
B.P. 7616 KIGALI
Email: jntaganira@ur.ac.rw or jntaganira@nursph.org
Tel: 078 886 4720

Contact Hours: 15

Purpose
The purpose of this course is to introduce MPH/MSc candidates to basic epidemiology principles, concepts, and methods. The course combines theoretical knowledge with practical applications, permitting students to demonstrate their competencies through both individual work and group interactions. Competencies are evaluated on students' ability to define and identify determinants of disease, threats to internal validity and external validity, describe and use epidemiologic analytical study designs.

Objectives
1. Students should be able to define the different theories of causality.
2. Students should be able to contrast the difference between cause and association
3. Students should be able to define and identify the major sources of errors, bias, and confounders in epidemiological research.
4. Students should be able to compare and contrast the key study designs used in epidemiological research.
5. Describe and use analytical studies: case-control, cohort, experimental study designs, randomized, controlled trials (clinical and community trials)
6. Students should be able to identify an epidemiological research problem and elaborate the research question appropriate to addressing that problem.

Expected learning outcomes
By the end of the course unit, the learner should be able to:
a) Define and use measures of association
b) Discuss the theories of causality of Koch, Bradford Hill and Rothman
c) Define types of bias and identify their impact
d) Describe methods of reducing bias
e) Describe the properties of a confounding factor
f) Describe methods to identify a confounder
g) Describe and use epidemiological studies (Analytical studies).

Content
- Measure of association
- Theories of causality

- Types and impact of bias
- Understanding confounders
- Analytical studies: case-control, cohort, experimental study designs, randomized, controlled trials (clinical and community trials).

Schedule

	Date	Topic	Readings
1	Week 1 – Part 1	– Course overview – Measures of Association	Hennekens: p30-p53 & p73-p100 Gordis: p227-p246
2	Week 1 – Part 2	– Measures of Association: Exercises	
3	Week 2 – Part 1	– Causality – Internal validity: Bias	Hennekens: p272-p286 Gordis: p227-p246
4	Week 2 – Part 2	– Causality & Bias: Exercises	
5	Week 3 – Part 1	– Internal validity: Confounding & Effect Modifier	Hennekens: p297-p326 Gordis: p247-p264
6	Week 3 – Part 2	– Confounding & Effect Modifier: Exercises	
		– CAT #1	
7	Week 4 – Part 1	– Epidemiologic Study Designs: Cohort Study – Epidemiologic Study Designs: Case-Control Study – Epidemiologic Study Designs: Intervention study	Hennekens: p132-p214 Gordis: p131-p264
8	Week 4 – Part 2	– Analytical Study Designs: Exercises	
9	Week 5	Group work: Readings and PowerPoint Preparation – Group # 1: Epidemiologic Study Designs: Descriptive Study – Group #2: Epidemiologic Study Designs: Cohort Study – Group #3: Epidemiologic Study Designs: Intervention study Group #4: Epidemiologic Study Designs: Case-Control Study	
10	Week 6 – Part 1	Group presentations – Group # 1: Epidemiologic Study Designs: Descriptive Study – Group #2: Epidemiologic Study Designs: Cohort Study	
11	Week 6 – Part 2	Group presentations – Group #3: Epidemiologic Study Designs: Intervention study – Group #4: Epidemiologic Study Designs: Case-Control Study	
		– CAT #2	

Learning and teaching methodology

Lectures, group discussion, Assignments, and seminars. All students will be expected to attend each class fully prepared to participate actively in discussions. Students are also requested to read chapters related to this course in the main textbook (Gordis) and practice all the exercises at the end of each chapter.

Instructional materials/equipments
Textbooks, journals, flipchart, handouts, case studies.

Assessment
Continuous assessment (CATs) - 60%; End of module 1 examination - 40%; Total - 100%

References

i. Gordis, Leon (2013). Epidemiology (5th ed.). Elsevier Saunders, Philadelphia, Pia.
ii. Charles H. Hennekens, Julie E. Buring, SherryL.Mayrent, Epidémiologie in médecine, Limppincott Williams & Wilkins, Philadelphia, USA.
iii. Webb, Penny (2005). Essential Epidemiology. Cambridge University Press, New York.
iv. Germstman, B, Burt (2003). Epidemiology kept simple: an introduction to traditional and
v. Lilienfield, Abraham, M. (1994). Foundations of epidemiology (3rd ed.). OUP New York.
vi. Moon Graham (2000). Epidemiology: an introduction. Open university Buckingham.

OTHER READINGS

- ***Causality***
  - ✓ Kaufman JS, Poole C. Looking back on "Causal thinking in the health sciences". Annu Rev Public Health 2000;21:101-119.
  - ✓ Susser M. Glossary: Causality in public health science. J Epidemiol Community Health 2001;55:376-378.

- ***Cohort studies***
  - ✓ Checkoway H, Pearce N, Dement JM. Design and conduct of occupational epidemiology studies: I. Design aspects of cohort studies. Am J Ind Med 1989;15:363-373.
  - ✓ Checkoway H, Pearce N, Dement JM. Design and conduct of occupational epidemiology studies: II. Analysis of cohort data. Am J Ind Med 1989;15:375-394.

- ***Case-control studies***
  - ✓ Maclure M, Mittleman MA. Should we use a case-crossover design? Annu Rev Public Health 2000;193-221.
  - ✓ Pearce, Checkoway H, Dement J. Design and conduct of occupational epidemiology studies: III. Design aspects of case-control studies. Am J Ind Med 1989;15:395-402.
  - ✓ Pearce, Checkoway H, Dement J. Design and conduct of occupational epidemiology studies: IV. The analysis of case-control data. Am J Ind Med 1989;15:403-416.

- ***Confounding***
  - ✓ Greenland S, Morgenstern H. Confounding in health research. Ann Rev Public Health 2001;22:189-212.

- ***Available courses and other materials on the Internet***
  e.g: YouTube - Leon Gordis Lectures on Epidemiology